

Kiln Pointers from Paragon

January 2002 – July 2009

Arnold Howard

Paragon Industries, L.P. – Better Designed Kilns
2011 South Town East Blvd.
Mesquite, Texas 75149-1122
Voice: 972-288-7557 & 800-876-4328 / Fax: 972-222-0646
ahoward@paragonweb.com / www.paragonweb.com

Copyright 2009, by Paragon Industries, L.P.

Low Voltage During the Summer

CONTENTS

Low Voltage During the Summer

Recent Q&As:

Memorable Quote

News: Over-Temp for Digital Kilns

LOW VOLTAGE DURING THE SUMMER

Even a small drop in voltage can slow your kiln down. Here is an example from my own test firings:

I test-fired a kiln recently. It took 5 hours and 3 minutes to reach 2331 degrees F (1277 C). In an earlier firing on a different circuit, the same test kiln took only 2 hours and 30 minutes to reach 2350 degrees F (1287 C).

The difference in voltage between the two 120-volt circuits? Only seven volts. If your kiln is slowing down, do not assume that it is due to worn elements. The voltage to your building may be low due to summer time demand. If so, try firing your kiln when electrical demand is lower and the voltage is higher. Fire at night or early morning.

RECENT Q&As

Q. On the Sentry Xpress processor, why would you use a second segment, and what's the purpose of the speeds?

A. The speeds are for simple firings that need only a single segment. For instance, you are firing to 1650, holding for a certain period, and then turning off the kiln. You would not need an extra segment for that type of firing.

Each single speed, from 1 through 5, fires at a particular rate per hour. SPd1 fires at a rate of 200 degrees F per hour. If you wanted to fire to a single temperature at fast rate, you would use SPd5.

The extra segments in PRO1 - PRO4 are for more complicated firings. You may never need more than one segment, though. In fact there is a tendency to use too many segments, especially with small projects.

If you were firing a thick glass project into a mold, you would need an extra segment for cooling through the annealing range. Otherwise the glass would crack, because it would cool too fast.

Any time you want to change the firing speed or add an extra hold somewhere in the firing, you will need an extra segment. For instance, crystalline ceramic glazes need several segments.

MEMORABLE QUOTE

“Read an hour every day in your chosen field. This works out to about one book per week, 50 books per year, and will guarantee your success.” -- Brian Tracy

NEWS: OVER-TEMP FOR DIGITAL KILNS

We are offering an over-temp for digital kilns. It is the Orton Auto-Cone, a cone-activated shut-off. The retail price is \$120.00 when installed on a new kiln. The Auto-Cone is independent of the controller and the thermocouple.

Have you ever had sharks swim inches from your face? That happened to me last Saturday while visiting the Dallas World Aquarium with family. As we stood under a curved glass archway, the sharks swam past us on the other side of the glass. The glass archway is a marvel of design that any glass artist would appreciate.

Sharks are exquisite. I could watch them for hours.

I wish you a relaxing July 4th weekend.

Clay Biscuits for Runny Ceramic Glazes

CONTENTS

Clay Biscuits For Runny Ceramic Glazes

Recent Q&As: Four factors in choosing a kiln; viewing witness cones; witness cones and a digital controller; the small gouges in firebricks

Memorable Quote

News: Basic Kiln Seminar October 2 – 3, 2009

CLAY BISCUITS FOR RUNNY CERAMIC GLAZES

By Lili Krakowski

What can you do about running glazes? TEST, TEST, TEST. Never put a new glaze on a pot before testing it first on test tiles of several clay bodies in several locations in your kiln. Never apply glaze from a new batch before testing it first. (Mixing errors are made!)

Make pancakes or biscuits of grogged, quite refractory clay, and set tests on them. Not an itty-bitty biscuit, but one large enough to act as saucers. Designate a worn or uncleanable shelf TO TESTS ONLY.

And for those who love double application, test that too. Oh, the messes created by one glaze over another, fluxing each other!

Making Biscuits

(Please see Lili's accompanying drawing.)

- 1) Add grog, fireclay, or alumina to the high temperature clay.
- 2) Wedge the ingredient from #1 above into the clay.
- 3) Spread the clay into a "biscuit" about 1/4" thick.
- 4) The biscuit edges can be irregular, or you can make a pinched rim. The middle of the biscuit should be flat. Make the biscuit big enough to catch glaze sputters.

Note: Biscuits work both ways: They protect a kiln shelf from glaze, and they protect pots from glaze that has embedded into a shelf.

(Thanks, Lili, for the pointer on biscuits and for the drawing that you graciously included. --Arnold)

RECENT Q&As

Q. I am considering buying my first kiln. The choices and information on kilns seem overwhelming.

A. Choosing a kiln becomes simpler when you narrow the search with these four factors:

1) The size of the electric circuit in your studio. Will you use the circuit already wired, or will you have a new one installed? Your kiln choice will be limited by the number of amps available.

2) The size of the kiln. Estimate how much firing chamber space you need. How big are the pieces you will fire? How often do you want to fire?

3) Front loading or top loading.

4) Firing temperature.

Narrow the kiln selection search with those four factors, and make a list of kiln models that you are considering. Then compare those kilns in greater detail. Try out the competing controllers using online interactive demos. That is like driving a car before you buy it.

Q. I lose shelf space when I keep a clear line of sight from the peephole to the cones and the element behind them. (This question refers to positioning the witness cones inside the kiln.)

A. You need to see only one set of witness cones. You don't have to see them on every shelf.

Q. I'd like to add a hold on my digital controller to heal glaze pinholes in my next cone 5 firing. Should I fire to cone 4, add hold time, and stop the firing when I see the cone 5 witness cone drop?

A. Yes. Fire to cone 4 with hold, and turn off the kiln when the cone 5 witness cone drops. Write down how long the kiln was on hold. Then the next time you fire, program that much hold time.

Q. The firebricks in my kiln have what look like gouges, or small holes, on the surface. The depth of the holes is 4 – 8 mm (1/3 inch). Is there anything wrong with the kiln?

A. Do not worry about the holes. A surface gouge with a 4-8 mm depth is normal for a firebrick. The bricks are porous. Those gouges were formed when the bricks were manufactured.

Firebricks can withstand tremendous stresses during firing. They expand and contract; they cycle from red hot back down to room temperature repeatedly. Few other materials are put to such a severe test. Consequently, cracks and other cosmetic flaws form in the surface and are unavoidable.

Paragon's website now has 581 FAQs. You can find answers to questions by entering key words in the search line at www.paragonweb.com. Example: A search for paper clay brings up this answer:

<http://www.paragonweb.com/faqinfo.cfm?faqid=618>

MEMORABLE QUOTE

"My grandmother, who has taught china painting for 60 years, coached me during my first firing. I treasure the memory of that moment of my life with her." --Darcy Giesseman

NEWS: BASIC KILN SEMINAR OCTOBER 2 – 3, 2009

Paragon will hold a 1-1/2 day Basic Repair and Maintenance Seminar at the Paragon kiln factory in Mesquite, Texas. The seminar covers basic electricity, kiln electrical installation, the multi-meter, switch replacement, electrical troubleshooting, element replacement, the Kiln Sitter, electronic kiln diagnostics, and more. Please call for more information.

Last Saturday I was on the roof of my two-story house replacing the chimney siding. The sunscreen on my face looked like war paint. As I crouched on a scaffold, my safety glasses slid off the roof and into the back yard. The next day I retrieved the glasses. One of my dogs had neatly chewed off the stems, which were scattered in the grass.

I hope you are enjoying your summer.

Record Your Kiln's History

CONTENTS

Record Your Kiln's History

Recent Q&As: Firing bronze clay; repairing a lid chain; FULL firing rate explained; worrisome error messages

Memorable Quote

News: Safety Backup For Digital Kilns

RECORD YOUR KILN'S HISTORY

Keep a record of upgrades that you make to your kiln. This will prevent errors when ordering parts later.

For example, a customer recently ordered heating elements for the lid of a Paragon glass kiln. According to the kiln's serial number, the lid had the u-shaped groove that we discontinued several years ago. However, the customer had changed the lid to the newer recessed, pinless groove without telling us, so we sent the wrong elements.

Examples of kiln upgrades:

Changing the kiln's voltage (i.e., from 240 to 208) because you moved to a different building or a different country

Replacing the lid on your glass kiln with a lid that has a different groove type than the original

Upgrading from a single relay to dual relays or a mercury relay

Write the date and type of upgrade on your instruction manual or on a sheet of paper stapled to the inside cover. Also write down the kiln maintenance performed such as changing the elements.

When buying a used kiln, verify that the voltage listed on the data plate is correct. Do this especially before ordering elements. Sometimes the voltage on the electrical data plate is wrong, because the elements were changed to a different voltage than the original elements.

If you ever need to change your kiln's voltage, have the kiln manufacturer send you a new electrical data plate showing the new voltage, and replace the original data plate. Paragon will be glad to send you the new data plate at no charge with the elements.

RECENT Q&As

Q. Does the powdered carbon from bronze clay firings damage the kiln?

A. You should place a lid on the stainless steel container that holds the powdered carbon. This will prevent the carbon from using up the oxygen in the kiln. The kiln's heating elements last longer in an oxygen atmosphere.

Q. My kiln has a lid chain, and I am doubtful that it is strong enough to hold the weight of the lid.

A. You could add another chain so you would have one on each side of the lid. The most important consideration in chain strength is the attachment points that hold it to the kiln. If they are corroded, they should be replaced.

Some people remove the chain altogether and lean the lid back in the open position against a wall behind the kiln.

Q. What is the kiln's actual firing rate when I select FULL rate on the controller?

A. On full rate, the heating elements stay on until the kiln reaches the target temperature. The elements do not cycle on and off, because the controller is firing the kiln as fast as it will go.

So the actual firing rate, on full, depends on the individual kiln's heating capacity. Suppose you were firing to 1650F at full rate. The tiny Paragon QuikFire, if it were powered by a digital controller, would reach 1650F in about 15 minutes. The Caldera would take about an hour.

Q. I worry when my kiln shows an error message, though the kiln continues to fire.

A. Many of the digital controller error messages are only to alert you that the kiln is not firing exactly as you had programmed or that there was a temporary power failure. If the error is serious, the kiln will automatically shut off. Examples of serious errors are a controller board gets too hot or the temperature keeps rising past the programmed temperature. As long as the kiln has not shut off, everything is probably okay.

Keep the instruction manual near the kiln so you can look up error messages when one appears. This will alleviate your worries.

MEMORABLE QUOTE

"No man ever became great or good except through many and great mistakes." -- William E. Gladstone

NEWS: SAFETY BACKUP FOR DIGITAL KILNS

We are offering the Auto-Cone, without the Limit Timer, as a safety backup on digital kilns. The Auto-Cone will be housed in a separate box on the side of the kiln. The retail price of the Auto-Cone backup is \$120.00 when installed on a new kiln. The Auto-Cone includes a screwdriver and allen wrenches.

One of my prized possessions is a misshapen ceramic dog that my son, Patrick, made at age seven. It was part of a ceramics class here in Mesquite. While your children are small, have them make ceramics. Unlike paper art, ceramics or glass can last through many generations as treasured family heirlooms.

How to Plug the Glass Window on a Kiln

CONTENTS

How to Plug the Glass Window on a Kiln

Recent Q&As: TCR error message; Converting degrees C to degrees F

Memorable Quote

HOW TO PLUG THE GLASS WINDOW ON A KILN

Many small kilns can be ordered with a high-temperature glass window, which allows you to see inside the kiln. This is especially helpful in fusing glass, because you can judge just when to turn off the kiln. The windows are typically 1" x 3" or 2" x 2", which is larger than a peephole.

Some of the kilns that have the window are designed to fire glass or pottery. (See the electrical data plate on your kiln for the maximum temperature rating.) But to fire pottery in such a kiln, you may have to plug the window.

Recently I ran four tests of an empty digital Caldera with window in the lid. All tests were with a single segment, full rate, to 2350 degrees F.

Test #1: In the first test, I left the glass window unplugged. The kiln stalled and flashed FtL at around 2119 F. (FtL = Firing Too Long, meaning the kiln couldn't reach 2350F.)

Test #2: In the second test, I plugged the 2" x 2" lid cavity under the window with ceramic fiber. I filled the entire 2" x 2" lid cavity so the fiber was flush with the firebrick inner lid surface. The kiln reached 2350F in 2 hours, 50 minutes.

Test #3: In the third test, I plugged the 2" x 2" opening with only a 1/2" layer of ceramic fiber. The kiln slowed down and finally flashed FtL at 2339 F.

Test #4: In the fourth test, I fired the Caldera with a solid firebrick lid without the window. The kiln reached 2350F in 2 hours, 47 minutes.

RECENT Q&As

Q What causes the thermocouple TCR error message on a digital kiln?

A There are three reasons:

- 1) The main one is reversed thermocouple wires.
- 2) A false temperature reading (such as -300 degrees) resulting from a defect in the temperature measurement circuit or memory corruption.
- 3) Operating the kiln in a cold environment where the thermocouple is cold (32F or below) and the controller board temperature is much warmer (70F or above). Orton recently enhanced the software to eliminate TCR from this condition.

Q I am casting 3" thick glass and wish to set cooling rates of less than one degree Celsius. Is this possible with the Sentry 2.0?

A Since 1 degree F is .55 degrees C, set the controller for degrees F. Then convert your degrees C program to degrees F. Use formula 1 below to convert a firing temperature. Use formula 2 to convert a change in temperature, or rate.

1) Firing temperature (i.e. "Fire to 1600F." 1600F = 871C)

$$(C \times 1.8) + 32 = F$$

$$(F - 32) \text{ divided by } 1.8 = C$$

2) Firing rate or temperature change (i.e. "Fire at 200F per hour" or "Fire 200F hotter." 200F = 111C)

$$C \times 1.8 = F$$

$$F \text{ divided by } 1.8 = C$$

MEMORABLE QUOTE

“There is more treasure in books than in all the pirate's loot on Treasure Island ... and best of all, you can enjoy these riches every day of your life.” -- Walt Disney

Let me know if we are missing an especially good title from our kiln firing reading list:

http://www.paragonweb.com/Books_and_DVDs.cfm

I picked up the reading habit from my parents. When I was 13 years old, I spent part of my summer vacation reading paperback novels. I averaged one a day. It was an escape from the sweltering heat of North Africa.

How to Install Push-on Terminals

CONTENTS

How to Install Push-on Terminals

Reader Response: King Tut exhibit

Recent Q&A: Overloading a circuit

A Kiln Story: When Lightning Struck a Kiln

Memorable Quote

News: 1852 Kiln Unearthed in Utah

HOW TO INSTALL PUSH-ON TERMINALS

The push-on terminal is a small electrical connector on the end of a wire. Push-on terminals connect wires to the switches and relays inside a kiln. Do not use the terminals and wire sold in hardware stores. Kilns require high-temperature parts.

When replacing a part such as a switch, also replace the push-on connectors that have been damaged by heat. The push-on terminal should be tight.

If the push-on terminals are on so tight that they are difficult to remove from the switch, grip the terminals with needle-nose pliers.

Push the terminals onto the blades of the new switch or relay as far as the terminals will go. The push-on terminals must be fully seated on the blades of the new part. Again, use pliers to push the terminals into place. Make sure the wires are securely fastened to their terminals. A loose wire can destroy a new relay or switch by arcing and overheating.

READER RESPONSE

Last week I mentioned seeing the King Tut exhibit in Dallas. Ann Davis of Washington, DC wrote, "We spent three days going through the Cairo Museum once, and even went to Tut's tomb. Oh, the faience! I taught pottery at the time and had to scramble for faience recipes so I could copy that blue color. I found old faience recipes. The stuff was so runny it puddled on the kiln shelves. What a mess! I think I had too much tin in it. Those Egyptians were clever. They could make it work."

RECENT Q&A

Q. I am going to fire a 120-volt kiln and a small air conditioner in a garage that has only one circuit. Any advice?

A. Your kiln should have a separate circuit of its own. If it fires on the same circuit as the air conditioner, the breaker will trip. Since you have only one circuit in the garage, you will have to run the air conditioner and the kiln one at a time.

A KILN STORY: When Lightning Struck a Kiln

By Yvonne George of Sanford, North Carolina

Well, I DID IT! Yes, I changed the thermocouple...all by myself! Now, that may not seem like a big thing to you, but it was monumental to me. Electrical things intimidate me...for a very good reason.

Three years ago I was standing by my kiln when I heard thunder in the distance. I was 5-6 inches away from the metal jacket of the kiln and not in contact with it. A neighbor was

standing on the other side of the garage when the next lightning strike came through my kiln and bounced into me.

My friend saw a big white flash, though I only vaguely remember seeing it. The thunder was loud, but I never heard it since the hit to my stomach took away all sense of other events. I was dazed, had a bad headache, and felt like a horse had kicked me in the stomach. The lightning left three small burn marks on my abdomen.

My neighbor got me into the house where both our husbands were and sat me down. I rested the rest of the day and into the next day when my headache slowly subsided.

After relaying this unusual story to my grown kids, they insisted I see a doctor, which as a nurse I felt was excessive. I called one, and she insisted on seeing me with the explanation that every bodily system needed to be checked. She said electrical damage can show up as long as a week later.

Before changing the thermocouple, I read the instructions over and over and decided that they were clear and simple. Took under an hour with the hardest part being the removal of all the screws from the electrical box. I have fired the kiln twice since Saturday. The only difference I see is the temperature shown is one degree higher than before. I can live with that.

Thanks to Paragon for such a great product...and great instructions. If I can make a repair, anyone can. But when a heating coil burns out, you may have to come and change it. Don't think I'm ready for that!

MEMORABLE QUOTE

"Our greatest weakness lies in giving up. The most certain way to succeed is always to try just one more time." Thomas Edison

NEWS: 1852 Kiln Unearthed in Utah

By Tim Scarlett (414-418-9681), director of the Utah Pottery Project

Our excavations have unearthed the first English-style updraft kiln to be studied by scholars west of the Mississippi River. The Davenport family left Brampton, England and set up their shop in Utah. The family of factory throwers had to reinvent techniques and round out their skills from just throwing to include finding and processing raw clays, building and operating kilns, and finding and making glazes that would stick to the pots. Potters can imagine how difficult that must have been in 1852 on Utah's frontier.

(Tim Scarlett is an associate professor in the Industrial Heritage and Archaeology program, Department of Social Sciences, Michigan Technological University.)

<http://utahpotteryproject.blogspot.com/>

Thunder woke me at 3:00 this morning. Light flashed in through the rain-pelted windows. As the storm intensified, the crack of thunder became one continuous, faint roar, like the low growl.

Please feel free to join me on Twitter:

<http://twitter.com/arnoldhoward>

Analyzing Firing Problems

CONTENTS

Analyzing Firing Problems

Reader Response: The creative escape

Recent Q&As: Mayco's Creative Images on glass

Memorable Quote

A Paragon Story: April Fools' Day

ANALYZING FIRING PROBLEMS

I have a friend who once fired ceramic angels in a kiln. The blue glaze turned out too light, and my friend was so upset that she wanted to drive her car over the angels. This is a normal reaction to disappointing firing results, especially after you have spent hours on the pieces.

In analyzing a firing problem--whether it is a problem with your kiln or the pieces you fired--get away from the problem and relax. An auto mechanic in Hawaii told me that when he struggled to solve a mechanical problem, he would go away for 15 minutes, drink coffee, and think about something else. When he returned to the problem, the solution often came to him effortlessly. Sleep on the problem. The answer often comes in the morning.

Look for the easiest solution before assuming that it will be expensive or difficult. Sometimes a burned out element can be repaired with just a new element connector.

READER RESPONSE

Ileana Lavender of Pine Crest School in Fort Lauderdale, Florida wrote, "I'm a middle school art teacher, fairly new to clay and glass. I wanted to share a quote from one of my students, who stayed late one night. As she was walking out the door, she stopped, took a step back, and said, "Wait ... outside this door is reality." She paused a second and then was ready to go back into the real world. This is what I think art does for most of us."

Immersing oneself in pottery, glass fusing, or enameling is like an escape. When you return to your daily life, you can face difficulties easier. Frances Darby, the founder of Paragon, told me that ceramics helped people face terrible problems such as the worry over a desperately ill child.

RECENT Q&As

Q. In the last Kiln Pointer, a reader said you could fire decals on glass bottles. Would that include Mayco's Creative Imagines? If so, should they be fired to full fuse?

A. Mayco's Creative Images are blank decal sheets. You can print your own decals onto the sheets with an HP laser black and white printer. Creative Images are designed for ceramics, but they can also be applied to glass. They survive fusing temperatures. Apply the decal to the top glass surface.

MEMORABLE QUOTE

"I love the impossibility of ceramics. Just when I think I've got it figured out, something bursts my bubble once again. It keeps me humble. It keeps me interested, challenged, enthralled." --Kelley Webb Randel

PARAGON STORY: APRIL FOOLS' DAY

In the early 90s, all the Paragon employees came into the office lobby for a group picture. We moved the furniture to clear a space, and I set up the lighting with reflector umbrellas and stands. We even invited the company founder, Frances Darby, for the special photo

event. She posed next to the company president, John Hohenshelt Sr. This just happened to be on April Fools' Day.

I clicked off a roll of 120 film in a Mamiya medium-format camera, which was mounted on a tripod. Then the employees shuffled back to the factory, we moved the furniture, and I removed the lights.

It was only later that day that I realized the film was blank. I knew that without even processing it. I had forgotten that the lens was set at "Mirror Up," which required tripping the shutter from the lens in addition to the shutter on the camera. I had to call all the employees back to the office and shoot the picture again the next day. Norm, an engineer, thought that this was my private April Fools' Day joke. He only shook his head when I tried to convince him that it wasn't.

How To Use Tile Holders

CONTENTS

How To Use Tile Holders

Recent Q&As: What a bad relay looks like; slumping glass bottles; the temperature rating of kiln windows

Memorable Quote

HOW TO USE TILE HOLDERS

When I first started working at Paragon, my favorite office wall hanging was a painting fired onto ceramic tiles and framed.

An efficient way to fire ceramic tiles is to stack them in tile holders. The holders take up little room in the kiln and allow heat to circulate freely around the tiles. This prevents tile breakage that sometimes happens when tiles are fired flat against a kiln shelf. Tile holders have less thermal mass than a kiln shelf, so holders require little energy to fire.

The Bell Plateholder shown in the picture is an especially efficient design. You can position the plateholder vertically or horizontally. Vertical placement requires two plateholders; horizontal placement requires one. Fire the plateholders vertically if you do not want anything to touch the tile front during firing.

RECENT Q&As

Q. Does a bad relay always look burned?

A. No. Sometimes a bad relay can still look new and even continue to make the clicking noise. To be sure about the condition of the relay, test with a voltmeter. It takes the guesswork out of kiln diagnostics. You can also use a neon test light if you don't have a voltmeter.

Q. Can you slump more than one bottle at a time in a kiln?

A. Yes, you can load more than one bottle per kiln shelf provided the kiln is large enough. The bottles should be spaced far enough apart so that when they slump, they will not touch each other. Before firing a kiln load of bottles, experiment with one or two to make sure they will turn out.

Q. What is the maximum temperature of the glass in your kiln windows?

A. Paragon's currently shipped glass window is rated to 2300°F (1260°C), although most kilns with the window are rated to lower temperatures. The Caldera is rated to 2350°F (1288°C). But with the window in the lid, it will no longer reach its maximum temperature unless the window is plugged with ceramic fiber.

MEMORABLE QUOTE

"We must all wage an intense, lifelong battle against the constant downward pull. If we relax, the bugs and weeds of negativity will move into the garden and take away everything of value." -- Jim Rohn

Several weeks ago I went to the King Tutankhamun exhibit in Dallas with my wife and her parents. The exhibit included 3,000-year-old clay pieces. Some were crude by today's standards, but exquisite nevertheless because of the age. Each artifact was imbued with feelings that have remained even after 3,000 years. Especially interesting was a headpiece worn by the king.

It is amazing that many of the basic shapes of pottery and other common tools are so very old: the pottery handle, bowl, vase, teapot; the knife; drawer pulls.

See the exhibit if you ever have the opportunity. Go on a weekday to avoid crowds, and first read a book on ancient Egypt.

Tomorrow is the anniversary of D-Day, one of the most dramatic events of the last century.

The Anatomy of a Kiln

CONTENTS

The Anatomy of a Kiln

Recent Q&As: Removing melted glaze or glass from the brick floor

A Kiln Story: Debugging a Kiln

Memorable Quote

THE ANATOMY OF A KILN

You can learn a lot about kilns just by watching people make them. The more you know about how a kiln is made and the anatomy of a kiln, the easier it will be to operate and maintain a kiln. This is one of the reasons I produced the Paragon factory tour videos.

Here are some of the maintenance procedures that you will better understand after watching the videos:

Cementing firebricks. You will learn, for instance, that if you work fast, you do not need to wet the bricks with water before applying the cement. The firebrick department factory video shows how we get a very thin seam between the bricks.

Arranging the wires in the switch box.

Replacing a sidewall brick.

Coating the firebricks with brick coating, which looks gray when first applied to the lid and seems to disappear after it has been fired.

Replacing an element.

Installing screws in the stainless steel kiln case.

Replacing the firebrick walls and top on a square front-loading kiln.

Replacing parts in the SC-series silver clay kilns.

Crating a top-loading kiln, useful if you ever need to move.

You can see the videos at Paragon's website and at Youtube.com:

<http://www.paragonweb.com/videos.cfm>

At the Paragon video page, scroll down to Paragon Factory, Products, People. At Youtube.com, enter--

Paragon factory tour

or

Paragon kilns

(without quotation marks) in the search line. Then click on Channels.

RECENT Q&As

Q. Two small pieces of a test project stuck to the floor of my kiln. I picked them up, and pieces of the floor stuck to the pieces. Now there are two scars in the floor about 1 1/2" long and 1/3" wide. One of them only removed a superficial amount of kiln floor, while the other removed about 1/16". Do I need to worry about this?

A. No, the damage to the firebrick floor is minor and will not affect the firings. After removing all traces of glass (or ceramics), coat the firebrick bottom with kiln wash. Hold a piece of cardboard near the walls to avoid splashing kiln wash into an element groove as you apply the kiln wash to the brick bottom.

A KILN STORY: DEBUGGING A KILN

From a kiln technician on the East Coast:

"I just fixed a kiln over the phone. The kiln owner heard a strange buzzing sound when she started the kiln, so she turned it off. I heard the sound over a cell phone.

"I had her turn all three switches off. We went through changing the switches from Off to High one at a time and isolated the buzzing to the top elements. After awhile the ugly buzzing ended.

"This kiln is stored in an outdoor shed, and I believe bugs/critters small enough to fit through the vent slits crawled into the switch box and caused a short. We burned that little bugger up, and the kiln is now firing properly."

The first "computer bug" was a moth stuck in a computer relay. In 1945 Admiral Grace Murray Hopper, who found the moth, was the first to use the term "debugging."

MEMORABLE QUOTE

"What is it about that meditative quiet when kids are working with clay? I teach 3rd, 4th and 5th graders in a very poor neighborhood, and even the toughest 5th grader will let down his 'cool and tough' act for clay." --Grace Sheese

Cementing kiln firebricks reminds me of growing up in Tripoli, Libya. I used to watch Arab workers painstakingly build houses from white limestone blocks. Amidst a chattering of Arabic and the smell of strong coffee, they cemented the blocks into walls and then spread mortar over the surface.

Eliminating Dust from a Firebrick Lid

Photo: vacuuming_lid_may09_w1.jpg

Caption: The brush nozzle on a vacuum removes dust from the inner lid surface.

Paragon's recommended reading list:

Paragon's Recommended Reading List

CONTENTS

Eliminating Dust from a Firebrick Lid

Recent Q&As: Coating the kiln bottom; how many pieces can you fire in a microwave kiln

Memorable Quote

ELIMINATING DUST FROM A FIREBRICK LID

An old firebrick kiln lid sometimes drops dust into the firing chamber, usually from lid cracks. The dust can ruin glazed pottery and fused glass, though it has no effect on ceramic bisque ware.

The heat from the kiln expands the firebricks, which frees the loose particles. You can remove the particles before the firing by vacuuming the lid with a brush nozzle. The brush is necessary; the vacuum nozzle held near the lid without the brush is not strong enough to remove all the loose particles.

Some of the particles are from refractory lid coating that has been applied too heavily. Thick layers of coating flake off. An especially thick coating looks like a network of peeling cracks on the inside lid surface. Remove the loose coating by gently sandpapering.

RECENT Q&As

Q. Is it necessary to ever recoat the kiln bottom with kiln wash? If so, how often? The kiln wash on the shelf deteriorates pretty quickly.

A. The kiln wash adheres to the firebricks better than it does to shelves, because the firebricks are porous. So the kiln can fire for years without an extra coating of kiln wash. Apply more kiln wash to bare areas after removing glass or glaze that has dripped onto the firebrick bottom.

Q. How many pieces at a time can fit into the MagicFuse microwave kiln?

A. It depends on the microwave oven you are using. The heat distribution in some of the inexpensive ovens is poor. This limits the firing to a single piece of glass, unless you don't mind having full-fuse and medium-fuse pieces in the same firing. Better microwave ovens can evenly fire about four glass pendants per kiln load.

You can compensate for uneven firing by using the turntable in the microwave. But the less expensive ovens fire unevenly even with the turntable. Reducing the power setting can improve heat distribution, because it increases the number of turntable revolutions during the critical last 30 seconds of fusing.

MEMORABLE QUOTE

“Almost all Nobel laureates in the sciences actively engage in arts as adults. They are 25 times as likely as the average scientist to sing, dance, or act; 17 times as likely to be a visual artist; 12 times more likely to write poetry and literature; eight times more likely to do woodworking or some other craft; four times as likely to be a musician; and twice as likely to be a photographer.” --Robert and Michele Root-Bernstein

My wife, our cats, and I watched Chris win American Idol on Wednesday. Millions have been watching the show partly because people are burned out on the news. During the 30s, America focused on the racehorse Seabiscuit for the same reason.

I wish you a safe Memorial Day weekend. My heart goes out to those of you who have lost a loved one in war.

Tightening an Element Connector

CONTENTS

Tightening an Element Connector

Reader Response: Making a kiln last longer in hot weather

Recent Q&As: The spacing between kilns

A Kiln Story: An International Kiln

Memorable Quote

News: New Kiln Factory Tour Videos

TIGHTENING AN ELEMENT CONNECTOR

Recently I test-fired a kiln that had loose element connectors. (The element connectors attach the kiln wires to the heating elements.) The element connectors were only hand tight, plus half a turn more. The kiln should have pulled 15 amps. With loose connectors, it pulled only 14.3 amps.

After I tightened the element connectors, the kiln pulled a full 15 amps. I increased the power of the kiln merely by tightening the connectors. Not only can a loose connector reduce the power to the elements, but the connector will also probably burn out later.

The following instructions are for the barrel connectors that Paragon uses. Getting the connector tight applies to any type of element connector, however.

When you install a new element, always use new element connectors. You will find a brass screw and a stainless steel screw in the element connector. Use the brass screw to hold the lead wire and the stainless steel screw to hold the element.

Hold the element connector barrel with Vice-Grips locking pliers. This will prevent the barrel from twisting as you tighten the stainless steel screw that holds the element.

Use a 1/4" nut driver to tighten the stainless steel screw until it is snug. Then use a 1/4" box-end wrench or a ratchet with 1/4" socket to get the screw tighter. Tighten it 1 1/4 turns past the point of firm resistance. If you have a torque wrench, tighten to 30 inch pounds. (We use Utica TC1-150RA torque wrenches at Paragon.) Do not worry if the stainless screw head breaks off as long as the screw threads have not stripped out.

It is difficult to get the connectors tight enough with a 1/4" nut driver alone, because that tool requires a strong hand grip. It is much easier to tighten element connectors with a ratchet or box-end wrench.

READER RESPONSE

The last Kiln Pointer was about ventilation in the kiln room. Charlie Spitzer of Cave Creek, Arizona wrote, "I'm in Phoenix, and I have two kilns in my garage. The ambient temperature there is frequently over 110 degrees F even without the kilns being on, and higher when they are firing.

"I put a small desk fan under the kiln control box, blowing upward. This sucks cooler air off the concrete slab floor and directs it through the vents on the bottom of the control box and out the top, enhancing the natural cooling circulation in the control box."

RECENT Q&As

Q. I have two kilns next to each other, but I never fire them both at the same time. Should I still keep them 3' apart?

A. No, you don't need to keep them 3' apart. The 3 foot recommendation is for kilns that fire at the same time. This is to avoid a buildup of heat.

A KILN STORY: AN INTERNATIONAL KILN

By Betty Jean Scott of Las Vegas, Nevada

My Paragon QuikFire 6 has traveled around the world. I purchased it from Judy Conway of Vitrum Studio. Several months later, we received our overseas travel orders assigning us to the U.S. Embassy in Moscow, Russia.

Through Judy, we bought a 220-volt muffle for my kiln, which was extremely easy to change. (The Paragon instructions were very thorough.) This allowed me to continue my glasswork while overseas. After two years in Moscow, we were assigned to three years at the embassy in Kuala Lumpur, Malaysia.

I create lamp work beads over flame and use my Paragon kiln for annealing the glass. But mostly I create fused glass cabochons for my jewelry. I will often spend over an hour filling the 6" x 6" shelf with several completely different intricate designs before placing the hood on top and firing the glass.

During our time overseas, I made many friends. There is something about ladies and crafts that provide a common bond. I used my kiln to introduce my friends to glass and worked with each of them to bring their creations to reality. One of my honors was to be invited to bring my jewelry to the Australian Embassy in Kuala Lumpur for a show and sell.

I can say that many people, friends, and their families, all over the world today, are wearing glass made in my Paragon Kiln.

MEMORABLE QUOTE

“Pottery, as you know, is frustrating. But we could not fully enjoy success if we did not experience failure. The whole experience is profound.” --Steve Burt

NEWS: KILN FACTORY TOUR VIDEOS

We have just loaded a series of Paragon factory tour videos to www.paragonweb.com . Click on About Us from the main menu; then select Company Videos from the drop menu. Or click here:

http://www.paragonweb.com/Company_Videos.cfm

Marilee Guttridge, a porcelain artist in Galt, California, has subscribed to the Kiln Pointers longer than anyone else. Thanks, Marilee.

Recently I watched the 1959 Russian movie “The Ballad of a Soldier.” It is beautifully filmed in black and white. Though I had to read English subtitles, this is the best romance movie I have ever seen. The haunting story crosses barriers of time and culture.

Kiln Room Ventilation

CONTENTS

Kiln Room Ventilation

Reader Response: The stoneware soap dish at the Phoenix Hyatt Regency

Recent Q&As: Thermocouple connections; plugging a kiln into a ceiling outlet; digital kiln transformer voltage

Memorable Quote

News: Square Glass Fusing Kilns

KILN ROOM VENTILATION

Yesterday a kiln technician told me about a school kiln that was fired in a storage room. The doors were kept closed during operation, and the room became too hot even though the kiln had an overhead vent.

The kiln room must have good ventilation. Open the doors and windows. If the room has no windows and the doors must be kept closed, install a duct to allow more air to enter the room. You could even install a grid-covered ventilation opening in the doors to allow makeup air to enter the room. Hot air removed by the overhead Vent-a-Kiln fan must be replaced by fresh air.

Avoid small, enclosed spaces such as a closet or small utility room. The kiln room must be large enough to avoid heat buildup around the kiln.

If you are installing a kiln in a school, mall, or other location with a central air conditioner, the building manager may ask how much heat the kiln will generate. A good estimate for studio kilns is 23,000 BTUs.

Consult building codes for recommended non-combustible wall material for walls that are near the kiln. Cement board or masonry tile are good choices.

READER RESPONSE

The last Kiln Pointer was about a soap dish that I had seen at the Hyatt Regency Hotel. Pat Hinz of Rancho Palos Verdes, California wrote, "I too was taken by the beautiful soap dish in our bathroom at the Hyatt. It is wonderful that a hotel recognizes local artists. A friend who lives in Arizona says many hotels there have things like this in the rooms."

RECENT Q&As

Q. The controller shows the wrong temperature. Tapping the kiln's switch box makes the correct temperature appear.

A. This is a symptom of loose thermocouple connections. The thermocouple senses temperature inside the kiln. If the wires from the thermocouple to the controller are loose, the temperature in the display may fluctuate.

Check the connector screws on the thermocouple block. It is on the other side of the wall where the thermocouple appears in the firing chamber. Also, check the thermocouple wire connectors on the back of the controller circuit board. They must be tight. (Note: Some of the small kilns do not have a thermocouple block. The only thermocouple connections on those kilns are at the back of the controller.)

Q. Is it okay to plug a kiln into a ceiling outlet?

A. Most lighting circuits have 14-gauge wire, often extended over long distances from the breaker or fuse box. The ceiling outlet will likely have reduced voltage. That is why we don't recommend it.

We also recommend that you avoid plugging a kiln into an extension cord, which introduces two additional connections between the kiln and wall outlet that can overheat.

Q. The voltage from the transformer to my controller is 32. Is that too high?

A. The transformer reduces the circuit voltage at a ratio of 10 to 1. For example, the transformer reduces 240 volts to 24. Sometimes, however, the voltage from the transformer is higher than a 10:1 ratio. This is usually not a problem, because the controllers can operate normally at 19 - 26 volts AC. The controllers can operate above 26 volts, but you risk damaging the controller when operating at higher voltages.

If the controller is not working properly on 32 volts, you should replace the transformer. But if the controller is working on 32 volts, it should be okay.

MEMORABLE QUOTE

“Live well, laugh often, and love with all of your heart!” --Anonymous

NEWS: SQUARE GLASS FUSING KILNS

We have just released the new Fusion-14 and Fusion-16 square top-loading glass kilns. The 14” square x 6 1/2” deep Fusion-14 operates on a standard household outlet; the 16” square x 6 1/2” deep Fusion-16 operates on a 5-20R, 120-volt outlet.

I enjoy the sounds of wind, rain, and thunder. Early Sunday morning, three thunderclaps shook the house and set off a car alarm across the street. I went outside to watch the storm for a moment. Touching a doorjamb, I felt the house shudder with each thunderclap.

A Marketing Idea for Potters

CONTENTS

A Marketing Idea for Potters

Recent Q&As: Installing a downdraft vent without drilling a vent hole in a wall; testing relays; 480 volt and 3 phase kilns

A Kiln Story: A Visit from the Past

Memorable Quote

News: Kiln Sitter Parts

A MARKETING IDEA FOR POTTERS

Two weeks ago I attended the National Council for Education on the Ceramic Arts Conference in Phoenix, Arizona. One of the first things I noticed in my Hyatt Regency room was a beautiful stoneware soap dish. I turned it over to see who made it and found the name Lisa.

This marketing idea is from Lisa and is for potters who can fill large orders. Go to local hotels and offer to make enough soap dishes for every room. You can customize the design to reflect local interests such as famous landmarks or a local heritage.

There is a tendency among potters to sign only the first name on ware, as Lisa did with her soap dish. Instead, place your website address and full name on the bottom of each piece so hotel guests can order more ware directly from you. This will help you build a list of repeat customers.

RECENT Q&As

Q. I am installing a downdraft vent, but I don't want to drill a hole in my exterior brick wall. Is there an alternative?

A. Yes. Route the vent duct to a window that opens, such as a basement window. Place a tight-fitting piece of plywood in the window. Cut a hole in the plywood and attach the vent duct to the plywood. When you are not firing, you can remove the plywood and close the window again.

Q. I have tested the coil on my relay, but the kiln still does not heat up.

A. Testing the relay coil is not a complete test. (The relay coil is the electromagnet that closes the relay contacts.) The relay contacts can be burned out even though the relay passes the coil test.

A short in the relay coil causes the kiln's switch box fuse to blow. The relay coil test is to determine the cause of blown fuses.

Q. Do Paragon 480 volt kilns have a cord plug?

A. No. All 480 volt and 3-phase kilns from Paragon are direct wired.

Q. Do Paragon 3-phase kilns have a cord and plug?

A. No. All 3-phase Paragon kilns for the U.S. and Canada are direct wired.

A GLASS KILN STORY: A VISIT FROM THE PAST

I attended two shows earlier this month: Glass Craft and Bead Expo in Las Vegas, Nevada, and NCECA in Phoenix, Nevada. At the Las Vegas glass show, author Boyce Lundstrom stopped at the Paragon booth. He remembered the two-day seminar he taught at Paragon in 1985. At that time his book "Kiln Firing Glass: Glass Fusing Book One"

was one of the few sources of information on fusing. Few people, including most stained glass artists, had ever heard of glass fusing.

At the 1985 seminar we made glass fused fish from patterns that Boyce had designed. Boyce fired the pieces in 8-sided, 22 1/4" deep Paragon ceramic kilns. He fired two shelves of glass per kiln.

At the NCECA pottery convention in Phoenix the next week, I met one of the students who had attended Boyce Lundstrom's 1985 seminar. Fewer than 20 students attended the seminar, and I met one of them in faraway Phoenix at a pottery convention.

MEMORABLE QUOTE

"What lies behind us and what lies before us are tiny matters compared to lies what lies within us." --Ralph Waldo Emerson

NEWS: KILN SITTING PARTS

The Orton Ceramic Foundation is now manufacturing Kiln Sitter parts. They are available through Paragon for immediate shipment.

Glass fusing can be addictive, as this incident shows. A couple stopped by the Paragon booth in Las Vegas. While the young wife talked to another representative, I talked to her husband. I asked if he was a glass artist, and he said, "No, my wife is the glass artist. I'm just the guy who wires the circuits in the basement."

He explained that she started out with a small corner of the basement and one kiln. "Now she has four kilns, and her glass work space has spread all over the basement."

I hope you are enjoying a productive 2009. We are very busy at Paragon.

Photographing Your Artwork

CONTENTS

Photographing Your Artwork

Reader Response: Removing glue from glass bottles

Recent Q&As: Installing kilns for seminars; firing raku in enameling kilns

Memorable Quote

PHOTOGRAPHING YOUR ARTWORK

Product photography is as demanding as the kiln-fired arts. Nevertheless, I have seen exquisite photos by potters, enamelists, and jewelers. You can get good results, too, if you have the patience to experiment.

Keep detailed notes of each photo setup so you can reproduce the lighting from your best shots. Long after you have forgotten how you shot the picture, you will still have your notes. Include a sketch of the lighting setup. Show the types of lights, distances, and angles.

Lighting reflects off surfaces the same way a ball bounces on a pool table. Move the lights to change where the reflection appears in the glaze, glass, or enameling.

On-camera flash (the type that is mounted to the camera) is too limiting. Get a flash adapter so you can take the flash off the camera and place it to the side and so that you can use multiple flash units. Or you could even buy a flash pack, which is a power source that flash units plug into. I've used a Novatron for over 20 years and love it. My wife and I used to shoot weddings with the Novatron.

I've had interesting results by placing glass on top of a sheet of white plexiglass. Place a light behind the plexiglass. That's how I photographed the glass-fused street scene shown in this pointer.

Study beautiful photos of pottery or glass to figure out how they were lit. Sometimes small reflections in photos show the types of lights used and how they were positioned. I learned that in a fashion photography class. The instructor showed us close-up magazine photos of fashion models. Reflected in the eyes of the models were the light sources, usually an umbrella light or box light.

One way to learn lighting is to study glossy brochures of expensive jewelry and silverware. It is very difficult to hide all the reflections in silverware, and sometimes those reflections actually enhance the subject.

Collect great still life photos from brochures and advertisements. File them in a 3-ring notebook with page protectors. Even if they are not your exact area of specialty such as pottery, you can still learn from them.

Try to find a copy of “Still Life: A Guide to Professional Lighting Techniques,” by Roger Hicks and Frances Schultz. It is filled with stunning photos, each with instructions and a lighting diagram.

Take still-life photography classes. The best ones are taught by advertising photographers. One class can open a new world to you.

READER RESPONSE

The last two Kiln Pointers included information on slumped bottles. Ginger from Ginger Glass & Crafts of Irvington, New York wrote, “Use Goo Be Gone to clean off the label glue. Then clean the bottles in a dishwasher. The Goo Be Gone removes all the glue, and the bottles come out shiny.

“Always make sure the bottles are clean and dry before you put them in the kiln. I also full-fuse the bottles, put decals on them, and I have put dichroic slide scraps inside them. They all turn out great, without devitrification. They make great cheese boards and cracker holders. Just make sure you fire the darker colors separately from the light clear bottles. They slump and melt at a different rate.”

RECENT Q&As

Q. I want to fire six 120-volt kilns at a seminar. Will that overload the electric system?

A. It is safe to fire six kilns simultaneously during your seminar as long as they are plugged into separate 120-volt circuits. If the building where you are holding the seminar does not have six separate circuits in one room, the kilns will have to be fired in two or more rooms.

Do not plug two kilns into outlets that are wired to the same circuit. The circuit breaker will trip when you turn on the second kiln, but the circuit wire will overheat if the breaker fails.

Q. Is it okay to use the E- and Q-series kilns for raku?

A. Yes, you can use them for raku firing. The firebricks and elements can withstand the temperature change from opening the door to remove the raku pieces.

MEMORABLE QUOTE

“Working in my small studio keeps me sane and happy. I forget about everything else and am grateful to do what I do.” --Heidrun Schmid

This week I have been making videotapes for Paragon. I learned to produce videos by volunteering at the Mesquite, Texas Public Access cable station in the 80s. The station aired my karate demos and interviews.

You can watch the latest Paragon video here:

<http://www.paragonweb.com/VideoInfo.cfm?VID=30>

(Or go to www.paragonweb.com, click on Kiln Audio & Video, and scroll down the list.) You will find audios for mp3 players and a growing list of kiln videos. I welcome your suggestions for new video topics. The newest video is “P006 Crating a Top-Loading Studio Kiln.” Watch the video if you ever need to ship a kiln.

Tools for Element Maintenance

CONTENTS

Tools for Element Maintenance

Reader Response: Slumping glass bottles

Recent Q&As: Firing bronze clay; brittle silver clay; top and side elements

Memorable Quote

News: New Temperature Rating on Glass Windows

TOOLS FOR ELEMENT MAINTENANCE

You can quickly change elements and repair bulging ones if you have the correct tools. Here is a list of tools that we recommend; most will also work with other brands of kilns. (These tools are for kilns that have element grooves rather than embedded elements.)

This email includes a photo. Click on the link below if your email does not show photos:

http://www.paragonweb.com/Kiln_Pointers.cfm

At the top of the photo:

PROPANE TORCH: Used to heat a bulging section of element, which is necessary before shrinking it back into the groove. Use a trigger-activated torch such as the BernzOmatic TS4000 shown in the photo.

Tools shown from left to right:

VOLT/OHM/AMMETER: The ohmmeter tests whether the element is burned out. The ammeter tests how much amperage the elements are drawing. The model used at our inspection station (and shown in the photo) is the Fluke T5-1000.

1/4" NUT DRIVER: Tightens barrel element connectors and switch-to-element lead wires.

VICE-GRIPS: Holds the element connector securely when tightening the connector.

SNAP-RING PLIERS: Lengthens sections of a bulging element to fit the element into the corner of element grooves. (The element must first be red hot.)

NEEDLE-NOSE PLIERS: Shortens bulging heating elements that are too long to fit into the element grooves. (The element must first be red hot.)

DIAGONAL CUTTING PLIERS: Cuts off the excessive length of the element after the element connector has been installed.

READER RESPONSE

The last Kiln Pointer showed a photo of a slumped glass bottle. The glass was shiny except for a section that had devitrified as part of a coating experiment. Bonnie Hellman, a CPA in Ouray, Colorado wrote that the glue from a label can cause the same effect on glass as devitrification. "The first few times I fired wine bottles, I thought the labels would burn off. The paper burned off, but the glue (which can be pretty tenacious) left a dull finish.

"I have found it necessary to clean off all labels and glue and have not ended up with marks such as the one you showed, which you've called a devitrification mark. Some wine bottles have labels that are attached with a glue that is hard to remove, and I've found I need to soak them, often overnight, and then use a metal scrubbie to remove the label and all the glue. It is also important that the bottles are dry before firing.

"I fire glass in my 7-cubic-foot ceramics kiln," Bonnie continued. "I end up with 2 full shelves of glass and fill the rest with wine bottles. I've found that Grey Goose and others

with painted labels keep the paint in a glass firing, even though I fire to full slump. Texture bottles retain most of the texture, so they're pretty cool, too.”

RECENT Q&As

Q. Bronze clay firing produces dust. Can you fire enameling in the same kiln that is used to fire bronze clay?

A. Yes. Bronze clay is fired inside a stainless steel container, which sheds black oxidation particles in the kiln. Since copper enameling requires a dust-free kiln, vacuum the black oxidation particles after each firing. This will leave the kiln clean enough to fire copper enameling and ceramic glaze.

Q. Why is my silver clay brittle after being fired?

A. The silver clay did not fire hot enough, or the hold was too short. You may be able to save the piece by firing again to the correct temperature and hold time. Fire a test piece 25 degrees F (14 degrees C) hotter.

Q. Do I need elements in the top and sides or only the top?

A. Glass does not like temperature variation. Though top elements offer even heating across a flat piece of glass, top and sidewall elements are recommended for firing tall or deep pieces with molds. Side elements offer more even heating of the sides of drape molds or deep castings. Side elements are standard in the Paragon Fusion-8 and Fusion-10 and optional on all the GL-series front-loading kilns.

MEMORABLE QUOTE

“The only reward of virtue is virtue; the only way to have a friend is to be a friend.” --
Ralph Waldo Emerson

NEW TEMPERATURE RATING ON GLASS WINDOWS

The glass windows on Paragon kilns are now rated to 2300 degrees F (1260 C). The window is optional on the Fusions, FireFly, Caldera, E series, Ovation-10, and SC-series.

Among my glass and pottery collection are Bonnie Hellman dichroic glass earrings, a Veena Raghavan porcelain vase, and a Mel Jacobson stoneware pot. Bonnie's earrings sparkle in even the dimmest light; Veena's blue vase has a beautiful ethereal quality; and Mel's pot has a long and colorful story behind it: a design feature from ancient China, the chattering tool that he made from scrap steel found in an alley, and the black specks from the shores of Lake Michigan. I have a Judy Killian glass bowl that glows in the dark.

Every time I see these pieces, I think of the friends who made them. Imagine someone thinking of you almost every day. That is what happens when people see your kiln-fired art.

Preventing a Dull Finish on Glass

CONTENTS

Avoiding a Dull Finish on Glass

Recent Q&As: The future of Kiln Sitters; melted silver clay

Memorable Quote

News: Paragon Class Kilns Available at Glass Craft Expo

AVOIDING A DULL FINISH ON GLASS

The dull or frosty surface on fused glass is called devitrification. This is rarely seen on fusible stained glass but common on certain brands of slumped bottles and other types of recycled glass.

Patrice Johnson of Moyock, North Carolina and Chris Watson of Virginia Beach, Virginia have been getting devitrification on fused bottles, especially the dark colors. They made a devitrification coating from a formula on Brad Walker's website. You can find more details at the link below:

<http://www.warmtips.com/20051022.htm>

The mixture:

1 tablespoon 20 Mule Team Borax laundry detergent booster

1 tablespoon Dawn dishwashing liquid

1 cup distilled water

Patrice and Chris applied two coats to test bottles using a small disposable sponge brush. They fired the bottles to cone 015 and 016. The coated area of the glass remained clear, and the non-coated area devitrified.

In another test, they sprayed the solution onto the glass. The first test with the brushed-on solution turned out better.

Patrice and Chris, thanks for sharing the results of your tests.

RECENT Q&As

Q. What is the latest news on Kiln Sitter parts?

A. Orton Ceramic Foundation is going to manufacture the Kiln Sitters and parts. Kiln Sitters should be ready in March, 2009.

Q. Why did my silver clay melt in the kiln?

A. If the piece melted even though you programmed the correct temperature, the thermocouple in your kiln may be a little inaccurate. You can compensate by lowering the programmed temperature. Fire test pieces until you are satisfied with the results.

MEMORABLE QUOTE

“I talk to my SC-3 kiln, tell it we are ready to start the day, and it glows and makes that little turning on and off sound to keep me company.” -- Ann Davis

NEWS: PARAGON CLASS KILNS AVAILABLE AT GLASS CRAFT EXPO, APRIL 1 – 5, 2009, LAS VEGAS, NEVADA

Paragon is furnishing kilns to classes throughout the show. You can get great prices on slightly used class kilns, complete with full product warranty. (Paragon is also paying for shipping to Las Vegas.)

The kilns will be available at the end of the show, packed in the original cartons with manuals and warranty card. Take the kiln home with you, or have it shipped from the show. [Click here for more information:](#)

http://www.paragonweb.com/News_Story.cfm?NID=87

This week a former employee stopped by Paragon to say hello. She had worked here ten years ago. She was driving from Missouri to San Antonio to surprise her husband, who is training to be an Army medic. Her visit reminded me that the employees at Paragon are like a close-knit family and take the time to stay in touch.

I hope you have a great weekend.

Use the Correct Tools

CONTENTS

Use the Right Tools

Reader Response: Dichroic glass; the fear of kilns

Recent Q&As: Glass slumping molds; firing stoneware over the gap between half shelves; what to do about dust falling from the kiln top

Memorable Quote

News: Advanced Kiln Maintenance Seminar February 20 – 21, 2009

USE THE RIGHT TOOLS

In replacing the faucet in my kitchen, I crawled under the sink to remove the nuts that held the faucet in place. The nuts were in a narrow recess up high behind the sink. With the glow of a lamp, I could barely see them let alone reach them with pliers. After I struggled for ten minutes, it became obvious that someone must have designed a special tool for the task.

I drove to Lowe's home improvement center and asked a salesman for advice. He immediately showed me a basin wrench. I took it home, crawled under the sink again, and removed the nuts in only several minutes.

Sometimes the difference between a professional and an amateur is that the pro has the right tool, and the amateur doesn't even know it exists. Think about that the next time

you operate or repair a kiln. Find the correct tools or supplies to increase your efficiency and enjoyment. Several examples:

- 1) If you are having trouble with kiln wash, experiment with different brands until you find one that is easy to remove yet does not readily flake off. Finding the right formula could save you many hours later.
- 2) Learn to use witness cones in ceramic firings. They are invaluable in troubleshooting and in recording your results.
- 3) Use a multi-meter to test your kiln, and save the instructions that came with the tool. Learn to use the voltmeter, ammeter, and ohmmeter.
- 4) Use a pair of locking pliers (i.e. Vice-Grips) to tighten barrel element connectors. It is the most useful tool I own. Locking pliers make it easy to tighten the element connector.
- 5) Buy the best glass cutter you can find. It should have an oil reservoir. It may be expensive, but it will begin paying for itself in the glass that you will save. It will also make fusing more enjoyable.

READER RESPONSE

From an anonymous reader: Do not fuse the coated side of dichroic against the coated side of another piece of dichroic. They usually will not stick.

Grace Brenneman of Vacaville, California wrote, "I bought my Paragon kiln about two years ago but was too nervous to fire it. I read the directions, took a couple of classes, and read several books but was worried I would set my house on fire. I finally got up the nerve and fired the kiln last month and have been firing it a few times a week since. I am having a ball working with glass, and my friends are amazed. I only regret I didn't buy a larger kiln."

RECENT Q&As

Q. What is the main difference between slumping glass in ceramic and stainless steel molds?

A. Glass is slumped into ceramic molds and draped over stainless steel molds. This is due to the difference in expansion and contraction between the glass and the mold. Glass contracts more than a ceramic mold and less than a stainless steel mold during cooling.

Q. Is it okay to fire stoneware pieces over the gap between half shelves?

A. Yes, as long as the gap between the shelves is not too wide. If your clay sags into the gap between the shelves during firing, then space the shelves closer together the next time.

Q. My kiln lid is cracked and drops dust onto glazed ware. How can I get around the problem until I replace the lid?

A. Position large ware on the lower shelves and smaller ware on the top shelf. Arrange the smaller pieces so they are not directly under the crack where the dust is falling.

You could also fill the firebrick crack with ceramic fiber. Roll the fiber and press into the lid crack with a knife. This method works only with wide cracks.

Sometimes dust comes from the kiln coating that has been applied too heavily. This is easy to recognize by the tiny cracks in the lid surface. They look like the cracks in crazed glaze. Sand the lid, vacuum, and apply a new coat of kiln coating.

Please handle the lid gently. Dropping the lid causes cracks in the firebricks.

MEMORABLE QUOTE

“Never, never, never give up.” --Winston Churchill

NEWS: ADVANCED KILN MAINTENANCE SEMINAR FEBRUARY 20 – 21, 2009

We are holding an Advanced Kiln Maintenance Seminar February 20 - 21, 2009 at the Paragon factory in Mesquite, Texas. If you wish to attend, please call 972-288-7557 or 800-876-4328.

The seminar will cover kiln design, extensive trouble shooting, three-phase power, and much more. Participants should complete the basic repair seminar or have experience repairing kilns before attending the advanced seminar. You do not need to bring tools. The seminar fee is \$105.00.

Meals, Airport Pickup, Hotels

As a seminar student, you are a VIP guest at Paragon. We furnish lunches on both days and dinner the first evening. The seminar is an exciting way to meet new friends.

If you arrive before 4:00 p.m. the day before the seminar, we will pick you up at Love Field or D/FW International Airport. Please call ahead with flight number, arrival time, airport, and gate number.

We will pick up students from the offices of the following hotels at 7:30 - 7:45 a.m. each seminar morning and return them at the end of the first day:

Hampton Inn 800-426-7866

Holiday Inn Express 972-288-9900

After the seminar, a shuttle will leave Paragon at around 12:30 - 1:00 p.m. to take students back to the airports.

For more information and to register, please call 800-876-4328 and ask for customer service. I hope you can come, and I look forward to visiting with you.

Dan Fenton is one of the pioneers in the glass fusing movement. He has taught since the early days and helped to develop the industry. Much of what we enjoy in glass fusing today is due to the work of teachers such as Dan Fenton.

Dan is undergoing cancer treatment. He is selling his glass artwork for \$500 per piece to pay for his medication. He would also like to teach glass fusing seminars. Teaching and working with glass helps him to forget the difficulties he is facing. If you are interested in purchasing artwork or hosting a seminar, please call Dan Fenton at 510-638-1313 or send an email to Patti at patriciaodoherty@yahoo.com. I appreciate your help.

Labeling Switch Box Wires

CONTENTS

Labeling Switch Box Wires

Reader Response: Vice-Grips used to tighten element connectors

Recent Q&As: Flaking thermocouples

A Kiln Story: Buying a Used Kiln

Memorable Quote

LABELING SWITCH BOX WIRES

Before replacing electrical parts inside a kiln, label the wires so you can connect them correctly to the new part without guesswork. Draw a simple diagram on paper, numbering the wires. Wrap masking tape with corresponding numbers around the wires in the switch box.

You could also take a picture of the switch box before replacing parts. Refer to the picture if you have questions about how the old part was connected. You can take the picture with even a cell phone.

As an alternative, unplug the kiln and remove the old part, such as a switch, with the wires still connected. Transfer only one wire at a time from the old part to the new one. Then install the new part in the switch box.

Replace wires that have been damaged by heat. And make sure the connections are tight. Loose connections generate enough heat to ruin a new part.

READER RESPONSE

Tony Rodriguez of San Antonio, Texas wrote, “Your article ‘Use the Right Tools’ refers to locking pliers to tighten the element connectors, but the photo shows diagonal cutting pliers. For those of us who are knowledgeable on tools it is okay, for someone new it could be very misleading as they could try to use the cutters.”

Thanks, Tony. I have inserted the correct photo in the archived newsletter:

http://www.paragonweb.com/Kiln_Pointers.cfm

(Please scroll down to “Use the Right Tools.” You can find all the archived Kiln Pointers here, too.)

RECENT Q&As

Q. Where are your kilns made?

A. Our kilns are made in America by skilled craftsmen. Some of our employees have been with us for over 20 years. 25% of them have been at Paragon for over 10 years.

Q. Should I replace the thermocouple when it starts to flake?

A. It is normal for the stainless steel sheath on the Type-K thermocouple to blacken and flake. The sheath is a high-nickel stainless steel and turns black above 2000 degrees F. Wipe the thermocouple with a paper towel before firing. This will remove any loose particles.

A KILN STORY: BUYING A USED KILN

Karen Sousa in Marion, North Carolina wrote, “When I bought my used kiln, I was misled about how recently it had been fired. When we picked it up, we couldn't turn it on because the home was having a major remodel and there was no electricity. I know, buyer beware.

“Only because of the detailed wiring diagrams available online were we able to determine that the owner had mis-wired the kiln. With a couple of short calls to Paragon, my local electrician rewired everything, we replaced the elements and several bricks, and now it runs like a dream.

“Although I would ask different questions if I were to purchase a used kiln again, it was a real learning experience. I know a lot more about how my kiln works than I would have if everything worked from the start. It was reassuring to know that if we have questions, the folks at Paragon are not only available to answer questions but enjoy sharing information and educating their customers.”

MEMORABLE QUOTE

“One can never consent to creep when one feels an impulse to soar.” --Helen Keller

I recently finished reading “Success is a Journey,” by Brian Tracy. The author describes how he crossed the Sahara Desert as a young man. The experience taught him about achieving goals, and he shares what he learned. I recommend this book; it is worth re-reading.

It reminded me of an experience my father had while working deep in the Libyan Desert as a geophysicist. One afternoon he took a walk in the desert. Before long he became disoriented in the undulating sand dunes. He staggered back into camp an hour later and never told anyone how close he had come to dying--just a short distance from camp.

I hope you have a great weekend.

Firing by the Numbers

CONTENTS

Firing by the Numbers

Recent Q&As: Disassembling a kiln; making a hole in a glass pendant

Memorable Quote

FIRING BY THE NUMBERS

A beginning cook can get good results by following a recipe from a book. But an experienced cook will adjust the recipe for even better results. The recipe may call for 60 minutes of cooking at 350 degrees F, but you may find that results are better at 50 minutes instead of 60.

A firing schedule for a kiln is similar to a recipe. You can find firing schedules from friends, glass companies, and Internet discussion forums. The Cone-Fire mode of a digital controller is itself a collection of ceramic firing schedules.

Some beginners feel that a firing schedule should give the same results from one kiln to another, especially if the kilns are digital. But every kiln fires a little differently, so tweaking a schedule is sometimes necessary. The firing schedule is only a starting point. As you gain experience with your kiln, you will learn to adjust the firing schedule for best results.

RECENT Q&As

Q. Is it necessary to disassemble a sectional kiln to get it onto the kiln stand?

A. It is faster and easier to find several helpers and to lift the kiln onto the stand. That takes just a moment. Disassembling the kiln is much more time consuming and unnecessary in setting up the kiln. However, we recommend disassembling the kiln if you need to carry it down a narrow staircase or through a narrow passageway. You could also disassemble it to load tall sculptures or to replace elements in the bottom section.

Q. What method do you recommend for forming a hole in a glass pendant during firing?

A. Coat a toothpick with glass separator and place it between layers of glass. The toothpick will burn out during firing, leaving a channel. You can also use a 1/8" wide x

1/8" thick strip of ceramic fiber paper. Remove the fiber with a toothpick after the glass has cooled.

MEMORABLE QUOTE

“If you think you can, you can.” --George Reeves

Last week my wife and I were in Rehoboth Beach, Delaware visiting our son and his wife. A block from the beach we found beautiful glass fused jewelry and wall hangings in galleries. The delicate jewelry was tack-fused. My favorite wall hanging was a turquoise ocean wave complete with white foam, made from stringers and frit. It wasn't long ago that glass fusing was rare. Few people had heard of it.

All of us at Paragon wish you a Happy New Year. I wish you much creative satisfaction in 2009!

Merry Christmas from Paragon

CONTENTS

Recent Q&As: Kiln wash on the underside of shelves; the difference between kiln wash and kiln coating; kiln wash on a kiln bottom that has elements; kiln paint

Memorable Quote

A Christmas Greeting

RECENT Q&As

Q. Is it okay to kiln wash the underside of a kiln shelf?

A. We recommend kiln washing only the top of the shelf for ceramic firings. Kiln wash applied to the underside of the shelf can flake off and land on glazed ware underneath. However, for a glass kiln with only one shelf, it would be okay to kiln wash both sides of the shelf provided the kiln does not have elements in the floor of the kiln.

Q. Is it okay to apply kiln wash to the lid of my glass kiln?

A. Please do not apply kiln wash to the lid. Kiln Wash protects the firebrick bottom and shelves from melted glass. When the melted glass is removed from a shelf, the kiln wash comes off with it. Since the kiln wash is designed to flake off, it can fall into the glass below when coated onto a lid.

You can use liquid kiln coating to protect the lid surface. Applied in a thin coat, kiln coating seals the pores and hardens the surface of the firebricks. This helps in preventing loose particles from falling. Kiln coating is an entirely different product from kiln wash, though in liquid form they look the same.

Q. Should you kiln wash the bottom of a kiln that has elements in the bottom?

A. No. The kiln wash could get into an element groove and ruin an element. This could happen even if you are careful to mask off the element grooves while applying the kiln wash.

Q. What kind of paint do you use on your kilns?

A. We spray a durable high temperature, water-base finish onto the kiln cases and switch boxes. We chose water-base paint because of the low emissions during spraying. This creates a safer work environment for our employees and cuts down on pollution.

MEMORABLE QUOTE

“I take nothing for granted. I now have only good days or great days.” --Lance Armstrong

CHRISTMAS GREETINGS

From the north Jamie Gray of the Calgary Warm Glass Guild wrote, “Arnold, I thought you might be interested to know that we’ve got a foot of snow on the ground here and it’s COOOLD, but very beautiful. And as you say in your Kiln Pointer newsletter, working with a warm kiln is an excellent way to spend a cold afternoon. Merry Christmas!”

I grew up in Calgary, Alberta, Canada, where Jamie lives, and remember the deep snowdrifts at Christmas. We rarely have white Christmases here in Mesquite, but I do enjoy the cutout snowflake decorations hanging from the wall partitions and the lights that shine from the tree in the Paragon office.

The blue lights on the house across the street from mine glitter in the night air. This morning the haze on the freezing windows spread the pinpoint lights into glowing blue orbs.

From the south Nora Bay wrote, "From sunny Mexico, I send my very best wishes for the Holidays and New Year to you and the Paragon staff. I always read Kiln Pointers with great interest. I have been using my kiln for fused glass and recently for firing painted porcelain. I just can't live with out it! Muchos abrazos!"

Thank you for reading the Kiln Pointers during 2008. On behalf of all of us at Paragon, I wish you a Joyous Christmas and a Happy New Year, wherever you may be.

Avoiding an Over-Fire

CONTENTS

Avoiding an Over-Fire

Recent Q&As: Kiln wash, heat distribution in a microwave kiln

A Kiln Story: The Glaze Mystery

Memorable Quote

AVOIDING AN OVER-FIRE

By Mel Jacobson, potter

- 1) Use an alarm clock. I use the old wind-up kind with a loud ringer. Set it for a certain time, and make sure you follow the ring. Place a small battery-operated oven timer in your pocket if you need extra reminders.
- 2) Get a large bulldog clip and paint KILN in red. Clip it to your jacket, or hang it from a doorknob. Or place a sign where you hang your apron: KILN ON.
- 3) When I was a high school teacher, I had the janitor turn off the master breaker to the kiln every night at 8. No kiln would ever be on past 7, ever, anyway.

You can listen to an interview with Mel Jacobson here:

<http://www.paragonweb.com/VideoInfo.cfm?VID=15>

(Or go to www.paragonweb.com, click the Kiln Audio & Video link on the left side of the home page, and scroll down to the A004 audio.)

RECENT Q&As

Q. Is it necessary to ever recoat the kiln bottom with kiln wash? If so, how often? The kiln wash on the shelf deteriorates pretty quickly, so I wondered if the same happened with the coating on the kiln bottom.

A. The kiln wash adheres to the firebricks better than it does to shelves, because the firebricks are porous. Therefore, it is rarely necessary to apply more kiln wash after the first application to a new kiln. Apply more kiln wash to bare areas after removing glass or glaze that has dripped onto the firebrick bottom.

Q. How many pieces at a time can fit into the MagicFuse microwave kiln?

A. It depends on the microwave oven you are using. The heat distribution in some of the inexpensive ovens is poor. This limits the firing to a single piece of glass, unless you don't mind having full-fuse and medium-fuse pieces in the same firing. Better microwave ovens can evenly fire about four glass pendants per kiln load.

You can compensate for uneven firing by using the turn table in the microwave. But the less expensive ovens fire unevenly even with the turn table. Reducing the power setting can improve heat distribution, because it increases the number of turn table revolutions during the critical last 30 seconds of fusing.

A KILN STORY: THE GLAZE MYSTERY

Cliff McCrea, a kiln technician in Austin, Texas, wrote, "I checked all the elements and replaced both thermocouples in two Paragon kilns. I then performed a test fire, and both kilns were at peak performance. Two days later the client called me and told me a black glaze turned blue when fired. I assured him the kilns were not the problem and for him to consult his glaze supplier. He did and found there was a quality issue in the glaze production.

"In retrospect, do not jump to conclusions about the kiln being the root cause of glaze problems."

MEMORABLE QUOTE

"Seek the wisdom of the ages, but look at the world through the eyes of a child." --Ron Wild

There is still time to make Christmas gifts with your kiln. Firing beautiful, hand-made ware in a kiln is a pleasant way to spend cold winter afternoons.

How to Use an Ammeter

CONTENTS

How to Use an Ammeter

Recent Q&As: Cleaning Kiln Sitter contacts, display message that appears on start up, firing cork clay, opening the door of a hot kiln

Memorable Quote

HOW TO USE AN AMMETER

The clamp-on ammeter measures the amps that the kiln draws and can help you diagnose kiln problems. At Paragon we consider it one of our most useful tools.

To find your kiln's rated amperage, see the electrical data plate. It is attached to the side of the kiln's switch box on most models. If an element or a relay burns out, the kiln will draw less amperage. Before checking the amps, check the voltage under load with a voltmeter. (Low voltage will cause low amperage, too.)

The ammeter is simple to use, as you will see from these instructions. But since you will be exposed to live wires, only a qualified repair person or electrician should perform the ammeter test.

- 1) Read the instructions that came with the ammeter.
- 2) Shut off the circuit breaker for the kiln's wall receptacle or unplug the kiln.
- 3) Open the kiln's switch box. (It is the enclosure that contains the kiln's switches or controller.) Place the ammeter clamp around either of the two hot wires coming into the switch box from the cord set.

Caution: Leave the kiln's switch box open, but be careful not to touch the electrical components during Step 4. Electrical parts inside the switch box carry live voltage when the power is turned on.

4) Turn on the breaker or reconnect the power. Start the kiln. (Manual kilns: Turn all switches to the high position. Digital kilns: Program a full rate in Ramp-Hold mode. Paragon's Sentry 12-key controllers also have an Element Test option that is designed for testing the elements with an ammeter.) The meter will show the total amperage that the kiln is using.

5) Disconnect the power, remove the ammeter, and close the switch box.

Result 1: Amperage is a little below normal. Consider replacing elements if the firing time is excessive. The voltage could also be low temporarily, in which case you may not need new elements.

Result 2: Amperage is way below normal. The problem is most likely a broken element or relay.

Kilns with more than one relay: By checking the amperage of each individual relay, you can find burned out elements or a bad relay. Clamp the ammeter around one wire that goes from the relay to the element(s).

RECENT Q&As

Q. My A-series Paragon kiln fires on Low and Medium but not on High.

A. (The A-series kilns have 4-way rotary switches. You will feel a distinct click between Off, Low, Med, and High.) Ordinarily, this is due to a dirty Kiln Sitter contact block. This assembly is under the plunger button on the other side of the Kiln Sitter cover plate. If one hot line is not making contact in a dirty Kiln Sitter contact block, the following could happen:

1) On Low, the elements light up.

2) On Medium, every other element lights up.

3) On High, none of the elements light up, because both sides of the Kiln Sitter contact block must carry current for the elements to operate on High.

You can usually solve the problem by cleaning the contacts with a pencil eraser. (Never use emery cloth.) The contact block is not difficult to disassemble if you are careful to catch all the washers and nuts as they fall out of the contact block. A magnetic tool makes dis-assembly easier.

Q. Every time I turn on my Sentry Xpress prior to programming, I get an E-1 in the display. This "error" message is not in the user manual. I am assuming it's just a start up code and not really an error.

A. E1 is the software version of your Sentry Xpress 4.0 controller. It is not an error code. Earlier versions of the controller did not show the software version on start up. Controllers that show this on start up have Add Hold Time, Change Target Temperature, Alarm, and Thermocouple Offset. These features are new with the 4.0 version.

Q. Does the flame from burning cork clay hurt the kiln's heating elements?

A. No, because the clay burns for such a short time.

Q. If I open the door while my digital kiln is hot, will the kiln continue to fire within the programmed firing schedule after I close the door, or will I have to restart the kiln and adjust the firing schedule?

A. Cracking open the door for a moment will barely affect the interior of a firebrick kiln. This is because the insulation stores so much heat. The temperature may go down, but when you close the door, the temperature will quickly begin to rise again.

Opening the door wide will lower the temperature farther than cracking the door open. This may happen when removing a piece during copper enameling or when raking the glass. But the controller will automatically begin raising the temperature again to continue firing the segment that you programmed. You do not need to reprogram the kiln.

Opening the door may trigger an alarm message that indicates the kiln cannot heat as fast as you had programmed. But the kiln will continue to fire.

MEMORABLE QUOTE

“Imagination is more important than knowledge.” --Albert Einstein

One of my favorite kiln quotes is from Kathleen Krucoff, who wrote that her Paragon kiln hums like a large kitten. That humming is the sound of elements vibrating in their grooves. Kathleen's simile reminds me of my cat, Bear, whose purring can be heard over a cell phone.

Basic Glass Cutting

CONTENTS

Basic Glass Cutting

Reader Response: Annealing silver

Recent Q&As: Testing a relay with a battery; preventing sharp edges on glass pendants

A Kiln Story: Kiln Barbecue

Memorable Quote

BASIC GLASS CUTTING

Always wear clear safety glasses while cutting glass. Small glass slivers easily become airborne.

1) Lay the glass on a clean, flat surface. Mark off the cut with a grease pencil at each end of the glass. Lay a straight edge over the glass and line it up with the marks you just made.

2) Hold the straight edge firmly and score the glass with a quality glass cutter (preferably one with an oil reservoir). Hold the cutter vertically and not slanted. Press hard enough so the scoring noise sounds steady and unbroken. But don't press harder than you need to.

3) Place the straight edge under the glass so an edge of the straight edge is lined up with the score line you just made. Press down on the glass to break it on the score line.

A quality glass cutter with oil reservoir, available from art glass suppliers, is much easier to use than the inexpensive cutters sold in hardware stores. A good cutter will save enough glass to pay for itself.

READER RESPONSE Annealing Silver

Jann Greenland of Greenland Creative, Inc. in Little Rock, Arkansas wrote, "I finished a first round of trials of annealing sterling with the Sentry Xpress 2.0 and wanted to fill you in. I am using a kiln to anneal a 'large' piece of metal, rather than using the torch, hoping for more consistent results. I used a 2.5 oz. strip of textured sterling (started at 16 gauge before roller printing) that I am making into a cuff bracelet and tried three different schedules.

"In all three trials, I ramped at full rate to 1150 degrees F and held for 15 minutes. In one, I left the metal to cool with the kiln door closed, no venting. In another, I opened the door after heat soaking for air cooling. In the third, I quenched after heat soaking.

“The trial with the door closed provided no appreciable annealing. In both other cases, I got good results. It wasn't ‘like butter,’ but I could initially bend the metal by hand.

“The entire firing time took 29 minutes, so it's not for someone in a hurry. I tend to work on several things at once, so it worked out fine for me. I would be interested in hearing about others' experience with annealing metal in the kiln.” jupiter@jannland.com

RECENT Q&As

Q. Is there a way to test a mechanical relay while it is outside the kiln?

A. Yes. You will need a 12-volt lantern battery and an ohmmeter. Look at the kiln's wiring diagram, and find the two terminals on the relay where the wires from the controller are connected. Using two wires with alligator clips on each end, hook up the 12-volt lantern battery to those two terminals. The battery acts as the signal from the controller. When you make the connection, you should hear the relay click.

Use the ohmmeter to test the action of the electromagnet inside the relay. Please see “Trouble Shooter for the Sentry Controller” for more details.

Q. How hot is the exterior of the Home Artist, SC-2, and SC-3?

A. Less than 250 degrees F. These kilns have an air channel between the firing chamber and the outer steel case. This helps to lower the case temperature.

Q. Some of my glass pendants have sharp edges, and some of the design work blended together and lost detail. How do I correct this?

A. The easiest way to eliminate the sharp points in the pendants is to fire to a lower temperature. That is also the way to retain shadow lines formed by the separate pieces of glass. The higher the fusing temperature, the flatter the glass surface becomes.

A KILN STORY: Kiln Barbecue

David Snyder of All Fired Up in Charlotte, North Carolina wrote, “Look before you fire! Or barbecue? A client had her kiln set up in a barn. She had not fired the kiln for at least a year. She started the kiln to see if it still worked, left the barn to take care of other things, and came back shortly to find smoke pouring out from under the lid of the kiln. She called me in a panic asking what she should do, and of course I told her to turn off the kiln.

“The next day I opened the kiln, and under a full shelf one inch off the kiln floor was a charred family of mice. They had chewed a small hole through the bottom of the floor and nested in the kiln under the shelf. We cleaned most of the remains from the kiln. I told her to fire to a cone 04 to ‘clean’ the rest of the mess. I then returned to patch the bottom of her kiln. Electrically it worked just fine.”

MEMORABLE QUOTE

“Life is either a daring adventure, or nothing.” --Helen Keller

A kiln can magically transform pieces of clay or glass. Recently I was with my 13-year-old niece, Sophie, and noticed she was wearing a small glass pendant I had made for her. Fused dichroic shards glittered on a blue glass background. She said she wore it all the time, even when she slept.

Drying Greenware

Photo caption: Happy Halloween from Paragon! L to R: Teri (Hells Angel), Veronica (50s teeny bopper), Laura (wicked witch), Susan (hippie), Shelia (Little Red Riding Hood). Sitting: Maria (the dark angel).

CONTENTS

Drying Greenware

Recent Q&As: 2 1/2” and 3” wall kilns; direct-wiring a kiln

A Kiln Story: A Beautiful Overfiring

Memorable Quote

Halloween at Paragon

DRYING GREENWARE

The drying time of ceramic greenware depends on the thickness of the clay, the method of drying, and the humidity in your area.

Touch the greenware to the inside of your wrist or to your cheek. If it feels warm, it is usually dry. Be sure to check the bottom of a piece, which retains moisture longer than

the upper, thinner sections. Dry longer if the clay feels cool or if it has dark patches, which indicate moisture. Note, however, that in humid areas, even damp greenware can feel warm. Greenware feels cool due to evaporation. Damp greenware can feel warm when the moisture in it stops evaporating.

An efficient way to dry greenware is to place it inside an enclosure such as a metal cabinet that contains a small electric heater. This is called a hot box. The moisture in the clay raises the humidity inside the cabinet. The humidity keeps the clay surface moist, which prevents the surface from closing up and trapping moisture inside the ware. Thus, the high humidity allows the clay to dry evenly. As the clay continues to dry and moisture slowly leaves the cabinet, the humidity drops, which causes the clay to finish drying.

RECENT Q&As

Q. I am trying to decide whether to buy a kiln with 3" walls or 2 1/2" walls.

A. Get the kiln with 3" walls if you are firing to cone 6 or above, because the kiln's heating elements will last longer. If you were firing to cone 05, then it wouldn't matter which model you chose.

Electrical cost to fire the 3" wall kiln is slightly lower than to fire the 2 1/2" wall version. In 1980 we introduced 3" wall kilns as the Energy Miser series, because they save electricity. The 3" wall kiln also takes longer to cool down. But slow cooling enhances certain glazes.

Q. The 240-volt studio kiln I am interested in purchasing comes with a cord and plug. Can it be direct wired? And isn't direct wiring a bit safer than using the plug?

A. A kiln that has a cord and plug can be direct wired by your electrician. He would need to cut off the attachment cap (plug). Yes, direct wiring is better than plugging the kiln into a wall outlet. This is because over a long period of time, it is possible for the springs in the wall outlet to weaken, causing the outlet to over-heat. Direct wiring a kiln eliminates the wall outlet altogether. However, a direct-wired kiln is no longer easy to move.

A KILN STORY: A BEAUTIFUL OVERFIRING

Dolita Dohrman of Louisville, Kentucky wrote, "At a studio in the Marshall Islands, there was a flat form that had what looked like wilted pots. I thought whoever made it was pretty artistic. It lay around the shop for months.

“I finally asked why no one had claimed it. The master potter in our group laughed and replied that the kiln had gotten way too hot and actually melted the clay as well as the glaze. What I thought was a flat form made of clay was really a kiln shelf, and the pots that were once about 8 inches high were now about 2 inches. I thought it would have looked nice as a wall sculpture.”

MEMORABLE QUOTE

“Don’t spend your precious time asking, ‘Why isn’t the world a better place?’ It will only be time wasted. The question to ask is, ‘How can I make it better?’ To that, there is an answer.” --Leo Buscaglia

HALLOWEEN AT PARAGON

When you walk through the front office here at Paragon, you have to dodge plastic bats and ghosts hanging from the ceiling. A mannequin wearing a monster mask sits in a chair just inside the front door.

One of my favorite Halloweens was the year my son, Patrick, was three years old. He was dressed as a tiny Pterodactyl, which was a flying reptile that lived in the dinosaur age.

Peephole Plugs and the Downdraft Vent

Photo caption: The downdraft vent collection cup is positioned under a top-loading kiln.

CONTENTS

Peephole Plugs and the Downdraft Vent

Reader Response: Gift trends

Recent Q&As: Erratic temperature display; turning off side elements in a glass kiln

News: Paragon Microwave Kiln

PEEPHOLE PLUGS AND THE DOWNDRAFT VENT

The downdraft kiln vent fits under a top-loading kiln or on the back of a front-loading kiln. The vent pulls a small amount of hot air from the kiln, dilutes it with room air, and vents the air to the outside.

During manual venting, the peephole plugs are removed and the lid is propped about an inch. It may seem counter-intuitive, but the peepholes should be plugged and the lid closed all the way when using a downdraft vent. Otherwise the vent will not remove the fumes, and the kiln can fire unevenly.

Cliff McCrea, a kiln technician in Austin, Texas, visited a customer who had a kiln equipped with a downdraft vent. The kiln was firing cooler on the lowest shelf; the glaze on that shelf was still powdery. The customer had been told to leave the kiln's three peephole plugs out while the vent was on.

After the customer inserted the peephole plugs, the firings were perfect. The downdraft vent had produced a cooler bottom shelf when the peepholes were open.

READER RESPONSE

Barbara Jack in Eagleville, Pennsylvania wrote, "We at Inspirations, Inc. have noticed an increase in the number of customers making gifts for the holidays. We have even had to quadruple our open workshop hours.

"We've observed over the years that while you are making a gift, the person you are making it for is always on your mind. You may even share memories of that person with others during the creating process. The person receiving the gift knows that it was made especially for them by someone who obviously cares a great deal about them, and they will think about the giver every time they use or wear the gift.

"It is a joy for us to help people to accomplish these goals."

RECENT Q&As

Q. I recently replaced the controller. It now shows an erratic temperature display. It jumps up 5 or 6 degrees and then down 3 or 4. The first controller did not do that.

A. Minor variations in temperature readout are normal. Usually there is nothing to worry about, because the actual kiln temperature does not fluctuate.

Since you just replaced the controller, the thermocouple wire connections on the back of the controller may be loose. This can cause the temperature display to become unstable.

Please check the connections by tugging on the two thermocouple wires at the back of the controller.

Q. Now that the Fusion-8 has two relays, is it possible to turn the side elements off and fire only with the lid elements?

A. The side element supplies about 30% of the heat. If you turn the side element off, the kiln will slow down and possibly not get hot enough to fuse glass. For this reason, we did not include a shut-off switch for the side element.

NEWS: PARAGON MICROWAVE KILN

Paragon has just introduced a microwave kiln for glass fusing. The kiln operates inside a standard microwave oven and reaches glass fusing temperatures in 5 – 8 minutes.

The ceramic fiber kiln, called the Paragon MagicFuse, has a 4 1/2” diameter round firing chamber. The length of firing depends on the wattage and brand of the microwave oven. After the kiln is removed from the microwave, the glass takes about an hour to cool to room temperature.

You can read more about the kiln at www.paragonweb.com

Yesterday morning as I rode to work on my bicycle, I passed grassy fields shrouded in mist. It was one of the coldest mornings we’ve had this fall, yet still mild enough to go without a jacket.

Firing the Microwave Kiln

CONTENTS

Firing The Microwave Kiln

Recent Q&As: Firing crystalline glazes without a controller

Kiln Story: The Melted Ice Cubes

FIRING GLASS IN THE MICROWAVE KILN

Recently I have been experimenting with a microwave kiln, which fits into a standard microwave oven. The kiln fires so rapidly that after five minutes, there is barely enough time for the outer surface of the kiln to become warm. Meanwhile, the orange, glowing kiln interior is hot enough to fuse glass.

I have had consistent firing results with this kiln by checking the glass visually before it has fused completely. That is the method I have used for years in firing the little Paragon QuikFire kiln.

The microwave kiln is very difficult to fire by recommended time alone. This is because microwave ovens of the same wattage can have different firing times. Also, firing times can vary even in the same oven. One afternoon, the firing time was 10 minutes. The next morning in the same microwave oven, it was 5 minutes, 30 seconds. This was due to voltage fluctuation.

Here is method I use to fire the kiln:

Set the microwave timer for a longer period than you will need. If firings take about 5 minutes, set the timer for 6 or 7.

Load the oven. Press Start. After a few minutes, open the door and lift the kiln top an inch for a second or two. Lower the top. Close the door and press Start again. (Note: You must wear clear safety glasses to check the glass. That is essential. Also, stay about an arm's length away from the kiln while you check the glass.)

A minute later (or 30 seconds, depending on how far along the glass has heated), repeat the above. As the glass gets closer and closer to final fusing, check it more often. When the glass is done and you remove the kiln from the microwave, write down the time shown in the display window. Subtract that time from the number of minutes you started with. That is your total firing time.

I have found that heat distribution varies inside the kiln unless you use the oven's turntable. If you do not use the turntable because the vibration and movement shifts the glass pieces, then fire only one or two pieces at a time.

RECENT Q&As

Q. My wife wants to try a crystal glaze. After it is fired to 2165F, the glaze needs a temperature hold of 3 hours at 1950F to develop crystals. How do I do that with a manual kiln that uses a Kiln Sitter?

A. Crystalline glazes can be fired in a manual kiln, but you will need to sit with the kiln during the 3-hour hold period. You will also need a pyrometer.

After the kiln reaches 2165F, turn off the switches. Allow the kiln to cool down to 1950F. Then raise the Kiln Sitter weight, press the plunger, and gently lower the weight. Turn the switches to Medium. If the temperature starts going back up, turn the switches down.

Watch the pyrometer and adjust the switches to maintain a temperature of 1950F. This is a balancing act. As the temperature drops a little, raise the switch settings; as the temperature goes too high, lower the switch settings. This won't require constant attention once you get the feel of it. You can read a book while the kiln fires.

KILN STORY: THE MELTED ICE CUBES

During the 70s, my supervisor at Paragon designed a calendar. One of the pages was to be illustrated with the headline "Cold feet, warm heart." He made a huge pair of earmuffs from a band of stainless steel and fake fur and placed them on top of the kiln. He poured bags of ice on the floor around the kiln.

Just when we were set to take the picture, we discovered that we were out of 120 film for the Mamiya camera, which was perched on a tripod in front of the kiln. All we had was 35 mm. The ice was melting, so we scrambled to find the 35 mm camera, load it, and mount it on the tripod. We shot the photo just in time.

I hope you have a relaxing weekend.

The Relays Inside a Kiln

Caption: Notice the slots on the bottom of the relay. Remove only one nut and bolt. See the second pointer below.

CONTENTS

The Relays Inside a Kiln

Reader Response: Over-fired clay

Recent Q&As: Glass fusing paint; life expectancy of kiln wash

A Kiln Story: Replace Only Needed Parts

THE RELAYS INSIDE A KILN

Earlier this month I taught kiln maintenance classes at the Weisser Glass Studio and the Vitrum Studio. One of the students brought a small digital Caldera kiln for me to check. I'll share two pointers about relays that come from that experience.

First, what is a relay? Digital kilns and some switch-operated kilns use them to turn on the heating elements. The digital controller sends a signal to the relays. Inside each relay, the power from the controller charges an electromagnet, which closes contacts that turn on the elements.

This may be easier to understand if you experimented with electromagnets in high school science class. I remember wrapping a nail with wire at age 13. The nail became a magnet when the wire was hooked up to a battery. That's how a relay works. A magnet inside the relay pulls contacts together. (To better understand how a relay works, take apart an old one you are replacing. You will find the electromagnet and the contacts.)

The two pointers:

1) A relay may be burned out even if it still makes a clicking noise.

A relay makes a clicking noise every time its electromagnet brings the contacts together. (Mercury relays are silent, however, because they don't use mechanical contacts.) The kiln that I checked made a normal clicking noise as the relay operated. But the heating element didn't turn on. I checked the relay with a voltmeter and discovered that it was burned out.

2) Most relays are held in place with two sets of nuts and bolts. When you replace a relay, check to see if it has slots or holes where the bolts fasten. If the relay has slots, remove only one bolt and nut. Loosen the other. Then slide out the relay from the loosened bolt. This will save you a lot of time especially if you are working in a cramped switch box.

READER RESPONSE

In the last Kiln Pointer I related the story of an instructor who over-fired ware because he didn't know the students had purchased low-fire clay. Carole Dwinell of Martinez, California wrote, "The studio where I take classes has had that problem once or twice too, where students have brought in a piece to be fired that the instructor thought was made with studio clay. There are signs ALL over the studio saying NO OUTSIDE CLAY, and they sell only cone 10 clays. At the beginning of each session, they display a kiln shelf with an ugly mess of melt-down on it. Pictures are sometimes better than words."

RECENT Q&As

From an August 28 Pointer:

Q. In the Kiln Pointer that demonstrated Glassline paints, a pen was used. Where can I purchase one?

A. You can buy the pen directly from the author, Larry Pile:

Misteroldhouse@aol.com / www.kesslercraftsman.com

Q. I've been having trouble with the coating on my kiln shelf lasting only one or two glass firings. It used to last five or six. The kind of kiln wash I use hasn't changed. I fire it the same. Any hints?

A. The lower the firing temperature, the less the kiln wash (or glass separator) sticks to the glass. I have had half a dozen firings from one application of kiln wash on the shelf when firing to a mid-fuse. Sometimes you can lay small glass pieces on areas of the shelf that still have a good coating of kiln wash and avoid the areas where the kiln wash has flaked off.

The higher the glass fusing temperature, the more often you need to apply the kiln wash. Some artists recoat the shelf after every glass firing. This is to avoid the possibility of laying glass over cracked or flaking kiln wash.

A KILN STORY: REPLACE ONLY NEEDED PARTS

Careful diagnostics can save money in replacement parts. Tony Rodriguez of San Antonio, Texas wrote, "A contemporary studio customer asked me to check her kiln. The complaint was that the bottom of the kiln was grossly under-firing. Someone had told her she needed to change the thermocouple, all the elements, and all the relays. Some of the LED lights in the digital display window were burnt, so some of the letters/numbers were hard to read. Again, she was told she had to replace the controller board, too. She had been using the kiln with the bad LED readouts for over a year without any firing problems until now.

"When I checked the kiln," Tony wrote, "the actual problem was only a bad relay for the bottom two elements. That accounted for the under-firing."

Have you ever noticed that no matter how many times you have fired a kiln, it is still exciting to open it? You never know exactly what you will find. Some of my favorite

glass pieces were mistakes. Recently, glue discolored a bluish dichroic piece and gave it a silvery cast. It was an exquisite gift from the “kiln gods.”

The Importance of Labeling Clay and Glass

CONTENTS

The Importance of Labeling Clay and Glass

A Kiln Story: Safety First

Recent Q&As: Painting on glass; cosmetically challenged kilns

News: The Future of the Kiln Sitter

THE IMPORTANCE OF LABELING CLAY AND GLASS

Sometimes small, overlooked details are the most important. A customer told me about an over-firing that happened in the kilns at a recreation center. Students bought cone 06 clay without informing the teacher. He loaded several studio kilns with student ware thinking that it was cone 6 clay. The clay over-fired, collapsed on the kiln shelves, and ran off the edges. This ruined 30 large, expensive shelves.

A teacher once told me that in the school setting, one of the main errors is in firing clay to the wrong temperature because the clay was not labeled. If you are not sure about the temperature of a clay, fire a test sample in a small kiln.

This also applies to glass. Yesterday I threw away a beautiful piece of dichroic, because I wasn't sure whether it was rated COE 90 or 96. If you fuse COE 90 to a piece of COE 96, the glass will probably break, sometimes weeks after you fired it. You will not have to worry about labeling glass if you buy only fusing compatible glass. Otherwise separate by COE number, and clearly label all containers.

A KILN STORY: SAFETY FIRST

Lise Brown of Nashville, Tennessee wrote, “A 6” strip of skin from my dad's forearm is still fried onto the side of the kiln where he fell against it, receiving third-degree burns. (He threw up his arm to save his face.) Every time before turning on a kiln, I check for combustibles and safety hazards and also make sure the electrical cord isn't touching the

side of the kiln. It's so easy to forget how important safety is when we work with kilns every day.”

Lise told me her father is okay now. Please remove tripping hazards from around your kiln.

RECENT Q&As

The last Kiln Pointer was on firing painted glass.

Q. What type of paints would you use to paint on glass before firing it?

A. The paint is called Glassline and made by the Clay Art Center in Tacoma, WA:

www.clayartcenter.net

The paint can be brushed or sprayed onto the glass. It can also be applied directly from the squeeze bottle, which includes metal tips in three sizes.

Q. Is it normal for the paint on a kiln to peel? What about rust?

A. Peeling, discolored paint around the door of a front-loading kiln is normal and is nothing to be concerned about. Kilns do not stay new looking for long, because they undergo drastic temperature changes.

The rust is also normal even on stainless steel kilns. To reduce rust to a minimum, fire only dry greenware. You can fire moist greenware using the controller's Pre-Heat feature, but it is better to fire only dry ware.

NEWS: THE FUTURE OF THE KILN SITTER

As you may have heard, W. P. Dawson, the manufacturer of the Kiln Sitter, is out of business. This has caused a lot of worry in the industry. Here is a message that came today from The Edward Orton Jr. Ceramic Foundation about the future of the Kiln Sitter:

“Orton knows that many of you are concerned that you will not be able to get replacement parts for your Dawson Kiln Sitter and that you will be forced to purchase an expensive alternative. There has been much speculation and rumors about the status of the Dawson Kiln Sitter and replacement parts.

“Orton is taking positive action to work with the owners of Dawson to acquire the necessary assets to continue the production of the Kiln Sitter and provide the industry a

long term, reliable source of parts for the Kiln Setter. This process and the ramp up of production will take a few more weeks to complete. Orton will strive to make the process as efficient as possible so that you can get replacement parts as soon as practical. A public announcement will be made as soon as parts are available. Monitor the Orton website to be the first to know.

“The Edward Orton Jr. Ceramic Foundation manufactures and supplies pyrometric cones, kiln vents, electronic temperature controllers and firing supplies to the ceramic industry worldwide.”

By the time Hurricane Ike reached Mesquite, Texas last Saturday, the storm had become a gentle wind that blew rain against the northern side of my house. I hope all of you along the coast escaped Ike and are safe at home now.

Firing Painted Glass

CONTENTS

Firing Painted Glass

A Kiln Story: Flowers standing in the sun

Recent Q&A: Brick repair

FIRING PAINTED GLASS

By Larry Pile

Photos by Katie Bielamowicz

As an artist with a long-time fascination around Japanese culture and art, I recently developed a line of fused glass pendants that feature painted Japanese kanji.

This article will describe the process step-by-step. The kanji symbol I’m painting in the pictures is the symbol for “the present” or “here and now.”

I start by using a template to cut my pieces of fusible glass in a square. The pendant pieces pictured have a background of black Spectrum 96 glass with a foreground of various Spectrum fusible colors. I have applied the same techniques to opaque, cathedral, clear, and dichroic glass as well.

Depending on the style of bail or snap-ring used to attach the piece to the necklace cord, I may also drill a 2 mm hole for the snap ring before ever attaching the foreground piece and before firing.

Once my pieces are cut to a uniform size, I use a tool called an Air Pen to apply my kanji characters. The Air Pen is air-operated and was originally developed for silk painting. It forces any kind of liquid through a very fine needle-shaped tip. The tool comes with various sized tips for liquids of varying viscosity and for thinner/thicker lines. I tend to use the finer tips to apply dark Glassline glass enamels.

Once the kanji characters are applied and have fully dried (just a few minutes), I use gel-glue to glue the foreground piece to the background. I keep the glue off of dichroic glass because it tends to discolor the dichroic upon firing.

I then assemble the pendants on the kiln shelf of my Paragon Fusion-10 or my Paragon Caldera and tack-fuse the pendants, insuring that the square pendants don't excessively round while firing. Once the pieces have cooled in the kiln, I attach the bail or snap ring and then ready the pendant for final sale.

If you have any questions, I may be reached via the below e-mail address or website. I hope you enjoy this technique and adapt to your own work!

Misteroldhouse@aol.com / www.kesslercraftsman.com

Thank you, Larry, for kindly sharing your glass painting technique. Katie Bielowicz did a great job shooting the photos.

A KILN STORY: FLOWERS STANDING IN THE SUN

Carol Lambert of Sandman Glass in Rigby, Idaho wrote, "It was a busy day, and I was not thinking. I was fusing a beautiful hand-cut amber stained glass 13" serving platter. I felt it was one of my best art glass pieces.

"It was in the last stages of firing, and I was excited that it was almost done. I decided to take a sneak peek. I couldn't see my pyro gloves nearby, so I grabbed a rag to protect my hands from the heat while opening the kiln. When I did this, the rag caught fire, which flashed my art glass piece right above the flowers on the left side. I now call this piece 'Flowers, Standing in the Sun.' It is one of my prized possessions."

As Carol found, a kiln can give serendipitous, magical results.

Please learn from Carol's story. Use only fire-resistant gloves or Paragon's lid lifter to touch the hot kiln handle.

RECENT Q&A

Q. I just replaced my sidewall elements, and a 3" long soft brick groove broke off while doing the job. How does one go about gluing it back into place?

A. Small sections of element groove are difficult to cement back into place, because the section that is to be cemented is so narrow. Instead, secure the element with an element pin.

Should you decide to cement the piece, use kiln repair cement. Temporarily lay a piece of paper around the element to prevent the cement from touching the element.

I wish you a relaxing Labor Day weekend. It will be a good time to make beautiful things with your kiln.

Designing with Dichroic Glass

CONTENTS

Designing with Dichroic Glass

Reader Response: A multimeter left on a kiln lid; heating pizzas

DESIGNING WITH DICHOIC GLASS

The easiest way to enhance a glass fused design is to add dichroic. Fuse a small piece to earrings or a pendant, and you will hear admiring comments.

Dichroic glass has a shiny metallic coated side over a clear or opaque glass base. The type with an opaque glass base is fused with the coated side up. The type with the clear glass base can be fused with the coated side up or down.

When fused with the coated side up, the dichroic surface has a metallic sheen. With the coated side down, the same dichroic glass sparkles like diamonds and changes colors as you look at it from different angles. The base transparent glass on top magnifies the colors and makes them glisten. Sometimes you will see the colors of the rainbow.

As you assemble the glass pieces, it is easy to tell which side of dichroic is up when you know the trick: Look for the shadow at the edge of the glass. The coated side will have no

shadow. With the uncoated base side up, the edges of the glass will cast a shadow onto the coating. Turn the glass so that the shadows move, and you will see them.

Dichroic glass is expensive. A small bag of scrap pieces is over \$60. But you don't need much. In fact, too much dichroic can overpower a design. Add a few shards of dichroic to a dark background for the full effect.

Test a sample piece before gluing a transparent-base dichroic into a design. The glue can discolor the coating.

READER RESPONSE

Last week's Kiln Pointer included an anecdote about a cell phone that had been placed on the lid of a kiln. David Coggins, a kiln technician in Queensland, Australia wrote, "Your item about the slightly melted phone reminded me of a similar tale.

"When I was repairing kilns, I looked after an Italian-made ceramic tile tunnel kiln at a large factory. The tiles were taken on a conveyor belt from one end through a pre-warming area, through the main chamber, then through a cooling area and out the other end. The main chamber had rows of elements above and below the conveyor.

"The conveyor rollers were special high quality stainless steel to withstand the chamber heat. They required replacement from time to time and were very expensive. At one time, a penny-pinching manager decided to use ordinary steel rollers instead. After a while, the plain steel rollers corroded through and broke, destroying a couple of elements and their supporting ceramic rods. My job was to make new elements, replace the elements and support rod, and fit a stainless steel roller.

"I had been called to repair the tile kiln. It was late in the day, I had a long drive home and was keen to get away, so I was glad to complete the job and head for home. When I got home, I realised that in my haste to leave, I had left my \$500 Fluke digital multimeter behind, and that it was probably on top of the kiln! They usually turned the kiln on the previous night before a firing run to ensure that it was up to temperature. I hoped this was not going to happen that night. I couldn't call as they had gone home by then, so I had to wait impatiently until the next day.

"I called first thing, and of course they had switched the kiln on the previous night. They rescued my meter and said, 'Oh, it's a bit warped.' I rescued the meter, but of course it was useless. Another expensive lesson."

Lise Brown of Nashville, Tennessee wrote, "If you place a pizza still in the cardboard box (this is crucial) on top of a kiln lid that's cooling down (of course!), it creates a perfect crust: still chewy but with a delightfully crispy bottom. It's even better than fresh,

so we put fresh ones on it right away. Regular crusts work best, pan crusts benefit some, and thin crust doesn't matter much.

“Furthermore,” Lise added, “garlic-butter dip, soy sauce, salad dressing, and aprons accidentally toasted on the lids cause no harm and are no reason for panic, though they may leave unsightly spots and minor brief smells. But why do I suspect you already know some of this...?!”

Two nights ago I woke up at 1 a.m. to the sound of thunder crackling like shotgun blasts. The rain-pelted windows rattled, and the lightning cast momentary shadows in my room. I have always enjoyed thunderstorms.

I hope you have a great weekend.

Reworking Fused Glass

CONTENTS

Reworking Fused Glass

Reader Response: Vincent van Gogh painting; a friendship pendant

Recent Q&As: A gap under the kiln lid; element pins

A Kiln Story: The Hot Lid

REWORKING FUSED GLASS

By Diana Chase

www.dianachase.com

Many beginning fusers get frustrated when their fused glass doesn't match the vision in their head. In fact, seasoned veterans like me still have the occasional disappointment when we open the kiln to see a project that did something unexpected.

Don't give up. Stay flexible and see what you can do to change the design into a success. For example, one of my students made an 8" disc to be slumped over a flower mold. We balanced the disc on top of a steel column with fiber board as a separator. The glass slumped down into four prominent folds, but it closed so tightly that we couldn't get the steel out. Undaunted, we inverted it and slumped it again to open it up and release the

steel column. But the steel made the glass heat unevenly, and it cracked in half on the heating-up end of the cycle. So we took the two halves, fit them together, added a bit of iridescent bronze, and voila! It's a beautiful bowl, and it's recycled too!

(Diana Chase has made some of the most spectacular glass art in Dallas, Texas. She is one of the pioneers of glass fusing. –Arnold)

READER RESPONSE

In the last Kiln Pointer I wrote about a glass jewelry artist who visited Auvers, France to see a church that Vincent van Gogh had painted.

Bonnie Hellman of Ouray, Colorado wrote, “Reading about Auvers reminded me of my visit there in June, 2004. In the cemetery where Vincent and Theodore van Gogh were buried, there are a number of grave markers that look like stone caskets with ceramic flowers resting on top. I had never seen this anywhere else.

“We saw the church from the Van Gogh painting,” Bonnie wrote. “When we were there it was the wrong time of day to take a photo from his painting's vantage point because we were facing the sun. There are several signs around town about him, including a few with a small reproduction of his painting at the spot where the painting had been created.”

Larry Pile of Kessler Craftsman in Dallas, Texas wrote, “As a glass artist, I was intrigued by the mention of traveling and 'connecting' with other artists.

“I, too, seek out other glass artists and glass manufacturers. Recently on a trip to Portland, Oregon, I took a dozen small fused glass pendants with the Japanese Kanji symbol for ‘friend’ painted on with Glass Fire enamel. Imagine the delight when we gave these to friendly hotel folks, the tour guide at the Bullseye factory, and a glass aficionado at the Portland Museum of Art.”

RECENT Q&As

Q. Why does my new kiln have a gap between the lid and top of the kiln?

A. Most Paragon kilns have a gap (approximately 3/32") under the lid near the hinge. This is to compensate for expansion of the firebricks. At high temperatures, the gap closes. The gap allows the lid to fit better as the firebricks expand.

Even after the gap closes, though, the lid will distort slightly as it gets hot, causing a line of light to appear under the lid. This is normal and results in very little heat loss, because at high temperatures, heat is no longer affected by convection. This is why there is little heat loss from an open peephole.

Q. What type of computer connection is required for the Sentry 2.0 computer interface kit?

A. The interface kit is designed for an RS232 connection. However, with an adapter, it can be plugged into a USB port.

A Kiln Story: The Hot Lid

Judi Emerman of Pepper Pike, Ohio wrote, "The lid of a kiln is a great place to keep a coffee cup warm."

But not a good place for a cell phone. Todd in Lakewood, Colorado wrote, "I had a friend over who was watching me work. I told her to be aware of the hot kiln. She didn't take me seriously and set her cell phone on the kiln for a minute or two.

"The cell phone stopped working, and she took it in to see if it could be fixed. The repairman looked at it and told her it had somehow gotten very warm and the components melted. My friend put two and two together and remembered the kiln."

A Potter's Magnifying Glass

CONTENTS

A Potter's Magnifying Glass

Recent Q&As: firing glass pendants, stilts fired to cone 6, flash coming from Kiln Sitter

A Vacation idea

A POTTER'S MAGNIFYING GLASS

By Lili Krakowski

Many beginners are willing to spend big bucks on equipment but forget the essentials such as books and a magnifying glass. I have not worked on glaze without a magnifying glass since 1951.

A strong magnifying glass or loupe is an essential tool when testing glazes. Magnification shows up crazes the naked eye can't see. It allows one to tell whether a glaze has a slight crawl or simply looks that way. One can tell tiny bubbles from pinholes and from material suspended in the glaze. And if the test-tile is broken, the interface between glaze and body--which many consider the most important aspect of glaze fit--is clearly visible.

Lili Krakowski learned about magnifying glasses from Hobart Cowles. Lili has been potting since 1949 (a year after Paragon was founded), and graduated from the School for American Craftsmen in 1953. She is a studio potter making functional ware. In recent years she has been making sculptural pieces. She wrote "Basic Internet Glaze Course" (to be found on the Internet).

I recommend a printer's loupe as a potter's magnifying glass. I used them in darkroom work before digital photography. The printer's loupe is small and very powerful. The one I have used for many years is the No. 5410 Paragon 10X Triple Lens Folding Magnifier, which is available at www.americanprintingequipment.com for \$66.00. (It is pure coincidence that it is named Paragon!) --Arnold

RECENT Q&As

Q. This is a follow-up question to your "Making A Simple Glass Fused Pendant" article. I've been told and have read many times that even to make a pendant like the one you pictured, I need to follow a slow ramp up schedule with a soak time, and a quick cool, followed by a very slow cool down. What did you mean when you wrote, "Firing and cooling time is as fast as your kiln will go"? Can I literally ramp up and cool down as fast as my kiln will go and still maintain the integrity of the glass? Will it be annealed properly? I am really hoping you say "Yes," as my total firing time including ramp up and cool down is 13 - 15 hours.

A. Small glass projects such as the 3/4" x 1 1/2" pendant shown in the last Kiln Pointer can ordinarily be fired as fast as the kiln will go and without controlled cooling through the annealing range. For instance, Paragon's small QuikFire will reach 1000 degrees F in five minutes. That kiln fires the piece so quickly that you can hold the finished, completely cooled piece in your hand an hour after you begin the firing. The smaller and thinner the glass, the less annealing time needed.

Long, slow firing schedules such as the one you are using are designed for thick glass such as large plates. This is especially true for pieces that have already been fused and are being fired a second time for slumping. Glass layers that are fused together require a slower firing than separate layers of the same size glass.

Q. I recently fired cone 6 glazed ceramic pieces that had glaze on the bottom, so I sat them on stilts. Two of those came out completely fused into the stilts. Have you ever heard of that happening?

A. Stilts are designed for low-fire ware in the 05 range. They can sometimes be used on very light cone 6 ware, but it is risky. If the ware is heavy, the stilts will embed into the clay.

Q. My kiln has a Dawson Kiln Sitter. When the weight drops at the end of a firing, a faint flash appears. Is that normal?

A. Yes. The flash is from the electrical contacts separating, which turns off the power to the elements. You will see the flash coming from behind the Kiln Sitter button.

If you see a flash when you press in the Kiln Sitter button, it is because the kiln switches are turned on. Before pressing in the button, turn off all kiln switches. Turning on the switches before pressing the button will shorten the life of the Kiln Sitter contacts.

A VACATION IDEA

A customer told me that he and his wife, who makes glass jewelry, visit the studios of local artists when they travel on vacation. Wherever they go, they feel immediate rapport with other artists.

One year they visited Auvers, France, the town where Vincent Van Gogh lived out his last few months. A church that he painted is still standing; they enjoyed comparing it with his famous painting. As they gazed upward at the brick walls, tall windows, and the central tower, they felt that they were looking at the church through the eyes of Van Gogh himself. The church is near the cemetery where he is buried.

The Basics of a Temperature Controller

Photo caption: The Sentry 2.0 digital temperature controller is made by the Orton Ceramic Foundation.

CONTENTS

The Basics of a Temperature Controller

Reader Response: the smoking kiln; the first firing; kiln songs

Recent Q&As: unplugging a kiln; compensating for an inaccurate pyrometer

THE BASICS OF A TEMPERATURE CONTROLLER

Some controllers are more complicated than others, but they all do three things. Once you understand this, you can understand any digital controller.

1) A controller fires at a controlled heating rate, or speed. This is usually measured in degrees of temperature change per hour. (This is like measuring the speed of a car in miles per hour.) At a rate of 100° per hour, it would take 10 hours for the kiln to reach 1000°.

2) A controller fires to a target temperature. This is the same as turning the dial on an oven to 350 degrees to bake potatoes, except the temperature for glass and ceramics is much higher.

3) After the controller reaches the target temperature, it can also hold, or soak, at that temperature. This is the same as the oven baking potatoes at 350 degrees for 45 minutes. On a controller, that would be called a 45-minute hold.

The controller fires in segments, or stages. Each segment has a firing rate, target temperature, and hold. After the controller has fired the last segment, it turns off power to the heating elements.

READER RESPONSE

Last week's Kiln Pointer included a story called "The Smoking Kiln." Newy Fagan of Ocklawaha, Florida wrote, "I was at a glass event once, when we smelled something burning. It was the kiln instructions in the plastic bag that were not removed when the instructor turned on the kiln for a bead class. No names mentioned, but another case in point for the 'Smoking Kiln' saga."

Carol Kothmann of Mason, Texas wrote, "For the first few firings, I had to have my husband around for moral support. I had never fired a kiln, nor even seen one used. My husband had no experience either, but somehow it felt much better to have him with me. I found it amazing to realize the amount of heat required to create the glowing interior. My husband was not so easily impressed as he had taught welding. Hot things don't bother him."

Angela deMott of Santa Monica, California wrote, "Peepholes, peepholes that need people, are the luckiest peepholes, in the world..."

"Jeepers, creepers, where'd ya get those peepholes..."

RECENT Q&As

Q. Would unplugging the kiln erase the digital programs? Should the kiln be unplugged when not in use?

A. Yes, you can unplug the kiln. The digital programs will stay in memory even without power. For safety, you should unplug the kiln or disconnect the power when the kiln is not in use.

Q. I use a portable analog pyrometer with a thermocouple inserted into one of the peepholes. When cone 6 is down and cone 7 is starting to bend, the pyrometer reads 1960F, although Orton says the kiln is between 2260 and 2300 according to the witness cones. I would like to know how to make the pyrometer more accurate so I can use it to hold-soak to get crystals.

A. Because of the cone tests, you know the pyrometer reading is 300 F. too cool in the cone 6 - 7 range. Merely add 300 degrees to the readings in that temperature range.

Make sure the thermocouple is inserted the same distance into the firing chamber and in the same peephole with each firing so that you will get consistent readings. Also, check that the thermocouple lead wire connections are tight.

Q. While this is fine for knowing when I am close to cone 6, how consistent would the error be at other temperatures? Is it likely that the pyrometer will be consistently 300 degrees low throughout the firing (at least after reaching 1000), or does the discrepancy vary at higher or lower ranges?

A. Your pyrometer reads 300 degrees too cool in the cone 6 range. But in other temperature ranges (i.e. cone 04), the readings may not remain consistently 300 degrees off. For this reason, you should test the pyrometer with cones for the other temperatures where you will do a soak.

Last Saturday my wife's uncle, Mark, was on life support at Baylor Medical Center after undergoing surgery. In late afternoon, a nurse switched off the array of monitors and respirator. Computer screens went black, the indicator lights on machines faded, and the mechanical breathing went silent.

At a moment like that, one realizes that most of our concerns are meaningless. It is friends and family that really matter.

Making a Simple Glass Fused Pendant

CONTENTS

Making a Simple Glass Fused Pendant

Recent Q&As: Firing at night for lower rates; three-zone firing; shelf spacing

A Kiln Story: The Smoking Kiln

MAKING A SIMPLE GLASS FUSED PENDANT

Small glass fusing projects allow you to be creative without learning the technicalities of glass fusing. This project took me eight minutes to cut and assemble. Firing and cooling time is as fast as your kiln will go.

After firing, the pendant is done. You do not need to glue a jewelry finding to the back, because the design includes a channel that is fused into the glass where you can string a cord. Use glass that is rated fusing compatible.

If your email doesn't show the assembly photos, you can visit the Kiln Pointers archive site:

[Click here](http://www.paragonweb.com/Kiln_Pointers.cfm)

- 1) Cut 2 pieces of 3/4" x 1 1/2" glass.
- 2) With scissors or razor blade, cut a strip of 1/8" thick fiber shelf paper to form the channel for the cord or chain. Size: 1/8" thick x 1/8" wide x 1" long.
- 3) Clean fingerprints from the glass. Then handle only by the edges.
- 4) Lay the fiber paper across one piece of glass so that it is parallel with the 3/4" side and 3/8" from the edge.
- 5) Gently lay the second piece of glass over the first. You can glue them together with Elmer's white glue diluted with water 1:1.
- 6) Sprinkle broken pieces of dichroic glass over the top piece of glass.
- 7) Load the piece into a small kiln on a kiln-washed shelf. This can be fired in an enameling, ceramics, or jewelry kiln. Position the shelf so you can see the glass through a peephole.
- 8) Fire the glass until the glass pieces have fused together and the top piece has curled around the fiber paper scrap. Turn the kiln off before the dichroic glass flattens into the surface.
- 9) Allow the kiln to cool to room temperature.

10) When the glass is cool enough to touch, remove the fiber paper with a tooth pick and thread a cord or chain into the channel.

RECENT Q&As

Q. Does it cost less in electricity to fire the kiln at night?

A. In some areas, electricity is cheaper at night. You can find out by asking your utility company if they have a "time of use" plan. Also, ask if they have a separate demand charge. This is where they charge an extra fee when you use more electricity than usual at any given time. If they have a demand charge, you could save by firing the kiln when other appliances are turned off.

Q. How can you improve heat distribution of a three-zone kiln that fires cooler on the bottom?

A. (The answer is for the Sentry 2.0 controller. Instructions may vary for other brands.) The controller has three display lights. They each represent a zone inside the firing chamber. When a light blinks rapidly, that zone is not receiving enough heat to maintain even heat distribution. The kiln will continue to fire, though. Slowing down the firing will give the kiln more time to even out the heating. That should give the underfired zone enough time to catch up with the other two zones.

If a section of the kiln heated unevenly and the lights did not blink during firing, adjust the thermocouples with Thermocouple Offset. In this case, since the kiln fired cooler on the bottom, adjust the bottom section to fire hotter and the top and middle sections to fire cooler.

Q. I am firing tiles. Is it okay to have shelves spaced 3 – 4 inches apart?

A. Yes, you can fire the shelves as close as 3 - 4 inches apart as long as there is at least one element groove between shelves. Also, it is better to have element grooves between shelves rather than lined up horizontally with a shelf.

KILN STORY: THE SMOKING KILN

Pam East in Alpharetta, Georgia wrote, "I was teaching Enameling on Art Clay Silver at the Metal Clay World Conference last year. The conference provided me with only one Paragon SC-2 kiln for a class of 10, which I didn't think was enough. Fortunately, one of my friends, Lorrene Davis, said I could use hers for my class, giving me a second kiln.

“She arrived with the kiln not long before class started, and in my rush to get everything ready, I didn't check it. When the students arrived I walked them over to the kilns and instructed them on programming for enameling, turning them both on in the process.

“Not long after, we looked back and saw ugly black smoke pouring out of Lorrene's kiln! I dashed to the kiln, shut it off, looked inside, and saw kiln shelves, wrapped in cardboard and plastic, blackened and smoking. I used tongs to pull everything out and into a trash can and doused it with water. I was terrified we were going to set off the sprinklers!

“The inside of her kiln was a blackened mess. It looked awful. I had one of the people working the conference take the kiln to the outside dock area and fire it to 1700 degrees F for 30 minutes. When we got it back, the mess had burned out and everything was nice and white again. The kiln worked just fine for the remainder of the two-day class.

“The moral of this story is pretty obvious... If it's not a kiln you've used recently... LOOK INSIDE BEFORE STARTING IT!”

www.pameast.net

Something that might help you in these times of high gas prices:

Years ago I researched gas mileage for a writing project. The most important points I learned:

- 1) Keep the tires inflated to the correct pressure, which is listed inside the door frame of your car.
- 2) Change spark plugs every year.
- 3) When you approach a hill, speed up before you reach the hill. Do not accelerate while you are going up the hill.

I hope you have a great weekend.

Spacing Inside the Ceramic Kiln

CONTENTS

Spacing Inside the Ceramic Kiln

Recent Q&As: Glass stuck to a thermocouple; where to place a bead kiln; lid gap on an oval kiln

Announcements: Annie Chrietberg handbuilding class; Kiln maintenance seminar October 17 – 18, 2008; 9 programs in the 12-key Sentry controller

SPACING INSIDE THE CERAMIC KILN

Cliff McCrea, a kiln technician in Austin, Texas, has seen elements burned out lately due to contact with glaze. He reminds customers to keep glazed ware at least 1” away from heating elements. Glazes may bubble and land on an element if the ware is too close. When firing a piece that is so large that a tip of it comes closer than 1” to a kiln wall, place that section of the piece between elements and not directly opposite an element.

The minimum spacing between shelves is 2 1/2”. You can achieve this minimum height by stacking a 1/2” post on top of a 2” post. Shelves must be stacked so there is at least one row of heating elements between any two shelves.

The posts used with each layer of ware should be at least 1” taller than the ware. Keep a ruler near your kiln. As you fill a shelf with ware, lay the ruler across two posts to make sure the ware is not too tall.

Keep all ware and kiln shelves at least 1” away from the side, top, and bottom of the end of the Kiln Sitter tube or digital thermocouple.

Make sure at least one element groove is between the top shelf and the top of your kiln. The top of ware should be at least 1” lower than the lid. If the ware on your top shelf is over- or under-firing, try using two half shelves instead of a full shelf. Stagger the height of the shelves.

RECENT Q&As

Q. I have an SC-2 kiln (I love it!). A very small piece of glass is stuck to the thermocouple, which seems to be working. Should I try to remove the glass?

A. Scrape the glass off with a small knife. The glass could melt with the next firing and embed into the floor of the kiln if the glass were left on the thermocouple. After you scrape off the glass, the thermocouple should work as before. But even if you break the thermocouple, a new one is only \$18.

Q. I have a Paragon BlueBird XL bead kiln. It is okay to place it on a table, or should it be on a cement floor?

A. Yes, you can place the kiln on a table. The kiln surface should be heat-proof, such as a metal table or a ceramic kiln shelf on top of a table.

Q. Why does a gap form on the left and right side of the lid on my oval kiln?

A. A firebrick lid does not remain flat at high temperatures. The inner lid surface expands more than the outer surface, resulting in what we at the factory call "oil canning." Since the inner lid surface expands more than the outer, the lid bows downward toward the firing chamber. The outer surface becomes very slightly concave, and the inner surface becomes convex. The change in shape is not enough to notice except around the edges of the lid, where you will see a line of light.

The change in shape is more pronounced on the oval kiln than it is on the "round" 10- or 12-sided kilns. The oval lid bows upward about 1/4" from the kiln body on the left and right side. When the lid cools down again, it flattens out. This is nothing to be concerned about.

Q. In a recent issue of Kiln Pointer you state that Paragon sells rods to fire beads. Could you please tell me where to buy them? I want very short ones to fit in the Xpress-Q11-A kiln.

A. The rod for your kiln is the SR-5: 10 gauge, 5" (12.7 cm) long, \$2.00 each. It should be available through your local distributor. If not, please send an email to info@paragonweb.com.

ANNOUNCEMENTS

HANDBUILDING CLASS Annie Chrietberg is teaching a class on handbuilding functional pots with textured slabs and templates. Place: The Creative Art Center in Dallas, Texas. Time: Friday, August 1, 2008, 10:00 a.m. – 5:00 p.m. Please call 214-320-1275.

PARAGON BASIC KILN MAINTENANCE SEMINAR Paragon Industries will hold a 1-1/2 day Basic In-Plant Kiln Maintenance Seminar in Mesquite, Texas on October 17 - 18, 2008. Mesquite is 30 minutes east of Dallas.

The seminar includes two lunches, one restaurant dinner, and a 3-ring notebook of maintenance data on Paragon kilns. Ask about Paragon's airport and hotel pickup schedule. You do not need to bring tools.

For more information call Paragon's customer service: 800-876-4328 / 972-288-7557 or send email to info@paragonweb.com

FIVE PROGRAMS ADDED TO SENTRY 2.0 We have just upgraded the Sentry 2.0 12-key controller. It now has nine programs in Ramp-Hold mode instead of the four

programs of the previous version. The first program has 20 segments; the others have 10 segments each.

The newest controller operates the same as the earlier one. The only difference you will notice is that the extra programs are available.

Carole Dwinell of Martinez, California wrote, "We now have more than 500 wildfires blazing, and rain would be a miracle. We're looking closely at what to grab if we're evacuated. It is a major concern."

I empathize with all of you near the fires. When I was eight years old, a fireman rescued my six-year-old brother, Lawrence. The fireman found him trapped in a brush fire and carried him out. That was near Calgary, Alberta.

Wishing you an enjoyable weekend

An Update on Viewing Witness Cones

CONTENTS

An Update on Viewing Witness Cones

Basic Kiln Maintenance Seminar October 17 – 18

Recent Q&As: Testing the accuracy of a digital controller

A Kiln Story: The Fired Pretzels

AN UPDATE ON VIEWING WITNESS CONES

Recently I experimented with viewing witness cones through a peephole. I wondered if it would be possible to see them with a cell phone camera and therefore avoid the direct glare of the firing chamber.

I positioned the cones on a shelf in a Paragon TnF-23-3, fired to cone 7, and placed my cell phone in front of the peephole. The camera could not register an image even when filtered with green firing safety glasses. However, a Canon Rebel digital camera picked up the image of the witness cone, which I am including with this Kiln Pointer. The firing safety glasses that I placed in front of the camera removed some of the glare. If your email does not support images, you can see the picture in the Kiln Pointers archives:

[Click here](http://www.paragonweb.com/Kiln_Pointers.cfm)

I found it easier to see the witness cones without the aid of the camera, though. You may need to look through the peephole at different angles to see the entire cone especially if the cone is close to the peephole.

Here is a previous Kiln Pointer with more information added:

Most people have difficulty seeing the witness cones on the kiln shelf during firing. But if you position them just right, you can see them even at cone 10, when the kiln interior turns white-hot.

Being able to see the cones during firing is your assurance that the kiln is firing normally. If the kiln takes longer than usual to fire and you cannot see the cones, you may worry that something has gone wrong. Maybe the kiln is even over-firing.

In formulating these guidelines, I tested a welder's facemask, mirror, and high intensity flashlight. You don't need those items, even for cone 10 viewing.

- 1) Place the cones 8" - 12" or more away from a peephole. Positioning them closer makes them difficult to see.
- 2) Have enough space around the cones to keep them from touching a piece of ware when they bend.
- 3) Position cones so that when viewed from the peephole, they are silhouetted by an element on the opposite kiln wall. (Keep cones at least 2" from an element.) The element that silhouettes the cones should be level with the lower part of the cone. If the element is in line with the upper part of the cone, the cone will disappear from view when it bends.
- 4) The center elements in some kiln models do not glow brightly even at high temperatures. In this case, position the witness cones level with a top or bottom element. The element must glow brightly to silhouette the cones.
- 5) If you use the three-cone system, always have the higher temperature cone on the same side in every firing. Otherwise you can lose track of which cone is which.
- 6) Wear firing safety glasses when viewing the cones through the peephole.

Basic Kiln Maintenance Seminar October 17 – 18

We are holding a 1-1/2 day Basic In-Plant Kiln Maintenance Seminar in Mesquite, Texas on October 17 - 18, 2008. Mesquite is 30 minutes east of Dallas. You do not need to bring tools.

The seminar includes two lunches, one restaurant dinner, and a 3-ring notebook of maintenance data on Paragon kilns. For more information call customer service at 800-876-4328 / 972-288-7557 or send an email to info@paragonweb.com . Ask about Paragon's airport and hotel pickup schedule.

RECENT Q&As

Q. I have a glass kiln. Is it worthwhile to check the accuracy of the digital controller with a pyrometer?

A. The pyrometer may be inaccurate, too. If you had two pyrometers, you would likely get two slightly different temperature readings.

If the controller is inaccurate, it is probably actually the thermocouple that is off rather than the controller. Even new thermocouples can vary a little.

One of the main advantages of the controller is that it fires consistently from one firing to the next. But you may need to alter the temperatures from a recommended firing schedule to get the exact results that you want.

A Kiln Story: The Fired Pretzels

John Toki in Berkeley, California wrote, "A customer called to tell me her kiln was disintegrating and that the kiln bands were literally falling apart. Handfuls of iron chips were mysteriously falling near the kiln stand after a firing. I asked her, 'Did you do anything different from your other firings?' She replied, 'No.'

"I consulted with a metals expert and the kiln manufacturer without an answer to the problem. We continued to send new parts and sheet metal bands to the customer. A year and a half later, Bryan, Leslie Ceramic's general manager, was talking to the customer. She said, 'Bryan, you should see those sculptures my son is making by dipping pretzels into clay slip.'

"Bingo! That was it. The salt from the pretzels combined with moisture was migrating through the kiln brick and causing severe corrosion to all metal parts. Mystery solved!"

(John owns Leslie Ceramics and co-authored the recently revised 640-page "Hands in Clay.")

The intense summer heat is about to begin here. I learned to adjust to it during my childhood days in Tripoli, Libya. At first the heat was stifling, because I had moved there from Alaska. But eventually I could even walk bare-footed on the hot sand.

I hope you are enjoying your summer.

A Pre-Firing Checklist

CONTENTS

A Pre-Firing Checklist

Recent Q&As: An element that remained pliable after firing; determining a kiln's kilowatts

A Kiln Story

A PRE-FIRING CHECKLIST

Recently a customer thought her kiln needed a new controller, because the heating elements wouldn't turn on. But after several days, the kiln surprised her; the relays began clicking, and the elements hummed.

Upon investigation, she discovered that a delay start of 99 hours and 50 minutes had been programmed into the kiln. She asked her little six-year-old granddaughter if she had played with the kiln. The child hesitated and then said the cat might have touched it.

That little story has two lessons: Don't panic when something goes wrong with your kiln. The solution might be far less expensive than you imagine. And second, follow a pre-firing checklist. It saves time and prevents errors. Pilots use pre-flight checklists. My traveling checklist has saved me many hours over the years trying to remember everything to pack. I keep copies of it in a file folder. A checklist is especially useful if you don't fire your kiln often.

Customize this checklist to fit your particular needs:

General Checklist---

Remove flammable materials from the firing room.

Make sure the plug is pressed all the way into the wall outlet.

Check the plug and outlet for signs of heat damage.

Vacuum the kiln before firing glazes or glass.

Digital Kiln Checklist---

Make sure the thermocouple extends the correct distance into the firing chamber. (It is easy to bump the thermocouple with a shelf.)

Top-loading kilns: Look inside with a flashlight to make sure the ware or a shelf is not too close to the thermocouple.

Use Program Review to compare the actual program with a written program.

Kiln Sitter Checklist---

Make sure you are using the correct pyrometric cone number.

Remove chairs or other objects that could get pushed against the Kiln Sitter and prevent the weight from dropping.

Top-loading kilns: Look inside with a flashlight to make sure the ware or a shelf is not too close to the Kiln Sitter tube.

Make sure the cone is centered properly on the cone supports. Check this just before you close the lid.

RECENT Q&As

Q. I have always being told that elements that have been fired and come out of the brick groove are brittle. It was understood that you pinch them with a pliers only after they are heated. Last week I was stripping the elements out of an old kiln. These elements had been fired many times, yet they were pliable and springy. I feel I could have comfortably stretched or squeezed them without the fear of breaking them.

So when I have sagging elements, why can't I simply squeeze areas with pliers and reset them back in the element groove? Why heat the element? Just how brittle is an element after firing?

A. Iron chrome elements become very brittle after they have been fired. They easily break if bent while cold and must be heated with a propane torch until the section you are bending glows red.

Nickel chrome elements, on the other hand, are far more pliable after they have been fired. They can be bent while cold. But even nickel chrome elements are fragile.

Place a small magnet near the element to tell which type you have. The iron chrome attracts the element; the nickel chrome does not.

Q. How does one determine the kilowatts that the kiln draws?

A. Look at the kiln's electrical data plate. It is usually on the side of the switch box. The data plate lists the watts, amps, and volts. Divide the wattage of your kiln by 1000, which gives kilowatts.

A KILN STORY

Sylvia Hoyman of Anchorage, Alaska wrote, "When I got my kiln I had a big talk with my two- and four-year-old kids about the dangers of a hot kiln. A year later the four-year-old still warns ME every time I open the kiln, "Mom, you be careful. That can be hot!"

If you have a minute, please answer our kiln survey. I would appreciate hearing your opinion. The survey link is in the center of our home page at www.paragonweb.com .

[Click Here to take survey](http://www.surveymonkey.com/s.aspx?sm=hQC_2f7v9mQktA438sn3C6_2bA_3d_3d)

I hope you are enjoying your summer or for those in Australia, your winter.

Organizing the Kiln Area to Save Time

CONTENTS

Organizing the Kiln Area to Save Time

A Kiln Story: The Sonic Boom

Reader Response: Ceramic beads

Recent Q&As: Ceramic beads

ORGANIZING THE KILN AREA TO SAVE TIME

When we are very busy, organizing the kiln area seems like the last thing we have time to do. Yet this is one of the best ways to save time.

I was reminded of this when I visited The Bisque House in Granbury, Texas this week. It is one of the cleanest, most organized studios I have ever seen. It looks more like an expensive restaurant than a pottery and glass studio.

Organizing the kiln area will not only save you time but also increase your enjoyment of the kiln.

- 1) Keep the kiln on a stand with casters if you need to move the kiln out of the way when you are not using it.
- 2) Sort boxes of pyrometric cones by number. Not only will you save time looking for the right cones; you will also lessen the chance of using the wrong ones.
- 3) Keep kiln posts sorted by length.
- 4) Vacuum dust from the kiln area with a HEPA-filtered vacuum cleaner. Dust can accumulate inside the switch box and eventually overheat electrical connections. Keep glaze dust away from the kiln. It can burn out elements.
- 5) Store flammable materials out of the firing room. Keep paint, gasoline, and the lawnmower in a storage shed if your kiln is in the garage. Otherwise you will spend time removing these items every time you fire the kiln.
- 6) Do not store anything on top of or inside the kiln. You will waste time moving stored items out of the way to use the kiln. Storing anything on the lid may also be a fire hazard, because someone may inadvertently place something flammable on it not realizing that the lid is still hot from a firing.
- 7) Keep steel shelves near the kiln to stack ceramic ware. This places the ware near the kiln for easy loading. The heat from the kiln will also help dry the clay.
- 8) Keep important firing instructions on the wall at a convenient height so you don't have to spend time hunting for it. Examples would be a pyrometric cone chart and controller programming instructions.
- 9) Find a convenient place for your firing logbook and kiln instruction manuals. A document holder on the wall is a good location.

A KILN STORY: THE SONIC BOOM

John Toki in Berkeley, California knows a woman who lived near an air base. Loud jets flew overhead regularly and shook the windows on her house. She filed a report with the United States Air Force for a sonic boom that caused her kiln to shake so much that the pottery inside the chamber fell over while the kiln was firing.

Then she found out that the washer/dryer repairman forgot to tell her that he scooted the kiln over to access her laundry equipment. (John owns Leslie Ceramics and co-authored the recently revised 640-page "Hands in Clay.")

READER RESPONSE

The last Kiln Pointer was "How to Fire Glazed Ceramic Beads."

Joseph 2bears of Lomita, California suggests, "Why couldn't a stainless steel bead mandrel with bead release be used to fire ceramic beads? Would this allow the glaze to cover the hole in the end of the bead and still release from the mandrel? A used stainless steel kitchen whisk picked up at a garage sale would provide a lot of wire for this use. Nichrome wire is fairly expensive. Would stainless steel be a good alternative?"

Newy Fagan of Ocklawaha, Florida wrote, "Sometimes I cast glass beads. After removing them from the investment, I cold work them to take off the outside layer, then suspend on bead mandrels with 975 or 1100 degree F Fusemaster overglaze. The little ugly ducklings transform into another bird."

RECENT Q&As

Q. What do you use to make the hole in the clay beads?

A. Press the hole into the clay while the clay bead is still soft. If you wait until the clay is dry, you will have to drill the hole and risk breaking the bead. Use a metal rod to form the hole in the clay with a slight twisting motion. Clean the opening of the hole on each side of the bead. After the bead is given its final shape, clean the holes again.

Q. What can my students use that would require the least amount of instruction and fine motor skills to color the beads?

A. Brush the glaze onto the bead while the bead is positioned on a rod. Your students can handle the rod without disturbing the glaze. Suspend the bead so that it doesn't touch anything while the glaze dries.

Q. Where can I purchase the rods to fire the beads?

A. The rods, which are called bead rods or stilt rods, should be available from most clay suppliers. (Paragon sells them too.) The rods come in 6 and 10 gauge and lengths from 3" to 12".

Q. What prevents the beads from closing up on the rod from shrinkage?

A. Make the hole in the beads a little wider than the stilt rod. That way the beads will remain loose even if they shrink during firing.

This week Shelia Collins, Connie Speer, and I visited the new Bisque House in Granbury, Texas. Granbury is a quiet little town where people go out of their way to be courteous. Cars on side streets stop so pedestrians can cross.

I wish the new store much success.

How to Fire Glazed Ceramic Beads

CONTENTS

How to Fire Glazed Ceramic Beads

Reader Response: Using a kitchen timer

Recent Q&As: Temperature overshoot, firebrick repair

HOW TO FIRE GLAZED CERAMIC BEADS

Ceramic greenware beads can be piled onto the kiln shelf. But once the beads have been bisque-fired and then glazed, they must be suspended by stilt rods (also called bead rods). Since the beads are glazed, they cannot be placed on the kiln shelf.

Stilt rods are made from the same type of wire as kiln heating elements though the rods are thicker than elements.

The beads must not be glazed inside the hole and around the edge of the hole. Otherwise they will stick to the rod. Space the beads so they do not touch. Suspend the stilt rods between two posts. You can also center a stilt rod over a horizontal post so that the rod extends past the post on each side. Then load an equal number of beads on each end of the rod. This is an efficient way to fire many beads since one short post can hold several rods. Be careful not to jar the kiln, or the rods could fall.

Wendy Peck of Winnipeg, Manitoba, Canada, shares a technique that she learned from Grant, who works at The Sounding Stone in Winnipeg. "I was making beads and pendants with Southern Ice (cone 10) a few years ago. My pottery supplier set me up with soft firebricks and a handful of kiln element pins. I stuck the pins all over the soft

brick, porcupine-like. I could fire quite a few beads and pendants on each brick, and the pins held up to the heat without bending.

“I first put the pins in at a steep angle, but some of the pendants slid down and fused to the brick. So I learned to stick them in at a slight angle. Grant is my local supplier for all things clay, and a great advisor.”

READER RESPONSE

In the last Kiln Pointer I shared the story of an overfired glass piece that looked like a small green face. Ardith Willmer of Santa Cruz, California wrote, “I purchased a small clip-on kitchen timer from The Pampered Chef for around \$13.00. When I am 'watching' the kiln, I clip the timer to my apron. I ALWAYS check the gauge to make sure the time is still running, and then I just forget about it until the timer goes off.”

Decide when you will check on the kiln, and set the timer to go off as a reminder. For example, if you started the firing at 7 a.m. and you want to check the kiln at 9 a.m., set the timer for 2 hours. The count-down timer on a digital wristwatch makes a handy kiln reminder, too.

RECENT Q&As

Q. My small kiln went all the way up to 1600 degrees F before the glass pieces were fully fused. Seems a little high to me. Is there a way to test to make sure my kiln is reading the right temperature?

A. The 1600 degree F temperature is due to something called overshoot, which happens during a fast firing. The temperature in the walls goes higher than the temperature of the glass because of the fast rate. It is normal and nothing to worry about.

Q. A piece of element groove about one inch long has broken off inside my firebrick kiln. How should I repair it?

A. The damage is cosmetic only. As long as the element doesn't come out of the groove, the piece does not need to be cemented back into place. As a general rule, do not repair cosmetic damage. Kilns do not stay new looking for long.

I once asked a visitor what he thought of the Paragon factory, and he said, “I see interesting patterns everywhere.” I’ve always noticed them, too—switch boxes lined up in rows after they’ve been silk-screened, kilns on an assembly line, or stacks of firebricks.

While I was riding my bicycle to work, the sun on the horizon silhouetted a building that was under construction. I watched the sun flash through a row of wooden rafters as I sped past. The pattern of evenly spaced roof framing reminded me of the patterns at the Paragon factory.

We will be closed next Monday to observe the sacrifices of those who gave so much in the service of their country. All of us wish you a safe Memorial Day weekend.

How to Handle Kiln Shelves

CONTENTS

How to Handle Kiln Shelves

Recent Q&A: How to figure kilowatts

A Kiln Story: The Green Glass Face

HOW TO HANDLE KILN SHELVES

The secret to keeping your kiln new looking is in the way you hold the shelves when you load or unload the kiln. At Paragon an employee named Shelia Collins has a Paragon kiln that is over 10 years old and still looks new on the inside. Here is how Shelia handles shelves:

- 1) First, work slowly and deliberately. Treat the kiln as if it were a piece of fine furniture that you didn't want to scratch. Don't touch the firebrick walls if you can help it.
- 2) Tilt the shelf as you lower it into the kiln. Center it so it doesn't touch the kiln walls. At all times, be aware of the location of the thermocouple or Kiln Sitter tube so that you avoid bumping the shelf against it.
- 3) As you level the shelf into position, center it in the firing chamber. Top-loading kilns: Position your hands so that they are at the firebrick corners. This offers more space than straight sections of the walls.
- 4) If full shelves are too heavy for you to load, use half shelves. Not only are they lighter, but they are also less apt to touch the walls during loading and unloading.
- 5) Do not allow anyone to load or unload your kiln until you have trained them.

RECENT Q&A

Q. How do you determine the kilowatts that a kiln draws?

A. Look at the kiln's electrical data plate. It is usually on the side of the switch box. The data plate lists the watts, amps, and volts. Divide the wattage of your kiln by 1000, which gives kilowatts.

A KILN STORY: THE GREEN GLASS FACE

At the Las Vegas Glass Craft and Bead Expo last March, a glass fusing teacher told me a story about one of her kilns. She owns a Paragon QuikFire, a small ceramic fiber kiln equipped with a pyrometer. The kiln can reach 1000 degrees F in only five minutes, so it requires undivided attention.

One time while firing her QuikFire, she was distracted and went into the next room to help a student with a glass design. When the teacher returned a moment later to the kiln room, she smelled something unusual—the smell of a clothes iron—and then remembered the QuikFire, which by then was glowing brightly. The pyrometer needle was all the way over past maximum temperature.

The next morning the teacher apologized to the little kiln, wiped it off, and hesitantly looked inside. A green glass piece had melted into a puddle on the bottom. What looked like two eyes and a down-turned mouth were fused into the green puddle. She turned the kiln on to test it, and it hummed to life. All was well with the kiln.

The teacher shows the green glass “face” to students and tells them that this is the kiln’s face when it has been overfired. “When you fire a kiln,” she tells them, “wear a timer around your neck.”

Last week my wife, Sandi, and I celebrated both Mother’s and Father’s Day by visiting our son, Patrick, and his wife, Leni. We drove from Mesquite to Camden, Delaware to deliver Patrick’s little Mitsubishi Eclipse. That took 22 hours including a four-hour stopover for a nap in the Smoky Mountains.

Patrick and Leni rent a two-story house that was built in 1870. While we stood under a huge, vine-covered tree in their back yard, we met their neighbor, whose house has been in his family since 1813. That is the house where his father was born. Imagine living in a house that was built long before the Civil War.

All of us at Paragon wish you a joyous Mother’s Day.

A Simple Thermocouple Error

CONTENTS

A Simple Thermocouple Error

More On Getting To Know Your Kiln

Recent Q&As: Replacing relays and elements; dark discoloration inside a kiln

A SIMPLE THERMOCOUPLE ERROR

Sometimes the most worrisome problems are the easiest to solve. If something goes wrong with your kiln, look first for the simplest solutions. Before assuming that you need new elements, for instance, check for a disconnected wire.

Here is another example: If the display window on your kiln shows a temperature in the 100 – 150 degree F range (37 – 65 C) even though the firing chamber is much hotter, the problem is most likely due to bare thermocouple wires that are touching inside the switch box.

Disconnect the power, open the control panel (switch box), and check the thermocouple wires, especially at the back of the controller circuit board. (The thermocouple is the rod that extends into the firing chamber. It senses the temperature.) You will find two wires that run from the controller to the thermocouple. Color coding for thermocouple wires:

Type-K thermocouple: yellow wire (+ terminal) and red wire (- terminal) with brown or yellow outer wire insulation

Type-S & R thermocouples: black wire (+ terminal) and red wire (- terminal) with green outer wire insulation

Look for bare areas of the wire where the insulation has been stripped too far. The first place to check is the wire ends that attach to the back of the controller. If the bare ends cross over and touch, the thermocouple will register the temperature of the switch box instead of the firing chamber.

This problem takes only a moment to fix. Remove the wires, cut them a little shorter, and reattach the wires to the controller.

MORE ON GETTING TO KNOW YOUR KILN

The last Kiln Pointer was “Getting to Know Your Kiln.” Here is another thought on that topic:

One of the best backup systems is to know the temperature of the light around the lid. Here is a quick way to develop that ability:

Check on your digital kiln from time to time as it fires. Each time you look at the kiln, guess at the temperature of the light. Do this without looking at the controller display. Then check the display to see how close you came. You can also use this same technique on a manual kiln with pyrometer.

RECENT Q&As

Q. When you replace relays in a glass kiln, should you also replace the heating elements?

A. No. The lid or roof elements in a glass kiln last many years, because glass temperatures are so low especially compared to pottery temperatures. As long as the elements still fire, do not replace them.

Q. I fired my SC-2 kiln for the first time and turned it off because of a strong smell. I also found dark discoloration inside the kiln.

A. During the first firing, you may smell a strong odor from your kiln. This is normal and is caused by the burning of binders in the ceramic fiber firing chamber. The odor is accompanied by a discoloration, which disappears after the kiln reaches about 1000F (537C). It is nothing to worry about.

Here is another example of a seemingly serious problem that had a simple solution. When I first started working at Paragon, I saw a 1965 VW Bug for sale parked outside a mechanic's shop. The price was only \$250, so I stopped, talked to the owner, and checked the car out. As I crouched at the back of the car with the hood open, I revved the engine and heard what sounded like a rod knock. That's why the car is only \$250, I thought. A rod knock meant the engine needed to be rebuilt.

I bought the car anyway. After I drove it home, I checked the engine and noticed that the fan belt was too tight. I loosened it, and the knocking sound went away. The engine sounded perfect. The car was a joy to drive, and the engine ran beautifully the entire time that I owned it.

Getting to Know Your Kiln

CONTENTS

Getting to Know Your Kiln

Recent Q&A: When a new element bulges out of the groove

Last Week's Glass Craft & Bead Expo in Las Vegas

GETTING TO KNOW YOUR KILN

At the Glass Craft and Bead Expo last weekend, I met Joyce Whidden, an enamelist who has been firing a Paragon E-series kiln since 1957. She knows by watching the color of light around the kiln door when it is time to load her enameling. And she can sense just when to remove it for perfect results.

Because Joyce does not use a digital controller or pyrometer, she has had to depend on the power of observation to fire her kiln. When the light around the door begins to turn yellow, she knows that the kiln is too hot for enameling. Joyce mastered her kiln long ago through the power of observation.

Kilns are a little scary to the beginner. Firing a kiln can at first feel awkward or even confusing. But the more you interact with your kiln, as Joyce has done, the sooner you will master it. Even though your kiln may be a digital automatic, take the time to get to know it. The more you observe the kiln, the sooner you will master it.

1) Keep a firing logbook that shows total hours of firing time, type of load, and firing results. In addition, think of the logbook as a diary. Write down anything that you learn about your kiln each time you fire it. Write down questions, too. Writing questions gives you something tangible to think about and often results in finding answers when you least expect it.

2) Spend time with the kiln while it fires. In your firing logbook, write down anything interesting that you observe.

3) Any time you hire a technician to work on your kiln, consider it a mini-seminar. Watch and even take notes. Most technicians are glad to answer questions.

4) Read your kiln's instruction manuals--not necessarily cover to cover, because some information is for reference, such as the section on changing elements. Read and even underline the operation sections. Few people understand how much time goes into producing a manual. Sometimes a single paragraph can save you many hours of trial-and-error learning.

RECENT Q&A

Q. I just replaced an element. It is bulging slightly out of the soft brick. Should this be stapled in place before using the kiln, or after the element has burned in?

A. The "round" top-loading 7-, 8-, 10-, and 12-sided kilns usually do not need element pins. A new element that bulges out of the groove should be pushed back in before you fire it. Since it hasn't been fired yet, you do not need to heat the element before moving it:

1) If the element is bulging out of a straight section of groove, compress the coils just a little with needle nose pliers.

2) If the element is bulging out of a corner, expand the coils with automotive snap-ring pliers.

Bulging elements that have been fired must be heated until they turn red before you can move them back into a groove.

LAST WEEK'S GLASS CRAFT AND BEAD EXPO

The annual Glass Craft and Bead Expo is held in the South Point Hotel in Las Vegas, Nevada. Nearby are the blinking lights and electronic music of hundreds of slot machines that play at all hours.

The exhibitors' area where I stayed was almost as colorful as the brightly lit slot machines. Light reflected from glass jewelry that covered rows of tables.

I stayed at the Paragon booth where I enjoyed meeting many of you. Thank you for taking the time to stop by to say hello. I enjoy the energy that surrounds people who are excited about creating. One visitor said, "I love making marbles. I don't want to do anything else!" Another visitor was a doctor who wanted to become a full-time glass artist.

I acquired an exquisite, glistening dichroic bowl from Judy Killian of Alaska. Thank you for the treasure, Judy.

On Sunday afternoon, Kay Walters won the drawing for a digital Caldera kiln. I phoned her and left a message; she called back with her address. Then she called awhile later to tell me again how happy she was, that she had danced and had told all her friends. For me that was one of the high points of my trip.

At the show I met glass artist Kay Bain Weiner and her husband, Herb. They have formed the non-profit KBW Educational Foundation to help educate glass artists. They provide scholarships, supplies, and books to high schools and colleges. To help them, please call 760-603-8646.

I returned home on Monday. When I opened the front door, my cats Jack and Cius raised their heads from a nap and looked at me curiously. Bubbin, the tailless cat, stretched from around the corner. It felt so good to be welcomed home.

The Downdraft Vent Intake Holes

CONTENTS

The Downdraft Vent Intake Holes

A Pointer from Steve Mills: Improving element performance

Recent Q&A: Kiln fires glass to wrong temperature

THE DOWNDRAFT VENT INTAKE HOLES

The downdraft vent system is used on larger kilns (not the small tabletop models). It pulls a small amount of air from the kiln, dilutes it with room air, and vents the air to the outside of the building. There are several brands of vents available. An example is the Orton Vent Master.

Most top-loading kilns with the downdraft vent have 1/4" air intake holes drilled in the lid. Try not to place ware directly under these vent intake holes. The room temperature air coming in through the holes can cause small areas of glaze imperfection such as crazing, cloudiness, or even cracking of the ware. The intake holes should be drilled near the outer edges of the lid so that they won't interfere with ware placed toward the central area of the top shelf.

One way to protect ware from cool air under an intake hole is to position a small scrap of shelf over the ware. Support the shelf with a post. Do not block the intake hole with the shelf.

Another method is to temporarily plug the intake hole with ceramic fiber and re-route the air into the kiln through a drilled peephole plug. The hole in the plug should be no wider than 1/4". Keep ware at least 3 inches from the drilled peephole plug.

Sometimes a loose peephole plug allows the vent to pull enough air into the kiln to cause glaze blemishes. In this case, keep ware 3 inches away from the peephole. Or wrap the peephole plug with a little ceramic fiber to make it fit snugly. (Ceramic fiber is available from ceramic suppliers.)

A POINTER FROM STEVE MILLS

Steve Mills of Bath in South West England wrote, "This actually goes back a long way to the early '80s when my wife and I were running a ceramic supply business alongside my production pottery. I fired a four cubic foot electric kiln virtually every day.

"When one day I suddenly had a very slow firing, I asked around and was advised to vacuum the kiln out. The result was an immediate cure, and I clocked that for future

reference. Since then I vacuum every four firings, advising our customers to do the same. The advice has also helped others with slow firing kilns.

“Every time a kiln is fired, it increases fractionally in size and shrinks again as it cools. With any brick, but in particular with soft brick, this movement creates dust by abrasion--admittedly very small amounts--but it adds up and can affect the operation of the elements.

“As we all know, a bisque explosion creates loads of dust very suddenly. This is more insidious yet can go unnoticed.”

RECENT Q&A

Q. My digital kiln fully fused glass at a programmed temperature that should have only lightly fused it. How do you correct a kiln that is firing around 50 degrees too hot?

A. If the kiln overfires by the same amount every time, lower the programmed temperature by 50 degrees or whatever temperature is necessary to compensate for the overfire.

If the kiln is firing inconsistently, check the thermocouple wires. They should be securely connected at the controller and the thermocouple. Make sure the wires are connected to the correct color-coded terminals. The thermocouple should extend into the kiln by around 3/4". If all of that checks out okay, then replace the thermocouple.

My niece Alina just had a baby girl in Hawaii. I remember as if it were last week when Alina was a five-year-old taking ballet lessons.

How to Store Kiln Furniture

CONTENTS

How to Store Kiln Furniture

Reader Response: A secondary use for a kiln's heat; an overfired kiln

The Kiln Sitter Firing Gauge

The NCECA show in Pittsburgh

HOW TO STORE KILN FURNITURE

There is less danger of cracking if you store shelves vertically in a shelf rack or even leaning against a wall rather than flat. If a piece of clay or other material is lodged between horizontally stacked shelves, weight pressing down can crack a shelf. However, as long as the stack is no higher than three or four shelves and the shelves are clean, you can store them flat.

Store kiln furniture in a dry area. Moisture can cause shelves to crack or even to explode inside the kiln. A freshly kiln-washed shelf should be allowed to dry thoroughly, then fired slowly to allow any moisture in the shelf to evaporate.

Store posts of the same length together. This will save you time when you load the kiln.

Store shelves so that the sides with kiln wash face each other. This prevents flakes of kiln wash from transferring to the underside of other shelves.

You may find it helpful to draw a shelf pattern on a table and plan the load for each shelf before you begin loading the kiln.

READER RESPONSE

Pat March of United Kingdom wrote, "When a stoneware firing has finished, we place an enamel casserole pot full of steak and vegetables on top of the kiln and leave it for hours. It is beautifully tender every time, enough for two meals cooked for free!"

Last week's Kiln Pointer was "Monitoring the Kiln." Tony Rodriguez of San Antonio, Texas wrote, "I just went to Austin to check a kiln that had a meltdown. When I opened the lid, the first thing I noticed was that the Kiln Sitter sensing rod was as thin as a sewing needle. I had serviced that kiln 2 1/2 years ago and provided the owner with a Kiln Sitter gauge and explained its use and the reason for it, along with the need for a firing log. During this time she had never checked the Kiln Sitter. The sensing rod was bent inside the tube assembly rendering it inoperative, and her Kiln Sitter does not have a safety Limit Timer. She fires at night in her studio and goes home - no monitoring whatsoever, and she fired to cone 10.

"I suggest you write or repeat a Kiln Sitter calibration Kiln Pointer and the reason why is needed."

THE KILN SITTE FIRING GAUGE

Many people have never seen a firing gauge, because it is often thrown away. But the gauge is important. If you don't have one and your kiln has a Dawson Kiln Sitter, you should order the firing gauge. The cost is only \$6.25 plus shipping. Your ceramic supplier may have them in stock.

A firing gauge comes with every new kiln equipped with a Kiln Sitter. Do not fire the kiln with the gauge on the cone supports. The gauge would prevent the Kiln Sitter from shutting off.

Use the gauge to adjust the actuating rod after every dozen or so firings. This is like giving a Kiln Sitter a "tune up." Place the gauge on the cone supports, sliding the actuating rod through the hole in the gauge. If the actuating rod is not centered in the porcelain tube, loosen the two screws on the guide plate and move the guide plate from side to side.

Lift the Kiln Sitter weight to the raised position. With the firing gauge in place, the trigger should just barely clear the release claw, coming as close as possible without touching. If the gap is wrong, loosen the set screw in the center of the weight, move the trigger, and retighten the set screw.

THE NCECA SHOW IN PITTSBURGH (NATIONAL COUNCIL ON EDUCATION FOR THE CERAMIC ARTS)

My NCECA adventure began Tuesday last week at 5 a.m. when a shuttle stopped by my house. It was misty and dark as I rolled my suitcase out to the curb and left for Dallas-Ft Worth Airport with John Hohenshelt (president of Paragon).

A mechanical problem delayed our flight. When we finally boarded a plane, the rain was beginning to pelt the terminal windows.

We waited on the tarmac, all seats filled in the cramped plane. The wind picked up until it howled above the whine of the idling engines. In a bright flash, lightning hit just 200 yards away. Rain streamed in rivulets over the portholes. Though we were still on the ground, the plane swayed gently as if we were in turbulent flight. Someone in the seat behind me said, "This is a nightmare. This is so scary."

After we idled several hours on the tarmac, the pilot said over the PA that we had used up 10,000 pounds of fuel and no longer had enough to reach Pittsburgh, so we had to return to the gate. No one was allowed to stand up unless it was a "bathroom emergency" because the plane inched forward every few minutes. We finally reached the gates, but they were all occupied with other aircraft, so we waited . . . and waited. Four hours after we boarded the plane, we reached the gate and went to retrieve our bags.

John and I almost called off NCECA this year because we couldn't get a flight out until Thursday. Then over my cell phone in the baggage area, a ticket agent told me a flight had just opened for Wednesday. I arrived late afternoon the next day.

At the Paragon booth we held a drawing for a Caldera digital glaze-test kiln. One of my favorite moments at NCECA was pouring the entry forms onto the floor Friday

afternoon, closing my eyes, and picking the winner. It was Susan Powell, an excited teacher who brought her students with her to carry the kiln.

On late Friday I met my son, Patrick, and his wife, Leni, outside the exhibitors' hall. They had just driven five hours from their home in Delaware and helped me crate kilns and pack the booth. Then we went to the Clayart room where I enjoyed seeing many friends.

At NCECA I acquired Bonnie Hellman dichroic glass earrings, a Veena Raghavan vase, and a Mel Jacobson pot. Bonnie's earrings sparkle in even the dimmest light; Veena's blue vase has a beautiful ethereal quality; and Mel's pot has a long and colorful story behind it: a design feature from ancient China, the chattering tool that he made from scrap steel found in an alley, and the black specks from the shores of Lake Michigan.

To all of you who stopped by the booth to say hello, thank you! You helped make this year's NCECA a special adventure.

Monitoring a Kiln

CONTENTS

Monitoring a Kiln

A Humorous Kiln Story

Book Reviews Wanted

MONITORING A KILN

The digital controller and Kiln Sitter used on kilns are very reliable. But if they fail, they can overfire the kiln and destroy all the ware, the shelves and posts, and even the firebricks. This is why all kiln manufacturers recommend that you monitor the kiln.

Monitoring takes very little time. Just check the kiln every now and then, especially toward the expected shut-off time. Monitoring the kiln also helps you to become familiar with its operation. If you "set it and forget it," returning to the kiln only after the firing is completed, you are missing an opportunity to learn more about firing.

Reminders

From my own experience, I know how easy it is to forget that the kiln is firing. Use a digital wristwatch or a small count down timer to remind yourself to check on the kiln. Decide how often you will check it. Set the digital watch's countdown timer for that length

of time. Or you can set the watch's alarms. (My watch has three separate alarms, and I use all of them for daily tasks.)

Checking the Kiln from a Distance

Some people place a baby monitor near the kiln so that they can hear the relays clicking from another part of the building. If your digital controller has a temperature alarm, set it for the times that you will check the kiln. You will hear the alarm on the baby monitor.

Schedule the Firing

Write down the total firing time of all your firings in a logbook. Once you know how long a firing should take, you can arrange your schedule to be near the kiln before it shuts off. Knowing the firing time will also alert you that something may be wrong if a firing takes longer than usual.

If you would ordinarily be away when the kiln shuts off, start the firing at a different time to better suit your schedule. The Delay feature of digital kilns can turn on the kiln automatically after an elapsed period of time. Or change the firing speed so that the kiln will shut off when you are nearby.

Digital Kilns

After you turn on the kiln, use Program Review to make sure you entered the program correctly. Have your firing logbook in front of you to check each Program Review entry. Common reasons for overfiring are programming the wrong cone or inadvertently using an extended hold time.

The Kiln Sitter

Be sure to load the correct cone in the Kiln Sitter. Double-check the cone number on the box. Set the Limit Timer for no more than 30 – 60 minutes beyond the expected firing time.

Make sure the Kiln Sitter is free of obstructions inside and out. Ware toppling over against the Kiln Sitter cone can cause an overfire. A power cord draped too close to the Kiln Sitter can prevent the weight from dropping all the way and shutting off the kiln.

Check the Color Around the Lid

Note the color of the kiln interior, which shows at the peepholes and around the lid or door. After awhile you can estimate, with surprising accuracy, when the kiln is about to shut off just by observing the color inside the kiln. If the kiln seems to be firing too long or if the interior color turns too bright, look through a peephole at the pyrometric cones on the shelf.

Witness Cones in Ceramic Firings

The pyrometric witness cone is a record of the firing. Use witness cones in every ceramic firing, even in electronic kilns. For one thing, the witness cones will verify the accuracy of your electronic controller and alert you to any thermocouple temperature drift.

If a firing takes longer than usual and you suspect the kiln is overfiring, check the cones through the peephole. Wear firing safety glasses when looking into the peephole. Firing glasses not only protect your eyes but also make the cones easier to see.

No matter how automated the kiln, firing still needs human attention. It takes just a moment to check the kiln near shut-off.

A HUMOROUS KILN STORY

Lynne Martin of Morganton, North Carolina wrote, "A few years ago I was taking a raku class at the local college. I walked in one day, and my hubby said, "You've been smoking pots again," because my clothes smelled very smoky. It became a joke between us. Well, the regular girl at McDonald's drive through (my daily Diet Coke fix in those days) asked about me one day, and he told her I was off smoking pots. She thought he was telling her I was smoking pot. When I later cleared it up with her, we laughed until we both cried... and she still asks me whenever she sees me if I have been smoking pots lately." This story came from <http://www.acers.org/cic/clayart/>>Clayart.

BOOK REVIEWS WANTED

Please look at Paragon's list of recommended books. [Click here](http://www.paragonweb.com/Books_and_DVDs.cfm).

Are we missing your favorite book or DVD titles? I welcome book reviews, which help the authors, who have labored long and hard to share their knowledge.

Kiln Gloves

CONTENTS

Kiln Gloves

Recent Q&As: Portable digital controllers

Travel

KILN GLOVES

Wear leather gloves when unloading ceramics from the kiln. The gloves will protect your hands from shards of glaze and bits of pyrometric cones that have stuck to the shelves. Razor-sharp glaze fragments can be so small that they are difficult to see. The gloves will also protect your hands from sharp stilt marks on the bottom of glazed ware.

Should a piece of ware break in your hands due to thermal shock, the leather gloves will help protect your hands from the sharp edges. (This is one of the reasons to wait until the kiln has cooled to room temperature before unloading.)

Some of the employees at Paragon wear thin cotton gloves while installing elements. This is a good idea. If you do this, make sure the gloves are clean. Flakes of kiln wash can transfer from the gloves to the new elements, which can cause premature element failure. So do not wear the cotton gloves to handle elements if the gloves have also been used to wipe kiln wash from glazed ceramics.

Wear heat-resistant gloves (such as Paragon's hot gloves) when handling a hot peephole plug or touching a hot lid handle.

RECENT Q&As

Q. Can you fire two kilns with one portable digital controller?

A. Yes. A portable controller can fire more than one kiln if you rotate the controller between the kilns, firing them one at a time. While one kiln is cooling, use the controller to fire the other kiln.

The controller plugs into the wall outlet, and the kiln plugs into the controller. Both kilns must have the same type of electrical plug. When you order a controller, you must specify the NEMA configuration of the wall outlet.

Q. I am adding a digital controller to my manual-fire kiln. How do I adjust the kiln Sitter?

A. When you add a digital controller to a switch-operated kiln, use the Kiln Sitter as an additional safety shutoff. Load a cone in the Kiln Sitter that is hotter than the actual firing so that the controller shuts off the kiln instead of the Kiln Sitter. The Sitter then serves as a backup shutoff.

Q. How complicated is it to install the thermocouple that comes with a portable digital controller?

A. The easiest way to install it is through a drilled peephole plug. Or you could drill a thermocouple hole in the wall of the kiln. If you are firing two kilns, one at a time, with the same controller, you will need to transfer the thermocouple from one kiln to the other.

Insert the thermocouple into the kiln wall until it extends into the firing chamber by the amount shown in the controller instructions. This is usually around 3/4". Then place a mark on the outside of the thermocouple that is even with the kiln case. During firing, check the thermocouple occasionally to make sure the mark on the thermocouple is still lined up with the kiln wall. That is your assurance that the thermocouple tip is extending the correct distance into the firing chamber.

Mount the thermocouple to the kiln so that it cannot fall out during firing. If you drill a hole in the kiln wall and insert the thermocouple, don't let anyone tamper with it. If the thermocouple falls out or is pulled halfway out, the kiln can overfire.

TRAVEL

Next week John Hohenshelt and I are flying to Pittsburgh, Pennsylvania for the NCECA (National Council on Education for the Ceramic Arts) potter's convention. I hope you stop by and say hello if you are there. John and I would enjoy visiting with you.

Trade shows are always an adventure. I meet new people and am immersed in the group culture of the event. The potters, glass fusers, enamelists, and metal clay groups each have a distinct culture, almost a world of its own. When I attend the glass show in Las Vegas next month, I will enter a different world than the one I will experience with potters next week.

Teaching Science with a Kiln

CONTENTS

Teaching Science with a Kiln

Recent Q&A: When to replace elements

When I was 13 years old, our science class made a small electric motor from common parts. It was fascinating to see the motor spin into a blur when the teacher connected it to a battery. Science demonstrations are always more interesting than reading a science book. Even many years later, I still remember that motor.

As you know from experience, high temperature produces dramatic changes in materials. This can be an excellent demonstration of science principles. In the following article, high school teacher Patricia Duda shares her experiences. –Arnold Howard

TEACHING SCIENCE WITH A KILN

By Patricia Duda

Cibola High School, Albuquerque, New Mexico 87114

I and a group of teachers in the Albuquerque Public Schools have found the Paragon Home Artist 120 kiln perfect for infusing art and materials science into our chemistry classes. We use it for three activities: comparing fired and unfired clay, fusing glass, and making raku pottery. One teacher has also used it in conjunction with our lab to extract copper from malachite.

In each case, we are teaching scientific principals: Making detailed observations; the physical and chemical properties and changes of materials, percent composition, and chemical reactions. Thanks to ASM Education Foundation for their Summer Teachers' Materials Workshop that gave us the courage and knowledge to step into new arenas!

Pinch Pots

We have the students make two similar, small pinch pots with clay and record their observations (the more the better to practice observation skills). They weigh the pots and then set them aside to dry for a few days. They record more observations and weigh them again to calculate the percentage of water lost.

We fire one set of pots, and the students compare and contrast the fired and unfired pots including another weight measurement. Both pots are placed in a small container of water, and the next day observations reveal that the unfired pot has “disintegrated.” We then discuss whether a physical or chemical change took place when the pot was fired.

Fused Glass

After discussing the various types of glass, composition, properties, and in particular the coefficient of expansion, the students construct a fused glass pendant. Due to cost of materials, each student makes a pendant about 1/2 x 1 inch (rectangles, triangles, etc.) with a clear glass base and top and their choice of colored glass pieces, colored glass frit, and one or two small pieces of dichroic glass. We place these on a mat, and students write their name on the corresponding square on a sheet of paper. You would not believe how many students don't know which one is theirs after it comes out of the kiln looking different, so keeping track is important! We fuse the glass in the kiln on shelf so we can easily reach in and out with the mat. The results are beautiful! Some students just keep the “stone” to put in their pocket, and others glue a finding (E6000 works well) onto one end for a chain.

Raku Pottery

For our ceramics unit, after we have finished our unit on metals and reactions with metals, the students make a small raku pottery piece of their own design within some limitations (no more than 1/4 inch thick and 4 inches tall, and it must project an area within a 4 x 4 inch card). We do this because we have 160 – 180 students' pieces to fire! The students write their names on the cards and place their piece on it to dry (we place these in a box tray).

We fire the pots, stacking as many onto three shelves as we can, in about three batches. The students then glaze the pots and can add to some standard raku glazes small amounts of copper, cobalt, or other metal carbonates. From an artistic standpoint, we add too much, but it works well because the students can see metal colors after the raku process. We discuss the results of the chemical reaction that we expect to see from the reducing atmosphere when we place the pots in a covered bucket with newspaper shredding and then remove them and quickly quench them in a bucket of water.

RECENT Q&A

Q. How will I know when the elements are worn out? My Paragon is relatively new, and the temperature seems to rise quickly with each firing, but will I notice a slowing of the temperature when elements wear out?

A. As the elements begin to wear, you will notice a very gradual increase in firing time. By keeping records of your firings, you will get a precise feel for how long a firing should take.

A firing that suddenly takes longer is usually due to low voltage during periods of peak electrical demand such as the summer time when air conditioners are running. Firings that very gradually become longer are due to elements beginning to wear. Replace the elements when firing times become excessive or when the kiln will no longer reach temperature.

Economical Ways to Fire a Kiln, Part Two

CONTENTS

Economical Ways to Fire a Kiln, Part Two

Reader Response: The cost of firing a kiln

Recent Q&As: Calculating electrical cost

News: Advanced Kiln Maintenance Seminar next week

ECONOMICAL WAYS TO FIRE A KILN, PART TWO

People are always surprised at how little it costs to fire a kiln. Nevertheless there are easy ways to improve firing efficiency. Economical Ways to Fire a Kiln, Part One, covered the first five points. Here are five more. These pointers are for larger kilns rather than the jewelry tabletop models:

6) Experiment with faster firings.

You may be able to fire the ware faster--especially glazed ware. Use a small digital test kiln to experiment with firing speed.

However, fire slowly enough to burn out all the organics. If faster firing causes more ruined ware, then speed becomes counter-productive.

7) Make sure the lid is closed all the way at high temperature.

A kiln lid can rise slightly during firing due to binding at the hinge. You will not know this is happening unless you are near the kiln at the end of the firing. A rising lid increases energy consumption.

8) Place 1" of ceramic fiber on top of the lid.

This will not only save energy, but it may improve the heat distribution inside the kiln. This is the easiest and least expensive way to add insulation to your kiln.

9) Add an extra layer of firebricks under the floor of the kiln.

When you replace a lid, slide the old one between the kiln stand and kiln bottom. This will give you 2 1/2" – 3" of extra insulation. For extra support, place a piece of galvanized sheet metal between the bottom layer of firebricks and the kiln stand.

I do not recommend adding insulation behind the walls of the kiln. This requires rebuilding the kiln and will probably void the UL Listing.

10) Replace worn elements.

Worn elements lengthen the firing time as the kiln struggles to reach temperature.

READER RESPONSE

Ardith Willmer of Santa Cruz, California wrote, "I called my electric company two years ago about firing at different times of day for cheaper rates, and they told me I would have to purchase a new meter for about \$700. Then when I fired at off hours, the meter would

read that information and would be a bit cheaper.....but one DID have to buy the new meter. I guess there is always a catch.”

Marc Hines of Tigard, Oregon wrote, “The cost of firing a kiln is surprisingly low. Here in the Northwest with hydroelectric power, it's cheaper still. Most folks I know who fire a small or medium sized kiln once or twice a week never really notice it on their home electric bill. For us, operating the air conditioner (even our efficient one) during the summer is much more expensive than firing both my glass kilns at the same time. It's the fusible glass that costs, not the electricity.”

Bonnie Hellman, a potter in Ouray, Colorado wrote, “I'm having a blast with the glass. To quote a ceramics friend, ‘It's so easy compared to ceramics.’”

RECENT Q&A

Q. Many of my firings are taking around 13 hours. Does this still cost the approximate \$7.00 you talked about?

A. People are always surprised at how little a kiln costs to fire. Though your firing takes 13 hours, the kiln elements are off much of that time, because they cycle to control the heating rate. Out of 13 hours, the elements may be on only 7 hours.

The latest 12-key Sentry 2.0 controller calculates the cost of electricity to fire a load. Program into the controller your cost of electricity and the kiln's wattage. Then include the firing cost in a detailed firing log book. Experiment with ways to save electricity, such as the ten ideas I have shared.

NEWS

There is still time to sign up for the Advanced Kiln Maintenance Seminar held February 22 - 23 here in Mesquite, Texas. For information, please call 800-876-4328.

Last week I watched “Casablanca” on television. It is one of the best movies I have seen and reminds me of Tripoli, Libya, where I spent three years of my childhood.

Economical Ways to Fire a Kiln, Part One

CONTENTS

Economical Ways to Fire a Kiln, Part One

Recent Q&As: 3-zone kilns; the element glow test

ECONOMICAL WAYS TO FIRE A KILN, PART ONE

People are always surprised at how little it costs to fire a kiln. The heating elements hum, and the interior glows. At porcelain temperatures, the interior turns yellowish-white. Naturally you would think it costs a fortune in electricity to generate so much heat. Yet on small kilns, the cost is less than a dollar per firing. The cost to fire the typical studio kiln is only several dollars.

Nevertheless there are easy ways to improve firing efficiency. These pointers are for larger kilns rather than the jewelry tabletop models:

1) Fire your kiln during off-peak hours.

Call your electric company to find out if they have discounts for power consumed during off-peak hours. During hot summer months, the line voltage may be higher at night too.

2) Dry the greenware before firing.

Firing moist greenware wastes electricity and also rusts the kiln. The kiln must be fired more slowly to prevent the moist clay from exploding. Greenware, which is unfired clay, should be bone dry before firing. Place a piece of greenware against the inside of your wrist. If it feels cool, it is too wet to fire.

3) Dry greenware on shelves in the firing room.

You can dry greenware using the heat that the kiln releases as it fires. Place the greenware on metal shelves near the kiln.

4) Can you fire your bisque to a lower temperature?

Ask your clay supplier if it would be safe to fire your bisque to a temperature lower than the typical cone 06.

5) Don't waste space inside the kiln.

RECENT Q&As:

Q. How do you design digital kilns to fire evenly without 3-zone controls?

A. Three-zone control improves heat distribution in a digital kiln by taking separate temperature readings from three sections of the firing chamber. We offer optional three-zone on digital kilns, but most people don't order it, because we use "tuned" elements on many of our kilns. The top and bottom elements glow earlier than the center elements, because the top and bottom of a kiln needs more heat than the center.

Also, three-zone requires three thermocouples instead of one. So there are three times as many thermocouples to maintain. Problems with a three-zone kiln are also more difficult to diagnose, such as when a thermocouple begins to drift.

Q. I would like to check the glow of my elements to make sure they are all firing. But the center elements are too dim to see.

A. When you check the glow of the elements, turn off the room lights. Then it will be easier to see the center elements, which glow more faintly. Or wait longer until the kiln gets hotter and the center elements begin to glow brighter.

Difficult Problems, Simple Answers

CONTENTS

Difficult Problems, Simple Answers

Recent Q&As: Dark spot in an element groove; reasons elements fail; no crimping tool needed to change elements; reason for fumes during first firing of a ceramic fiber kiln.

Sometimes mysterious problems have simple answers. When the digital temperature display is blank, make sure the kiln is plugged in. When an element stops firing, don't replace it until you have checked for a disconnected wire. Dave Coggins offers two examples of problems that have simple answers, one easy and one difficult. (The lid safety switch he discusses is required in certain parts of the world and can be factory-installed on most kilns.)

Dave is a retired kiln technician in Queensland, Australia.

DIFFICULT PROBLEMS, SIMPLE ANSWERS

By Dave Coggins

I occasionally miss working on kilns. There was always a challenge to solve some of the more way-out problems. I rarely found one I couldn't solve, albeit after a few sleepless nights.

I think my favourite difficult kiln problem with a simple answer was where the kiln would cut out half way through firing for no apparent reason. Everything checked OK--no bad connections, plenty of power to the elements, controller and thermocouple OK. It drove customers crazy.

The solution was in the door or lid safety switch adjustment. It was fine when the kiln was cold, but as the door or lid heated and expanded, the movement would open the safety switch and cut the kiln off. A simple adjustment would fix the problem every time.

A problem which I found most difficult to explain to customers happened when they moved their kiln from one location to another, and the kiln wouldn't reach temperature any more. They would say, "But it worked fine at my last place. Why won't it work now?" I would try to explain that their elements might be a bit tired, and there wasn't as much power available at their new location, etc., etc., only to hear, "But it worked fine at my last place. Why won't it work now?" This problem was difficult to solve, because it usually involved electricians and power supply authorities. I had a few cases where the customer just couldn't use the kiln until the supply authority installed a new power transformer in their street. Sometimes that took months.

RECENT Q&As

Q. An element burned out and left a dark area in the element groove. What is that dark area?

A. The dark area is contamination that caused the element to fail. Before installing a new element, always dig out the discolored spots in an element groove. Use a screwdriver and dental mirror. If you can't get a screwdriver into the groove, use a curved dental tool. Before installing the new elements, vacuum the grooves.

Q. Why does an element burn out suddenly rather than wear gradually?

A. Contamination with a foreign material such as kiln wash burns out an element.

The number one reason a new element burns out is a loose element connector. So read the instruction sheet that comes with replacement elements. It includes information on tightening the connectors. The instruction sheet contains a wealth of information. Read it twice before starting to work on the kiln.

Q. Does changing an element require a crimping tool?

A. No. Paragon elements use barrel connectors. You will need only a 1/4" nut driver and locking pliers to install the element connectors. (Locking pliers come in different brands. Vise-Grip is the best known.) Hold the barrel connector with the Vise-Grip pliers, and tighten the small bolt with the 1/4" nut driver.

Paragon element connectors should be tightened to 30 - 36 inch pounds. This is about 1 1/4 turns past the point of firm resistance. Suppose the head of the screw or bolt on the element connector twists off. That's okay, as long as the threads in the connector are still holding.

By the way, locking pliers are one of the most useful hand tools you can own. I have had Craftsman locking pliers since I was 19 years old and use them often. Locking pliers allow you to grip an object with tremendous power even if you have small hands.

Q. Why did smoke come out of my ceramic fiber kiln the first time I fired it?

A. The smoke that came off the kiln during the first firing is normal. It is the binders burning out of the fiber insulation.

Firing the Kiln at Night

Some people fire their kilns at night while they sleep. The reasons:

- 1) In some areas you can get lower electric rates at night.
- 2) Glass casting needs long firing cycles. A firing lasting several days is not unusual for large, heavy glass.
- 3) High-production studios fire the kilns after-hours in the evening so the kilns will be cool enough to open late the next morning.

If you fire at night, check the kiln near the shut-off time--even if you have to get out of bed. If you've had perfect firings hundreds of times, you might decide, once in awhile, to skip the visit to the studio to check the kilns. With a good firing history, this seems sensible. But it is still a calculated risk. It is like speeding--there is always a risk of getting a ticket.

According to the Orton Ceramic Foundation, the Orton KilnVent reduces cooling time by several hours. A shorter cooling time may help you schedule a firing so that you can check the kiln at a more convenient time.

Our customer service manager, Teri Trice, just delivered an 8-pound baby girl named Tabatha. Congratulations, Teri! A few days after the delivery, Teri actually came to work for a few hours.

My 20-year-old son, Patrick, joined the Coast Guard and moved to Delaware. Christmas has been joyous because of him, and for the first time in his life we don't have him home for Christmas. But his laughter is only a cell phone call away.

Thank you for reading the Kiln Pointers during 2007. On behalf of all of us at Paragon, I wish you a Joyous Christmas and a Happy New Year, wherever you may be.

Caption: Merry Christmas from all of us at Paragon! (Photo by Kerry A Adamo)

The Problems with Firing Ceramics Too Fast

CONTENTS

The Problems with Firing Ceramics Too Fast

Recent Q&A: Monitoring a kiln at night

Announcements: A historical glass DVD; an advanced kiln maintenance seminar

THE PROBLEMS WITH FIRING CERAMICS TOO FAST

One time a ceramist visited the factory and told me, “I always leave the kiln switches turned to high. I load the kiln. When I’m ready to fire, I press the Kiln Sitter button. When the firing is done, the Kiln Sitter shuts off the kiln. I leave the switches on high and haven’t touched them in years.”

Firing the kiln at full speed is risky. Ceramists want to fire their kilns faster to save energy. But fast firing causes more mistakes than any other firing practice. In this article I will describe the problems that can arise at each firing stage when the kiln is fired too fast.

Stage One: Water Smoking (Up to 800 – 900°F)

All clays contain water. The first stage of firing burns off the water in ceramic greenware. As the water heats, it expands and is pushed out of the clay. This is called water smoking.

Fast firing during this stage can lead to disaster. If the kiln heats past the boiling point of water (212°F), the water in the clay will expand too quickly. When the ware breaks during firing, it is usually at this first critical stage. Water boiling inside the clay can explode, damaging not only the ware but also the walls of the kiln. When the ware sounds like popcorn inside the kiln, you know you have fired too fast.

During water smoking, keep the kiln switches turned to low. If you are using a pyrometer or digital controller, maintain temperature at 200°F or lower. Another important point: vent the kiln so that the water can escape. If the water is trapped inside the kiln, it will absorb into the firebricks, slowing the firing and wasting electricity. To vent the kiln, raise the lid an inch or more and leave the peephole plugs out. Do not lower the lid and insert the plugs until all signs of water vapor have disappeared from the firing chamber. To check for water vapor, hold a small mirror near the vented lid. Water vapor will fog the mirror. (Hold the mirror near the lid for only a few seconds. If the mirror becomes too warm, the moisture will no longer fog the mirror.)

Dry the greenware thoroughly before firing. A dehumidifier is helpful especially if you live in a humid area. If you load wet greenware into the kiln, keep the kiln at 200°F or lower until the moisture has disappeared. Though you can fire the ware safely by drying it in the kiln at low temperature, it is less expensive to dry it before firing. Drying

greenware in the kiln not only raises the electrical cost of the firing, but it also rusts the kiln.

Stage Two: Dehydration and Quartz Inversion (900° - 1100°F)

After the initial water smoking stage, the clay continues to lose water at a molecular level. This continues to about 1100°F. At this stage, the clay changes chemically into fired ware. At around 1060°F, the clay goes through quartz inversion, which is the point at which the silica in the clay expands.

During stage two, the molecular water must exit the clay slowly, especially if the pieces are large. At quartz inversion, the clay will break if heated too quickly.

Stage Three: Oxidation (500° - 2000°F)

Impurities burn out of the clay from the very beginning of the firing, but especially during the Oxidation stage. The kiln atmosphere must have oxygen to burn the impurities. This is another reason venting is so important at the beginning of firing. The ware must be heated slowly to give impurities, such as carbon, enough time to become gases and combine with oxygen. The thicker the ware and the heavier the load, the slower the ware must be fired.

As the clay reaches higher temperatures, the components of the clay fuse together, sealing the clay surface. At this point, remaining carbon and other impurities will become trapped inside the ware. As the clay heats further, the trapped gases expand beneath the surface, bloating and cracking the ware.

Glaze pinholes, bubbles, crazing, and peeling are often caused by gases that had not burned out fully in the greenware firing. These gases are pushed to the surface during the glaze firing. Lead-free glazes are especially sensitive to trapped gases. These glazes lack the flux that smooths out glaze defects.

Trapped impurities turn white bodies gray and weaken the finished ware. They cause mildew in porcelain.

Stage Four: Maturity (1300° - 2300°F)

This is the stage where the heat has transformed the ware to the degree intended by the clay manufacturer. Over-glazes mature at 1000° - 1500°F; low-fire ceramics mature at 1700° - 2100°F; and porcelain and stoneware mature at 2100° - 2400°F. See your clay supplier for the recommended firing temperature of your clay. It is listed as a pyrometric cone number.

When to Speed Up the Firing

After the quartz inversion (1000° - 1100°F), clays in the bisque, or greenware firing, can be fired faster. By this stage, the water has been completely driven out of the clay. Actual speed will depend on how many impurities the clay contains. Slow the firing again during the last 200°F.

How fast you should fire depends on the thickness of ware and type of clay. Thin-walled, low-fire ceramics can be fired much faster than stoneware. Fire test pieces in a small kiln. Experiment with firing speed before risking an entire load of ware. Always test-fire clays you are unfamiliar with. If test results are satisfactory, but you want to fire faster, try further tests at increasingly faster rates.

Firing the ware too fast and with insufficient venting causes more problems than any other firing practice. So long as the clay and glaze are designed properly, you will get almost fool-proof results by firing slowly, venting thoroughly, and using witness cones. These are the basics of firing.

Some clays can be fired rapidly with no ill effect. Certain glazes even look better when fired fast. With experience, you will learn the limits of clays and glazes. You can experiment, yet still avoid the vast majority of firing mistakes, so long as you continue to follow the basics.

READER RESPONSE

The last Kiln Pointer was on firing the kiln at night. Jamie Gray in Calgary, Alberta, Canada wrote, "I recently hooked up a baby monitor so that I could wake in the night and listen for the kiln relays firing without having to go to my basement studio to check the kiln. For a recent firing, I had also set the digital kiln alarm for 100 degrees above my top temperature. If things went haywire, it would beep and warn me.

"That night while I was sleeping, the alarm went off and I heard it because of the baby monitor. The relays had burned out. If I had not had the baby monitor and had not set the kiln alarm, I might have had a very unhappy situation in my studio. Bottom line: One way or another, we should never leave our kilns unattended!"

ANNOUNCEMENT

Ed and Martha Biggar are selling a DVD of glass pioneers Frances and Michael Higgins. The Higgins fused glass for over 50 years. Martha wrote, "Insights into their history, their styles and techniques, and their lives together make this DVD a fascinating view into their Riverside, Illinois studio; one that you will want to watch again and again. Perfect for artisans, collectors, or both. It is incredibly informative and can be watched several times to get more out of it each time." For more information [visit Ed and Martha's website.](http://www.edandmarthabiggar.com)

ANNOUNCEMENT: ADVANCED KILN SEMINAR

We are holding an Advanced Kiln Maintenance Seminar February 22 - 23, 2008 at the Paragon factory in Mesquite, Texas. The seminar will cover kiln design, extensive trouble shooting, three-phase power, and much more. Participants should complete the basic repair seminar or have experience repairing kilns before attending the advanced seminar. You do not need to bring tools. The seminar fee is \$95.00.

Meals, Airport Pickup, Hotels

As a seminar student, you are a VIP guest at Paragon. We furnish lunches on both days and dinner the first evening. The seminar is an exciting way to meet new friends. If you arrive before 4:00 p.m. the day before the seminar, we will pick you up at Love Field or D/FW International Airport. Please call ahead with flight number, arrival time, airport, and gate number.

We will pick up students from the offices of the following hotels at 7:30 - 7:45 a.m. each seminar morning and return them at the end of the first day:

Courtyard by Marriott 972-681-3300

Hampton Inn 800-426-7866

Holiday Inn Express 972-288-9900

After the seminar, a shuttle will leave Paragon at around 12:30 – 1:00 p.m. to take students back to the airports.

For more information and to register, please call 800-876-4328 and ask for customer service. We hope you can come and look forward to visiting with you.

I hope you enjoyed your News Year's celebration. My wife and I watched "It's a Wonderful Life," starring my favorite actor, James Stewart. Each time I watch that movie, I get more out of it. It is a timeless, uplifting classic with a powerful message.

How to Avoid Kiln Shelf Breakage

Last week AT&T suspended my arnoldhoward@att.net email address, so anyone who pressed Reply could not reach me. I apologize for the inconvenience and have reactivated my account. If you sent an email last week, please send it again.

CONTENTS

How to Avoid Kiln Shelf Breakage

Recent Q&A: temperature response time in a digital controller

HOW TO AVOID KILN SHELF BREAKAGE

One time I crash-cooled a kiln by propping the lid with a post. When I returned to the kiln later, a shelf had cracked in half. Cooling a kiln too fast can cause this, especially if shelves are loaded with anything that retains heat longer than the shelf would. In the above example, I had two firebricks on the middle of the shelf.

Make sure the shelves do not touch a kiln wall during firing.

Store shelves vertically. If you stack them horizontally on top of each other, they break easily especially if a piece of clay or glass is between them.

Do not fire moist shelves. If they have been stored in a humid area, dry them by firing to several hundred degrees. If you dry more than one shelf, separate them with posts.

RECENT Q&A

Q. When I open the door of my kiln to check my cloisonné enameling, the kiln temperature drops to 1300 degrees F or so. After I close the door, the temperature goes down for 10-20 seconds before it slowly goes up again. What is the reason for the delay in temperature rise?

A. Every 10 seconds, the digital controller calculates whether to adjust the temperature. The temperature didn't rise because the controller had already decided that during the next 10 seconds, the elements should remain off. The controller made that calculation before you opened the door. It was only after the 10 seconds that the controller recalculated the temperature and turned on the elements.

Every 10 seconds, the controller can turn on the elements, leave them turned off, or turn them on for part of that period. Once you begin to understand how a digital kiln works, it doesn't seem so intimidating.

Last week my wife, daughter-in-law, and I drove 3,400 miles round trip to Cape May, New Jersey. It was an unforgettable odyssey. Snow-covered Cape May was quiet, almost deserted, and beautiful this time of year.

The Signature on Your Fired Art

Caption: A metal stamp looks professional and saves time.

CONTENTS

The Signature on Your Fired Art

Reader Response: another jewelry adhesive

Recent Q&As: adjusting the side elements on a GL-24ADTSD glass kiln

THE SIGNATURE ON YOUR FIRED ART

At a trade show this year in Louisville, Kentucky, I displayed several Tim Frederick pots along with a Paragon kiln. Tim had fired the pots in his Paragon Dragon.

A potter stopped at the booth, admired Tim's pots, and picked one up. He turned it over and saw the Tim Frederick stamp pressed into the bottom. "We should have a stamp made for our pots," his female companion said.

I told them that some potters also include a code with their signature stamp that indicates date of production, glaze formula, kiln notes, or other pertinent information. They can look at the bottom of any pot they've made, find the code in a spiral notebook, and read about that batch of pots. This is useful if a pot is every returned with a problem.

The potter, still holding the Frederick piece, agreed that it was easy to forget important details. "I'm doing well if I can even remember to sign my pots." He said that recently he visited a friend's house and saw a small bowl on display. It had a beautiful green glaze that he didn't recognize.

"Where did you find that amazing bowl?" the potter asked his friend. Then the potter turned the piece over and found his own signature.

The friend said, "You're kidding, right? I bought that bowl from you 15 years ago."

A production code can be a simple letter-number combination placed in an obscure area. This may work for other types of fired art besides pottery. (This idea came from potter Mel Jacobson. You can listen to an interview with him: [Click here for Mel's interview](http://www.paragonweb.com/videos.cfm))

READER RESPONSE

Last week's Kiln Pointer was a discussion of jewelry adhesives. Paul White of Santa Fe, New Mexico wrote, "I use silicone as a glass adhesive. GE window and door brand clear

works great. It works especially well if you have small holes for the silicone to ooze through.”

RECENT Q&A

Q. I have a Paragon GL-24ADTSD glass kiln with side, door, and roof elements. I keep the side elements turned off. How can I make the kiln fire faster?

A. Turn up the switches that control the side and door elements. This will increase the amperage and make the kiln fire faster.

[Recommended Reading](http://www.paragonweb.com/Books_and_DVDs.cfm)

What would you like to see in a kiln instruction manual? I ask because I am revising one of ours. I welcome your ideas. Just hit Reply to send me an email.

When I was 19, I spent days in my parents’ garage rebuilding the engine from my Volkswagen Bug. That’s when I learned to appreciate an instruction manual.

I still have my tattered VW manual. Seeing it takes me back to the wintry evenings in that dimly lit garage.

Adhesives for Silver or Glass Jewelry

CONTENTS

Adhesives for Silver or Glass Jewelry

Recent Q&A: placing a kiln on a porch

Reader Response: testing a thermocouple

Recommended Books

ADHESIVES FOR SILVER OR GLASS JEWELRY

Two weeks ago in this newsletter I recommended E6000 adhesive for glass jewelry. The next week John Morton of Redding, California complained that E6000 failed when exposed to moisture. [Kiln Pointer back issues](http://www.paragonweb.com/Kiln_Pointers.cfm/)

Other readers have generously offered a wealth of ideas on adhesives:

Elaine Klugesherz of Saint Louis, Missouri wrote, "On the tube of E6000, directions suggest using this product when temperatures are 70 - 85 degrees Fahrenheit, allowing 24 - 72 hours of drying time for a maximum-strength bond, applying a thin coat to each surface to be bonded and WAITING 2-10 minutes before pressing non-porous surfaces together. The rest of the directions state that all surfaces need to be clean and roughened before bonding. I have used E-6000 for a long time and have not had a bond come apart."

Yvonne George of Sanford, North Carolina wrote, "I have never been a fan of E6000. When living in Florida, the humidity was always a problem. Then I tried Liquid Nails. Okay, I know it's for building houses. But I figured if it holds a house together, it will hold anything. I have used it to hang wires on the back of large decorative tiles, glass, and almost anything that needs glue. I have used it to hold posts on earrings. I am not allergic to it, but I would suggest a skin test if a person is sensitive at all."

John Grosbeck of Clearwater, Florida wrote, "I, too, have had problems with E6000 not holding the bail to glass. I've found the Triolyse two-part adhesive to be a superior lasting product that doesn't show and holds up under all conditions."

Lis-el Crowley in Windsor, Connecticut wrote, "Are you leaving E6000 for 24 hours without disturbing it? I use it extensively, even on rings, and it holds well. I rough up the silver and glass, clean with alcohol, apply the glue, and then let it sit undisturbed for 24 hours."

Carrie Anderson in Kensington, Connecticut wrote, "I use Goop. It is clear, holds great, and is at the nearest Home Depot. I use it because it held together a pressurized filter for a pond pump that had been stepped on and broken in several pieces. Four years later, the pump filter is still holding up."

RECENT Q&A

Q. We do not have an enclosed room for a kiln. Our kiln sits on an outdoor porch under roof cover, and we also keep it covered with a barbeque grill cover when not in use. Are a kiln's electronic controls going to be affected if the kiln is subject to the extreme variations in temperature and humidity that we have in North Texas?

A. I will use a comparison from the Isle of Hawaii, where I lived for two years. Everything there rusts--even refrigerators. Houses are made with galvanized nails because of the salt air and high humidity.

Cars in Hawaii rust quickly if parked in the open. They last longer when kept under a carport. And they last even longer in an enclosed garage. In the same way, a kiln on an open but roofed-in porch is subjected to more humidity than one in a fully enclosed garage. In humid areas, the kiln will last longer in a garage. Nevertheless, many people fire kilns on their porches.

READER RESPONSE

Last week I described a thermocouple test. David Coggins, a kiln technician in Queensland, Australia wrote, "Your latest Kiln Pointer on testing a thermocouple with a paperclip is very good. This trick can be used to test thermocouples on most digital pyrometers as well.

"There is just one thing I would add: Before disconnecting thermocouple wires, always make a written note of the terminal each colour wire is connected to. Otherwise they might get reconnected in reverse, which would give confusing readouts. In your picture, the terminals are colour-coded to match the wire, but this may not always be the case."

RECOMMENDED BOOKS

I have compiled a list of books on pottery, glass, metal clay, and other firing arts. As I have discovered, finding and using even one or two good ideas from a book can change your entire workflow. [Click here for books](http://www.paragonweb.com/Books_and_DVDs.cfm)

Let me know if you would like to review a book or suggest other titles. From time to time I update the list.

Have you ever noticed that people are happiest when they are busy? I've learned this by observing the Paragon factory. The busier the factory, the more cheerful the employees.

Testing a Thermocouple with a Paperclip

CONTENTS

Testing a Thermocouple with a Paperclip

Reader Response: E6000 adhesive

TESTING A THERMOCOUPLE WITH A PAPERCLIP

The thermocouple senses the temperature inside a digital kiln. It is the rod that extends into the firing chamber.

The thermocouple is made of two dissimilar wires welded together at the tip. When exposed to heat, the tip produces a very small voltage, which varies with the temperature. The controller reads that voltage and converts it to a temperature.

A crack in the thermocouple's welded tip can cause the temperature display to bounce wildly or show FAIL. Loose thermocouple wires can cause the same problem.

Suppose you replace the thermocouple, and the display still shows FAIL. Here is a simple thermocouple test that you can perform yourself. It works with most brands of controllers and will help you determine if a display problem is due to the thermocouple or the controller:

- 1) Unplug or disconnect the kiln.
- 2) Remove the controller board from the switch box. On Paragon kilns, remove the four corner screws from the controller faceplate. Lift the faceplate out of the switch box.
- 3) Look at the back of the controller circuit board. You should see two thermocouple wires connected to the bottom of the board. Disconnect those two wires. (The older controllers have screw connectors; the Sentry versions have lever connectors or push-button connectors.)
- 4) Insert a thin piece of wire such as a bent paperclip in the thermocouple connectors.
- 5) Place the controller faceplate onto the switchbox with a couple of screws.
- 6) Plug in the kiln/connect the power. If the board reads room temperature, replace the thermocouple. If it reads FAIL, you will need to have the controller checked.

READER RESPONSE

Last week I mentioned E6000, which is used to glue findings to glass or silver jewelry. John Morton of The Glass Addict in Redding, California wrote, "My daughter tried her hand at making jewelry last summer. She used E6000 and Superglue to attach her earring posts.

"Last October we had a marathon here in Redding. The women's winner wore a set of my daughter's dichro earrings. After her victory, all that was left of her earrings were the posts. The dichro pieces had disappeared sometime on the 26-mile race. She sweated during the race, and E6000 is a water-based adhesive. These weren't expensive pieces, but I warn customers about swimming, water sports, etc. when wearing jewelry made with E6000."

John, thanks for sharing your experience.

Laura Lemons works in customer service. Today is her last day at Paragon. She is always industrious and always cheerful. We will miss her. We are very pleased to have Raquel and Chris as promising new customer service reps.

All of us wish you a happy Thanksgiving.

Replacing Electrical Parts

Photo caption: In some cases as shown above, it is easier to remove the old part before transferring the wires.

CONTENTS

Replacing Electrical Parts

Recent Q&As: adhesive for glass jewelry, 220 and 240 volts

Reader Response: wiring a circuit

REPLACING ELECTRICAL PARTS

You can use these instructions to replace a relay, transformer, fuse holder, or switch. To see videos on this topic,

[Click here.](http://www.paragonweb.com/videos.cfm)

- 1) Disconnect the kiln from the power.
- 2) Open the panel that holds the part you are replacing. This usually entails removing the screws that hold the switch box to the kiln. (If a Kiln Sitter is mounted to the switch box, pull the box straight out to avoid damaging the porcelain tube.) Prop the switch box so that it stays open at a convenient angle.
- 3) Examine the defective part to determine why it failed. Do you see heat damage? A loose push-on connector can overheat and burn up the part it is connected to. In this case, replace the push-on terminal that overheated.
- 4) Compare the new part with the original to make sure the new one is correct.
- 5) Hold the new part next to the defective one, aligned in the same direction. Remove and transfer one wire at a time from the old part to the new one. After attaching each wire to the new part, tug on the wire to make sure the push-on connector is tight.

6) After transferring the wires, remove the defective part from the kiln and install the new part.

(SWITCHES: Pull off the switch knob. If the knob won't come off, check to see if a setscrew is securing it to the shaft. Remove the single nut from the front of the defective switch. Some switches are fastened to the switch box with two screws. Remove screws. Remove the switch and install the new one making sure it is right side up. Reinstall the shaft nut checking to make sure it is not backwards. Tighten so the switch will not turn during operation.)

7) As you move the switch box back into place on the kiln, check to see that no wires are touching the kiln case or the element connectors. Wires touching the case or element connectors will burn. Tighten the switch box screws.

RECENT Q&As

Q. What do you recommend for gluing findings to glass jewelry?

A. The only adhesive I've used for jewelry findings is E6000. It is a wonderful adhesive.

Q. What is the difference between 220 and 240 volts?

A. In the United States, 220 volts is not an actual voltage. It is a label used for appliances that can run on either 208 or 240 volts. If your electrical system is rated at 240 volts and the actual voltage is 220, then you have low voltage, which will slow down a 240-volt kiln.

You can check the voltage with a voltmeter while the kiln is firing. The measurement should be taken at the kiln rather than at the breaker panel.

READER RESPONSE

Last week's topic was checking the circuit breakers. Pam Day of Tucson, Arizona wrote, "I hired an electrician to install a new outlet for my kiln in my garage. All he did was run a line from the outdoor light down the wall. Whenever I use my kiln and someone turns anything on connected to that circuit, it blows! I have to have him come out and re-do his work. Your article helped a lot and explained what was happening."

The sky is an ever-changing canvas of color. Commenting on last's week's note, Cindy Durant in faraway Penong, Australia wrote, "I especially enjoy the little note about the sky. Too many people do not pay attention to that. I, too, look at the sky every time I go outside. I am always amazed by the beauty I find there, day or night."

Carole Dwinell of Martinez, California wrote, "Your final lines in this newsletter were quite lovely. I have just returned from Churchill, Manitoba and the dusk and dawn near the Arctic Circle are quietly splendid."

Last night I watched "Bridge on the River Kwai," a fascinating psychological thriller. I saw it with my parents at age five and have always remembered the tune that the prisoners whistled.

Checking an Electrical Outlet

Small 120-volt kilns (or 100, 110, 115, 127 depending on what country you live in) can trip a circuit breaker if the circuit is also running other appliances at the same time. Here is a quick way to test a wall outlet with a lamp. (This information does not apply to the large studio kilns, which have one outlet for the entire circuit.)

First, check the kiln catalog or your dealer to find the recommended circuit breaker size for your kiln. For a 120-volt kiln, the circuit breaker recommended will usually be 15 or 20 amps.

Plug a lamp into the wall outlet that you intend to use for your kiln. Turn off the computers in your house. Then have someone with a cell phone go to the circuit breaker box and start turning off and then on each 120-volt circuit, one at a time. (The breaker box is usually in a closet or the garage.)

When the lamp goes out, tell your assistant by cell phone. The circuit amperage is stamped on the outside of each circuit breaker. Verify that the breaker is the correct amperage for your kiln. If the breaker is 15 amps instead of 20, for instance, then find a different circuit for your kiln.

You will find a label inside the breaker box with a space for each circuit breaker. Once you have found a circuit for your kiln, pencil in "kiln" on the label for that breaker.

With the breaker still turned off, plug the lamp into each nearby wall outlet where you will fire your kiln. Check outlets that are not only in the same room but also on the other side of the wall. This will show you which outlets are connected to the circuit you will use for your kiln. While the kiln fires, make sure any appliances powered by that circuit are turned off.

All of this sounds complicated. But it should take only 30 minutes or so, and it will familiarize you with the location of your breaker box. That is always useful.

One time I checked a wall outlet in my sister's house. It was connected to a thin lamp cord wire, which ran along the wall inside a layer of wood paneling. A heavy appliance plugged into that outlet would have burned up the lamp cord. The circuit breaker would not have prevented a fire, because the lamp cord wire would have burned before the

breaker tripped. I mention this to caution you about having non-electricians install wiring for you. It is not always cost-effective.

At dusk recently the moon looked like a silvery crescent in a dark blue sky. In the mornings when I leave home for Paragon, dawn is just breaking.

The Mirror as an Aid in Firing a Kiln

CONTENTS

The Mirror as an Aid in Firing a Kiln

Recent Q&As: Pyrometric witness cones

More videos added to Paragon's website

Interview with PMC teacher Tim McCreight, author of the new book "PMC Technic."

[Click here](http://www.paragonweb.com/Books_and_DVDs.cfm) for information on Tim's new book

THE MIRROR AS AN AID IN FIRING A KILN

A small mirror has several uses around a kiln:

- 1) Angle a mirror in front of a peephole to see into the firing chamber of a top-loading kiln. You won't have to crouch down as far.
- 2) Check the element grooves for debris such as pieces of clay.
- 3) Use a mirror when loading a cone into the Kiln Sitter.
- 4) Check for vapor during the venting period of a ceramic firing. Hold the mirror near a peephole for several seconds. If it fogs, moisture is still coming from the kiln. Leave the lid in the vented position until you can no longer detect moisture on the mirror.

RECENT Q&As

Q. Should you put pyrometric witness cones on every kiln shelf?

[Note: A witness cone is placed on the kiln shelf of ceramic firings. The cone indicates whether the ware has received the correct amount of heat.]

A. Yes, it is a good idea to place cones on every shelf when you are firing a ceramic kiln that you are unfamiliar with. Cones will help you to get a feel for the way the kiln fires.

Once you become familiar with the kiln, you will probably feel comfortable firing with only one set of cones on one shelf.

MORE PARAGON VIDEOS

Three weeks ago I announced Paragon's new on-line videos. Today I added five more videos:

M002 Accessing the Electrical Parts

M016 Replacing a Lid Heating Element (Plunge Type Groove)

M017 Cementing a Broken Firebrick

M018 Replacing a Lid Heating Element (Ball Groove Type)

M020 Door Rotary Safety Switch Adjustment

[Click here for video page](http://www.paragonweb.com/videos.cfm)

INTERVIEW WITH TIM MCCREIGHT, AUTHOR OF THE NEW BOOK "PMC TECHNIC."

[Click here for information on Tim's new book](http://www.paragonweb.com/Books_and_DVDs.cfm)

Q. When did you first get interested in jewelry?

A. I started making jewelry as a diversion when I was in college, where I was studying philosophy and English. It took several years before it dawned on me that what I was doing to balance my academic activities was really what I wanted to be doing full time.

Q. What area of metalsmith work do you find especially interesting?

A. When I started I was most intrigued by form, which led me to casting and forming techniques like raising and die forming. Along the way my interest shifted to a

fascination with surfaces, which has led me to engraving, chasing, and similar techniques. In metal clay I am perhaps most interested in surface, but these distinctions are only noticed after the fact. When I'm working, I just follow my curiosity.

Q. What was your reaction to PMC in 1994 when you saw samples for the first time?

A. Frankly, disbelief. I was sitting around a kitchen table at a farmhouse in northern Maine, flanked by an American engineer, a respected mentor, and two Japanese businessmen. Language was an issue, so when they said the metal objects laid out on the table in front of me had started out in the form of clay, I thought there was a translation error.

Q. How did your first attempts with PMC turn out?

A. Very mixed. Some outright failures, some pieces that could have been made in other ways, but with enough successes in the mix to keep me moving forward. I found (and continue to find, for that matter) that I am more open to experimentation with metal clay than with conventional techniques.

Q. What were your first mistakes with PMC?

A. A general shortcoming was that I over-worked my pieces. The more I work with PMC, the more I value the deliberate gesture and the quick escape.

Q. Please describe the 1995 Haystack Mountain School think tank where the group analyzed PMC. [This group studied PMC for the manufacturer in Japan to decide whether PMC should be marketed in the United States.]

A. First, it was a remarkable collection of talented people, each one a leader in the field. Second, we all noted that even though the 15 people represented a wide range of age and experience, in this material we were on a level playing field. There are many special memories I carry from those important days, but perhaps the most vital is the absolute openness of the artists. Each person was willing to share whatever they encountered, including their disasters. There wasn't an ego in the studio.

Q. In a few sentences each, please describe the personality and artistic style of the ten artists in PMC Technic.

A. Wow, this is difficult. With apologies in advance if I get it wrong, I'll give it a try (in alphabetical order):

- Tonya Davidson brings her many years of ceramic work to her innovative use of the metal clay syringe. Her energetic approach to materials and techniques leads her to invent new ways of working.

- Celie Fago is well known as a gifted teacher and a maker of elegant designs. In addition, she devotes untold hours of research to develop the techniques for which she is known. This is true of the polymer technique called Tear-Away, her work with keum-boo, and in metal clay hinges, which is what she covers here.
- Jennifer Kahn has worked with Celie for several years, and along the way developed a particular method of making thin metal clay bezels. Perhaps because she has picked up Celie's devotion to perfection, we know her instructions will be carefully tested and refined.
- Doris King was familiar with metalsmithing techniques before she came to metal clay, so it is natural for her to research ways to bridge the two fields of metalworking. She has a jeweler's love of precious stones and developed ways to combine conventional settings with metal clay.
- Terry Kovalcik's other life is as a professional illustrator. He brings to his PMC work the same narrative whimsy, attention to detail, and commitment to perfection that distinguishes his graphic work.
- Noorte Meijerink is a ceramic artist from the Netherlands who has found ways to embellish her raku vessels and panels with silver. Her work is highly graphic and has been met with immediate popularity.
- Kelly Russell storms into the metal clay world with great energy and a child-like willingness to try anything. The result is techniques and hybrid approaches that give her work immediacy and power.
- Barbara Becker Simon, like many of the other contributors, has training and experience in several craft media. With backgrounds in traditional metalsmithing, polymer clay, and lampworking, Barbara continues to push the envelope of technical innovation. What is remarkable is that all her experiments come out as fully resolved pieces.
- CeCe Wire has made her mark on the field of metal clay through a busy teaching schedule and two successful books. She learned about water etching from a potter and has developed it for metal clay, sharing her ideas freely as she goes.
- J. Fred Woell could have retired before he even touched metal clay and still have earned a reputation as a leader in American jewelry design. Unable to walk away from the field that he has influenced so much, Fred continues to bring his self-effacing charm and Yankee inventiveness to this new material.

Q. How did you choose Portland, Maine as a location for your publishing business? [Tim McCreight started Brynmorgen Press in 1985.]

A. I moved to Portland in 1988 to take a teaching position at the Maine College of Art. I taught there until a few years ago and feel privileged to have had the opportunity to work

with such wonderful students there. I had only visited Maine briefly before then, but once I arrived, I felt like I belonged here. Maine has a rich history of craft and an active arts culture.

Q. How can you tell, visually, if PMC is over or underfired?

A. It is not possible to tell by looking if PMC is properly sintered. One possible way is to trace the piece before firing, then gauge the rate of shrinkage by placing the fired piece on the tracing. For a large symmetrical piece this might work, at least as far as offering an educated guess, but it is far from precise.

Q. What is the temperature latitude in firing PMC?

A. The "original recipe" version of PMC had a very narrow firing range. Proper sintering only occurred when the metal was held at 1650F for two hours. PMC+ not only fires in a shorter time but provides a much broader range, running from 1470F – 1650F. PMC3 pushes those limits even further and can be fired as low as 1110F. In all cases, there is a trade off between time and temperature — the lower the temperature, the longer the work needs to "cook" to become dense.

Q. What major design trends has PMC artwork gone through since 1995?

A. Well, that's another huge question... As with any new material, early work often copies existing technology as artists explore the unique properties of the newcomer. In the case of metal clay, early work probably looked like cast and fabricated jewelry.

Also, and this may be unique to metal clay, the material was developed by scientists working in a lab, so it was not until working artists got started with it that real technical innovations were made. These are still happening, and coming along with great speed, which is why the field is so exciting.

Q. To what extent are you still interested in philosophy and English?

A. I spend a good bit of my time with language—writing, reading, and editing—and I continue to be fascinated with written communication and the power of storytelling. As for philosophy, I remain interested in trying to understand why we humans think the way we do, though the formal aspects of academic philosophy are beyond me.

Q. If you were to give a beginner with PMC only one pointer, what would it be?

A. Lighten up! I fully appreciate the cost of metal clay and the fact that its ease of use, paradoxically, makes us tense up for some reason. I get questions all the time from people who haven't opened their first package, but they have already rehearsed a dozen problems that they anticipate. Imagine someone about to play tennis for the first time who starts with lots of questions. I'd tell them the same thing — lighten up, trust your

instincts, and see what happens. When you stop defining success as a predetermined state, you open yourself to kinds of success you couldn't imagine before.

Q. How did you become interested in custom knifemaking? (Tim is the author of "Custom Knifemaking.")

A. As much as I love jewelry, there is some frustration over the delicacy of work in silver and gold. Knives not only get around that but also offer exciting opportunities for working within functional parameters. I enjoy the process of making a tool designed for a specific task.

Q. Who are your favorite knifemakers?

A. There are fabulous artists making knives around the world, too many to mention, but to be honest, my first thoughts go to the students I've worked with as they made their first knives. There is nothing to compete with the satisfaction of mastering the skills that transform raw materials into elegant tools.

Q. Do you heat treat your own knives?

A. Yes, my approach is traditional and old-fashioned. I cut my blades from 01 carbon steel, create the shape by hand filing, then heat treat with a torch.

Firing Copper Enameling

CONTENTS

Firing Copper Enameling

Interview with Pam East, author of "Enameling on Metal Clay"

[Click here](http://www.paragonweb.com/BookInfo.cfm?BID=38) for information on Pam's new book

Recent Q&A: Programming a slow cooling

FIRING COPPER ENAMELING

Enamels are powdered glass. They are fused onto metal (usually copper) inside a kiln. The powder is heated for several minutes at the correct temperature (1450°F / 787°C for most enamels), and the copper piece is then removed from the kiln.

The kiln should open from the front. The red-hot copper pieces are easier to remove through a door than through the lid of a top-loading kiln.

1) Heat the kiln to the temperature recommended for the enamels you are using. Digital kilns: Use a single segment. Hold time should be the length of your enameling session. Switch-operated kilns: You will also need a pyrometer (temperature sensor). When the kiln reaches the correct temperature, adjust the switch every few minutes to hold the temperature.

2) Lay the copper shape on an enameling rack. If the part that touches the rack is enameled, place a trivet (a type of metal stilt) under the copper. Some bowls or other shapes have enameled sides that might run during firing. These should be fired with a stilt even if the piece has a plain bottom. Use an enameling fork or a long spatula to place the rack into the kiln on top of 1/2" ceramic posts.

3) Firing the piece at enameling temperature should take about 3 minutes and requires undivided attention! Look at your piece every 15 seconds by cracking open the door. Wear firing safety glasses. Angle your line of sight so that the glow from an element reflects off the surface of the enameling piece.

First, the enamel will appear granulated. As the glass particles begin to fuse, the surface will resemble an orange peel. Remove the rack when the copper piece appears a rosy red and the reflection of the glowing element is smooth. Place the rack on a steel pad or large ceramic kiln shelf and let it cool.

4) After you remove the enameling piece, allow the kiln to heat up again to the enameling temperature. Then insert the next enameling piece.

RECENT Q&A

Q. I don't understand how the program a slow cooling. How can the temperature go from 1000 to 800 with a positive rate? Either the power is off with natural cooling or the power is on with increasing temperature as long as the rate exceeds the natural cooling.

A. Instead of thinking of "rate" as a positive number (temperature rising), think of it as temperature change per hour. A rate of 200 is a temperature change of 200 degrees per hour. Whether the 200 degrees rate is cooling or heating depends on the segment temperature. If the segment's target temperature is cooler than the temperature of the previous segment, then the rate is cooling rather than heating.

AN INTERVIEW WITH PAM EAST, AUTHOR OF ENAMELING ON SILVER CLAY

Q. At what age did you become interested in art?

A. I come from a creative family. Both my grandfathers made jewelry after they retired. My grandmother was a painter for as long as I can remember. And my sister is a graphic designer.

I never pursued art while growing up, because as a kid I thought art meant drawing, and I wasn't great at it. I would flirt with it from time to time, buying sketch books and colored pencils or pastels, but then my sister would knock off a quick drawing in my sketch book that was so good it would drive me to despair, and I'd give up again.

In college I took a photography course and discovered a deep love of art. I came to realize how limited my thinking had been about what constitutes art and ended up majoring in art and photography.

After I left college I had a variety of jobs, none of which had anything to do with art. On weekends I toyed with stenciling, airbrushing, needlework, and rubber stamping. (I own over 1,200 rubber stamps!) It wasn't until I was in my 30s and my daughter was two years old that I finally stumbled into jewelry making.

Q. How did you get started in enameling and metal clay?

A. I was an enamelist long before I found metal clay. I got my start making torch-fired enamel beads on copper tubing. Eventually I wanted to enamel on silver as well as copper. But I discovered that sterling silver does not enamel well without first going through the complicated process of depletion gilding (refining the copper out of the silver), and fine silver tubing is nearly impossible to find. Also, I was not particularly interested in investing the time and money it would take to become a silversmith.

Enter silver clay. What intrigued me the most was that silver clay fired to pure fine silver, would be suitable for enameling right out of the gate, and could be worked without specialized silversmithing tools or knowledge.

Once I got my hands into silver clay, it took over my life completely. The stuff is totally addictive, and I moved on from beads fairly quickly. The clay is such a versatile medium it wasn't long before I added a Paragon SC-2 kiln to my studio and was making earrings, pendants, pins, and more. Again, my love of experimentation pushed me to see what I could do with this amazing product.

Q. Please describe your first experiments with enameling on silver clay.

A. My first experiments with metal clay were, of course, beads. I had been working on copper tubing for years, and so I started off making silver tubes out of the clay and torch-firing enamels onto them. I had the usual successes and failures when one starts playing with something new. I learned a lot not only about silver clay but enameling as well. A seam in the tube or changes in thickness caused all sorts of problems with the enamel

chipping off. It took a while, but eventually I was able to produce consistent tubes with lovely patterns on them that would show through the transparent enamels.

Q. I noticed the pictures of the Paragon SC-2 kiln in your book.

A. The Paragon SC-2 is lightening quick to heat up and fire metal clay. I use mine for enameling as well. I wrote my entire book using the SC-2, and everything worked great.

Q. How did your book idea begin to form?

A. With my background in enamels, it was natural for me to look at everything I made as a canvas. I had been writing articles for bead magazines for several years, so writing enameling on metal clay articles was the next logical step. I wrote several before beginning to think about a book. I had noticed that there were several metal clay books on the market that had one enameling project in them, and there were several enameling books that touched briefly on metal clay, but there was no book devoted to the subject of enameling on metal clay.

In talking to my students, customers, and fellow artists in the metal clay community, I saw a strong desire for an enameling book for metal clay artists. There are many excellent books on enameling in general, but most of them target the fine art market and can be overwhelming for beginning home hobbyists. Also, the general enameling books do not address the specific challenges of enameling metal clay. It is significantly different than working on sheet metal. So I decided I to write a book with a clear focus on beginning enameling for metal clay artists. My goal was to demystify the process and make it easy for anyone to start applying enamels to their metal clay.

Q. What was most challenging about writing the book?

A. Time!!! Or a lack there of. While writing this book I was still running Pinzart, working trade shows, and raising a family. Life doesn't slow down and make time for you while you are writing. During the year I worked on the book, we weathered the storms of a manuscript due right during the holidays, edits due right during my daughter's Bat Mitzvah, and the loss of a family member.

I learned to schedule time for writing and to make it a priority. When a deadline is months away, it's easy to think you have plenty of time, but that's an illusion. Every day counts.

Using Silica Sand in Ceramic Firings, Part Two

CONTENTS

Using Silica Sand in Ceramic Firings, Part Two

Reader Response: Comments on sand

Announcement: New Paragon online videos and audios

Last week Mario Miguel Echevarria of Longmont, Colorado shared information on silica sand in the kiln.

Silica sand, as with kiln wash, will ruin heating elements on contact. Keep the sand out of the element grooves. Do not let the sand spill into the switch box louvers.

- 1) If you use a fan to lower the firing room temperature, do not aim the fan directly at the kiln. The breeze can stir the silica sand inside the kiln. This could ruin glazed pieces and scatter sand into the element grooves. It is okay to use a down draft kiln vent such as the Orton Vent Master. When correctly installed, the vent does not create enough airflow to stir up dust.
- 2) Do not place sand on the kiln bottom. Use it only on the shelves. The sand can work its way between the firebricks.
- 3) Pour the sand onto the shelf before lowering the shelf into the kiln. If you pour the sand on the shelf inside the kiln, dust particles are more apt to float in the firing chamber, scattering onto your pieces.
- 4) Do not pour the sand onto the shelf from a large bag. Use a scoop instead. A scoop stirs up less dust.
- 5) Use the sand sparingly on the shelf for most projects. Use a thicker layer if you are concerned about glazes running.
- 6) Keep the sand 2" – 3" away from the edges of the shelf. If the sand falls off the edges, it may filter down into the element grooves or onto glazed ware on the shelf below.
- 7) As you lower the shelf into the kiln, hold the shelf level. If it tilts, the sand could fall off the edges.
- 8) When unloading the kiln, remove the shelf and the ware together. If the ware is too heavy to lift out with the shelf, then hold the piece away from the kiln before rubbing the sand off the bottom of the piece. If you hold the ware over the shelf as the sand falls from the piece, the particles could fall into an element groove.
- 9) Vacuum the kiln after every firing with a soft brush attachment. Be sure to vacuum the element grooves.

READER RESPONSE

Charlie Spitzer of Cave Creek, Arizona wrote, "Regular play sand does NOT work as a separator. I used it under some pieces, and the sand fused to my shelves, making them useless."

Maggie Jones of Black Mountain, North Carolina wrote, "I mix my sand (or grog) with dry alumina hydrate to aid in the refractory properties and insure the granules do not stick together."

ANNOUNCEMENT: NEW PARAGON ONLINE VIDEOS AND AUDIOS

We have just added videos and audios to our website:

[Online Videos and Audios](http://www.paragonweb.com/videos.cfm)

You can download the mp3 audio files and listen while you work. The videos cover kiln maintenance, and operation of the 3-key Sentry Xpress controller. We will adding more titles soon.

We've loaded low- and high-resolution versions of each video so that you can watch them even if you have only a dialup connection. The small button to the left of the volume control under the video screens will show the video in full-screen mode.

Please let me know if you have any problems accessing these files. I also welcome your suggestions.

We chose the mp3 format for our audio interviews, because mp3 players are easy to find. My son, Patrick, just replaced his cell phone with a \$30 Nokia. It was the least expensive model he could find, yet even that one plays mp3 files. They load from the computer through a cable.

Using Silica Sand in Ceramic Firings, Part One

Last week's Kiln Pointer was on salvaging damaged kiln shelves. In response, Mario Miguel Echevarria of Longmont, Colorado wrote the following:

"I use warped shelves for firing tiles by sprinkling piles of grog on the shelf to 'shim' the irregular surface under the tile corners. If the work I am firing needs support under a warped corner or a fragile extension, I pile enough under it to support it and keep it from rocking. Works great!

"I use sand all the time in the kiln now to act as a ball bearing slide under large artwork. Since I have discovered this, my stress fractures in large tiles have decreased drastically.

"I use fire sand as grog. I use 35-mesh grog. I buy it from Mile Hi Ceramics in Denver.

"I reuse the sand over and over. I notice it turns from a gray beach-like sand to a cream of wheat looking sand after a firing.

"When using sand on shelves during a glaze fire, be very careful not to spill any onto the work around or below the sand-supported work. It will become a unwelcome (or sometimes welcome) permanent addition."

Thanks, Mario, for the valuable pointer.

READER RESPONSE

Q. What happens if you leave a carbon steel armature in a sculpture and fire it to cone 10? Will this harm the kiln?

A. Leaving the armature inside the clay sculpture will not harm the kiln. But difference in expansion rate between the metal and the clay may damage the sculpture.

From Marc Hines: Happiness is a warm kiln... or two.

Today we are teaching a kiln maintenance seminar at the factory. Cars are lined up all along the front of the building.

The seminar reminds me of the first time I changed an element. Paragon's new owner, John Hohenshelt Sr., told the crowded class, "And now Arnold will show you how to change an element. I will give the class to him." Surprised at his announcement, I walked toward the kiln and picked up the coiled wire.

Chairs shuffled as students moved from tables and gathered around the kiln near the front of the room. They closed in around me, some leaned over the kiln, and they watched as I threaded the element into place. I spoke almost as if I were reading instructions, because I had proofread them many times.

That's how I installed my first element. You will be successful, too, with your first element if you read the instructions before you begin.

I hope you have a great weekend.

How to Salvage Damaged Kiln Shelves

CONTENTS

How to Salvage Damaged Kiln Shelves

Recent Q&As: Enameling kilns

HOW TO SALVAGE DAMAGED KILN SHELVES

Cordierite ceramic shelves are used to stack layers of ware inside a kiln. Shelves and posts together are called kiln furniture.

If a kiln shelf breaks or warps, you can sometimes salvage it. Suggested uses for damaged cordierite shelves:

- 1) Support posts with small shelf pieces on the kiln's firebrick bottom. This transfers the weight of the kiln load to a wider area, reducing the stress on the brick bottom. This is especially useful if the bottom is uneven.
- 2) Saw the damaged shelf into strips, and use for glass box casting. Cut the shelf on a tile-cutting wet saw with diamond blade. You can rent one from a home improvement center or have a tile center cut the shelves for you. (Note: Please wear safety glasses when cutting shelves.)
- 3) Place a small shelf piece on top of a post to elevate the witness cones. This makes it easier to silhouette the cones behind an element and to line them up with a peephole.
- 4) Suppose the lid of your kiln has a crack where firebrick particles fall onto glazed ceramic ware. Place a shelf strip a couple of inches under the lid crack to catch the debris. Use two posts to hold up the shelf strip.
- 5) Save warped shelves for use with small projects that won't be affected by the warpage, such as jewelry, cups, etc.
- 6) Use a broken shelf section to load smaller ware around tall objects.
- 7) Saw a cracked shelf along the crack to make smaller half-shelves.
- 8) A warped shelf can cause glass bubbles on larger glass fused pieces. To salvage the shelf, drill a small hole through the shelf in the low spot. Do not press downward as you drill. Use a diamond bit and water or a masonry bit. As an alternative to drilling a hole, fuse glass on the reverse side of the shelf.

RECENT Q&As

Q. What is the difference between a kiln for enameling and a kiln for glass fusing?

A. An enameling kiln should be front-loading instead of top-loading. This is because the enameled piece is inserted into the kiln at around 1450 degrees F, fired for a couple of minutes, and removed while red hot. It would be difficult to do this with a top-loading kiln.

The kiln should be digital, because the enameling temperature is held for extended periods. You can also hold the temperature using an infinite control switch and pyrometer, but a digital controller does this automatically, which simplifies enameling.

Buy a kiln large enough for the largest pieces you plan on making. Before selecting a kiln, decide if you will use an existing electrical circuit or if you need to have a new one installed.

In a moment I will ride home from Paragon on my bicycle. The sun is beating down, but relaxing—like a sauna. I learned to enjoy the heat while living in Tripoli, Libya during my childhood.

Adding Silver to Fused Glass, Part 2

CONTENTS

Adding Silver to Fused Glass, Part 2

Recent Q&As: Room temperature reading on a digital controller; programming a slow cooling; ohmmeter basics

Enamelist Society Fusion Conference

ADDING SILVER TO FUSED GLASS, PART 2

Two months ago I wrote that instead of discarding silver filings, add them to fused glass. [Kiln Pointers Back Issues](http://www.paragonweb.com/Kiln_Pointers.cfm) Martha Biggar, Cindy Henry, and Judi Weers have kindly given more information about combining silver with glass.

Cindy Henry of Homosassa, Florida wrote, “When combining Precious Metal Clay with glass, use Bullseye Crystal Clear as opposed to the regular Clear. If you don't, there can be a chemical reaction with the clay.”

Judi Weers of San Antonio, Texas wrote, “When I place silver clay around Bullseye glass, the regular Clear 1101 will usually get a yellow tinge along the edge next to the silver. I have also placed silver clay (in thin paper form) between two layers of glass, and the silver looks like gold. Bullseye, I believe, remedied this by creating the Crystal Clear 1401, which does not yellow next to the silver.”

Martha Biggar of Draper, Virginia wrote, “Silver is used to give glass a gold color for stained glass purposes. Bullseye Glass Co. in the last few years has been producing a fusible non-lead hand-cast glass called Crystal Clear 1401. In my unscientific fusing experiments, I have found that some colors, especially the whites and french vanilla, are affected by silver. So even if you cap your fused piece with Crystal Clear 1401, it may not make a difference.

“Sometimes silver remains on the kiln shelf as little ‘ghosts’ of your work,” Martha wrote, “and this may color your glass even through a layer of thin-fire paper.

“The firing temperature does seem to matter, since firing the PMC in the low range, i.e. 1200F, does not heat the glass enough to have the silver color it, but in the midrange, 1350F, your glass may change color.”

RECENT Q&As

Q. My controller shows a room temperature reading of 89 degrees F when the actual temperature is 71-- an 18 degree higher reading. If I want to fire to say 1500 degrees, should I add the 18 and go to 1518?

A. A thermocouple is often not accurate at all temperature ranges. Because a thermocouple reads 18 degrees higher at room temperature doesn't necessarily mean it will read 18 degrees higher at 1500 degrees. I suggest firing to 1500.

Q. I am programming a segment of a firing that has a rate of 300 F and a temperature drop from 1000 degrees F to 800. Will the power shut off during that segment until the temperature drops to 800?

A. If the kiln's natural cooling rate is faster than 300 degrees per hour, the elements will intermittently turn on to slow down the rate to 300.

If the kiln's natural cooling rate is slower than 300 degrees per hour, you may get an error message. In this case, program a slower cooling the next time. The error message is simply to inform you that the actual cooling rate is slower than the rate you programmed.

Q. The kiln should be unplugged before touching the ohmmeter to the element. So, how does the ohmmeter check the element if the kiln is not plugged in?

A. The ohmmeter contains a battery that sends a small electric current through the element. If the element is broken, the electricity cannot make a complete circuit back to

the ohmmeter. If the element is not broken, the ohmmeter reads the electrical resistance in the element.

ENAMELIST SOCIETY FUSION CONFERENCE

Enameling is the art of fusing powdered glass to copper, gold, or silver. The enamel piece is inserted into a kiln at around 1450 degrees F and removed several minutes later.

Last weekend I displayed Paragon kilns at the Enamelist Society Fusion Conference in Columbus, Ohio. Some of the people I met had been enameling for over 30 years. You could tell they were enamelists by the colorful earrings or pendants they wore.

How to Dry Clay Sculpture

CONTENTS

How to Dry Clay Sculpture

Recent Q&A: How to program flash-cooling for glass

Announcement: Ed and Martha Biggar Glass and PMC Classes in Dallas, Texas

HOW TO DRY CLAY SCULPTURE

By Carole Dwinell

www.caroledwinell.com

To keep clay workable and 'wet,' I use clear 33-gallon garbage bags that I get at Costco. They must be clear so you can see the moisture on the plastic as water starts to evaporate. You want to know that the air inside the bag stays moist.

Place the ware on a piece of 100 lb. card stock (about the thickness of a business card and sold by paper companies). I have a ream of it in my studio. I used to use newspaper, but it shreds.

Place the ware, which is on the sheet of 100 lb. card stock, on a scrap piece of plastic (which I get from Tap Plastics). Keep the whole thing inside the clear garbage bag secured VERY tightly by twisting and twisting the opening of the bag. Then wrap the twisted plastic with a really strong rubber band.

I open the bag and spray the piece almost daily to keep the air in the bag saturated with humidity. That way I can work on the piece for many months.

When I'm finished with the clay sculpture and I want to start drying it, I open the bag for maybe 20 minutes. Then I twist and band it shut really tight again. Over a week or two, depending on the complexity of the clay piece, I gradually increase the time that I leave the bag open. I'll leave it open 30 minutes, then 45, then an hour and so on before totally sealing it off again.

The work I'm doing now includes thick tree trunks and very thin leaves. The tree sculptures are tricky because the leaves always try to dry first. By controlling the amount of time I expose the clay to drier air, those leaves become the conduit for the moisture in the rest of the clay to reach the surface.

By slowing the drying, the drier clay on the edges has time to pull the moisture from the thicker parts of the piece. With clay platters, the edges probably dry first. The foot and surrounding area are the last to dry. That's where the stress comes in. That's what used to happen with my thrown stuff, but since I started using the above drying method, I have had no cracks, no breaks, no shearing, nada, nothing. (Well, once I bumped a piece, but that doesn't count, does it?)

Remember that this drying procedure accompanies the 46 hour 'up' and 36 hour 'down' bisque firing. Both are crucial to the 'no breakage' success story. I have NO breakage at all.

(Carole's article "A Firing Schedule for Clay Sculpture" appears as the 05/15/2007 Kiln Pointer.

["A Firing Schedule for Clay Sculpture"](http://www.paragonweb.com/Kiln_Pointer.cfm?PID=254/)

RECENT Q&A

Q. Will programming a FULL rate during a cooling segment turn off the elements?

A. Yes. If you will be raising the lid to flash-cool the glass after the glass has fused, you should program a FULL rate. This turns off the elements during that segment so the kiln can cool quickly.

ANNOUNCEMENT: ED AND MARTHA BIGGAR GLASS AND PMC CLASSES AT THE CREATIVE ARTS CENTER, DALLAS, TEXAS, OCTOBER 2007

Thursday, October 11: New Techniques in Fused Glass. This beginner to intermediate class will include several new techniques in kilnforming: liquid stringer, glass paper inclusions, and simple pate de vere, among others.

Friday, October 12: Beginning PMC. Students will learn the basics of PMC while making at least three pairs of earrings and two pendants.

Saturday, October 13 and Sunday October 14: Intermediate PMC. This class is for the person who's had a little experience with metal clay but wants to push the envelope in their design and fabrication work.

For more information and to register, call Ed at 276-620-8595,
Or visit www.edandmarthabigggar.com .

[Ed and Martha Biggar](http://www.edandmarthabigggar.com/)

A Firing Schedule for Clay Sculpture

Photo caption: mirror1.jpg Shown above is the moisture test that Carole used. Fog on the mirror indicates that the clay is still releasing moisture.

CONTENTS

A Firing Schedule for Clay Sculpture, by Carole Dwinell

Reader Response: Suggestion for removing bottle labels; praise for Petra Kaiser; safety glasses.

A Firing Schedule for Clay Sculpture

By Carole Dwinell of Martinez, California

My tree forest series clay sculptures are 16" to 22" tall with clay formed in sizes from tiny, thin leaves to thick trunks and bases.

I fire sculpture slowly with a five-ramp bisque firing. It takes 46 hours up in temperature and 32 hours down. I have not had ONE firing problem with that schedule. Period. Not a crumble, not a crack.

I initially thought this schedule was going to be super expensive in electricity, but that has not been the case. There has been only a slight rise in the monthly electric bill, about \$22, and that was firing every week to be ready for a show.

The long soaks and the slow controlled cool-down keeps the temperature extremely even throughout the kiln. I put cones on all three shelves in one firing, and they were identical when I opened the kiln.

My firing schedule in degrees F for sculpture with thickness varying from 1/32" to more than 1":

Ramp 1) Up at 40°/hr to 180°, soak for 12 hours

Ramp 2) Up at 60°/hr to 1000, soak for 3 hours, then shut vent

Ramp 3) Up at 60°/hr to 1200°, soak 1 hour

Ramp 4) Up at 80°/hr to 1888°, no soak

Ramp 5) The cool-down: Drop temperature 50° per hour to 300° before shutting off the kiln. Then let it go the rest of the way down on it's own.

At 900° to 1000° F (Ramp 2), I get quite a bit of moisture at the upper vent of the kiln (the lower intake still being open). At first I thought perhaps it was the weather, because I was positive that the 12-hour soak at 180° had dried any water out of the ware. But at approximately 1000° F, I was getting WAY MORE moisture than at the lower soak.

At the lower temperature (Ramp 1), the moisture barely even starts to fog the glass* I use. At the higher temperature (Ramp 2), my glass is thoroughly fogged for tests taken during the Ramp 2 first hour of soak before it gets less and less as that three-hour soak wraps up.

Everyone I've talked to who has had kiln problems seems to fire way too quickly. Why would one put so much work into a sculpture and then play kiln roulette by firing too fast? It is the same with drying. There are so many ways to get your pieces to dry evenly and completely, yet I see shortcuts all the time that lead to disaster.

*Note from Arnold: Carole is referring to the mirror or glass test. Hold a mirror above the lid or top peephole where hot air from the kiln will move across the mirror's surface. If the mirror fogs, the greenware is still releasing moisture. (If you are firing with a downdraft kiln vent, first turn off the vent. Then perform the mirror test.)

For this test to work, the mirror must be at room temperature. The mirror fogs when moisture in the hot air condenses on the cooler mirror. If you hold the mirror too long near the kiln, the mirror will heat up and will no longer fog when moisture hits it. So hold it at the lid for only several seconds at a time.

READER RESPONSE

Last week's Q&A section included information on scraping labels from champagne display bottles for glass slumping. Karen Hardy of Redondo Beach, California wrote, "I have a suggestion for removing labels from champagne or wine bottles. I use a product

called Goo-Gone. You can find it in practically any hardware store and most grocery stores. Just spray or dab it on the label, let it soak in, and the label comes right off after a few minutes along with most of the gummy junk. Then you can use a paper towel with a bit more Goo-Gone sprayed on it to remove any leftover junk.

“The product is non-caustic, all organic, and has a wonderful orange smell. It's also really cheap, and you're not as likely to slice off your thumb as you would if you used a razor blade to scrape the label off (I'm accident prone).”

In last week's Q&A section, I recommended the book "Introduction To Glass Fusing," by Petra Kaiser. Yvonne George of Cameron, North Carolina wrote, “I went to a bead show in Orlando and saw a short demo by Petra and Wolfgang. They were so giving, enthusiastic and informative. I bought some supplies and her EXCELLENT book. I've been to Petra's home and studio. She is charming and so very knowledgeable. I would not be doing glass except for her and her encouragement...and the wonderful book. Highly recommended!”

[Click here to read more about “Introduction to Glass Fusing.”](http://www.paragonweb.com/BookInfo.cfm?BID=22)

Kate Julian of Stilwell, Kansas wrote, “I love these pointers from you! My only comment though, shouldn't you practice what you preach? The woman in the photo is not wearing protective eyewear.”

Thanks, Kate, for the reminder!

Here is part of an interview with Angelica Pozo, author of “Making & Installing Handmade Tiles”:

Q. What are the most common mistakes of the typical beginning tile maker?

A. The most common mistakes start from making tile from unsuitable clay. A heavily grogged clay is the most forgiving for tile making. Some people make tiles from porcelain, but those require extreme care in forming and drying. Beginning tile makers would have a much easier time with the proper clay body.

[Click here to read the full interview.](http://www.paragonweb.com/BookInfo.cfm?BID=37)

Firing a Kiln in the Summertime Heat

You can fire your kiln in the sweltering summertime, but you may need extra ventilation.

Firing a kiln when the ambient room temperature is too high is hard on switches, relays, transformers, and the controller. I know of a manual-fire kiln that had repeated switch failures during the summer. Someone finally sent us one of the switches. The plastic knob had actually softened and distorted! Upon further questioning, we found out that the room was small and had no ventilation.

Use a fan to blow air through the switch box louvers. Do not let the air blow directly onto the case of the kiln, especially at a peephole. The air should go in one side of the switch box and out the other to create a crosscurrent. Also, open windows.

The Orton Sentry controllers that Paragon uses shut off when the controller board temperature is above 176 degrees F (80 degrees C). The error message ETH (electronics too hot) appears. Our recommended maximum board temperature is 158F/70C. (That is the temperature inside the switch box.) In every case that I know of where ETH appeared, a fan solved the problem.

By the way, if switches keep burning out, it may be due to a bad push-on connector. When a push-on connector gets too hot, it loses its spring tension. Even if you tighten the connector by squeezing with pliers, it will loosen again. A loose connection causes electrical arcing, which overheats the switch.

Removing Pressure on the Silver Clay Kiln Door Latch

CONTENTS

Removing Pressure on the Silver Clay Kiln Door Latch

Recent Q&As: Firing glass with a manual kiln; programming a cooling segment.

REMOVING PRESSURE ON THE SILVER CLAY KILN DOOR LATCH

Paragon SC-series silver clay kilns use a spring-loaded door latch. There is a way to reduce the tension on the latch so that opening the door doesn't jar the kiln. This takes only seconds:

- 1) Remove the top screw from the latch, which is mounted to the door.
- 2) Use a toothpick or a small magnetic screwdriver to lift out the spring located under the screw. Save the spring.
- 3) Reinstall the top latch screw.

Removing the spring eliminates half the pressure on the door latch. The door is easier to open and close yet still has enough spring pressure to stay securely closed.

RECENT Q&As

Q. Is holding temperature with an infinite switch an alternative to a costly controller in glass fusing?

A. Yes, you can fire glass with a manual kiln. The controller is not essential. Paragon's first glass kilns were all equipped with infinite control switches.

The digital controller simplifies glass firings, though, especially if you are using a ceramic kiln. The controller allows you to fire difficult projects such as thick pieces that require days of annealing time.

Q. How do you program a cooling cycle? Programming positive temperatures doesn't make sense for a cooling cycle.

A. Every segment raises or lowers the firing chamber temperature. Instead of thinking of the segment temperature as either positive (heating) or negative (cooling), consider it merely a target. If the segment temperature is higher than the previous segment, the temperature automatically goes up. If the segment temperature is lower than the previous segment, the temperature automatically goes down.

Last week John Watson of Evenheat Kilns died. For many years, we at Paragon had a close relationship with him. In the kiln industry, most of our competitors are also our friends, and John Watson was a prime example of one.

How the Kiln Sitter Works

CONTENTS

How the Kiln Sitter Works

A Kiln Sitter Pointer

Reader Response: Frances Darby

Paragon Closed July 4 – 6

Flooding

HOW THE KILN SITTER WORKS

The Dawson Kiln Sitter is simple: A piece of clay bends when exposed to heat, which releases a trigger that turns off the kiln. Once you know how the Kiln Sitter works, you will find it easier to adjust.

Inside the kiln, a small clay pyrometric cone is centered horizontally on the Kiln Sitter cone supports. A lightweight rod that pivots up and down inside a tube rests on top of the cone.

A metal block is mounted to the other end of the rod outside the kiln. The block is called a claw and presses down over the end of a hinged weight. The claw prevents the vertical weight from dropping. If you removed the cone and lifted the rod up, the weight would drop.

The kiln heats up. When the pyrometric cone has been exposed to the amount of heat rated for that particular cone, the cone bends, and the rod that rests on top of it moves downward. As the end of the rod moves downward, the opposite end moves upward. This releases the weight.

When the weight drops, it moves a locking slide, which in turns releases spring-loaded electric contacts. The kiln shuts off.

The adjustments that every operator should know:

- 1) Adjust the actuating rod so that it is centered in the porcelain tube.
- 2) Adjust the trigger at the end of the weight. (You will need a firing gauge.)

KILN SITTER POINTER

This idea came from a potter named Mel Jacobson:

Keep chairs, stools, and small loading tables away from the kiln. Many of these items are the same height as the Kiln Sitter vertical weight on the outside of the kiln. It is so very easy for someone to come by and move a stool or small table up against the weight, which will prevent it from dropping, thus causing the kiln to overfire. When Mel taught high school, he banned stools and chairs from the kiln room.

READER RESPONSE

Last week I announced the death of Frances Darby, who founded Paragon. Ginny Reisinger of Ceramic Industry magazine in Powell, Ohio wrote, “Thank you for sending the information about Frances Darby. While it is sad to hear of her passing, I felt inspired reading about her. I did not know Paragon was founded by a woman, and I know first hand how unusual it was to find women successful in business back in the ‘old days.’ She sounds like such a wonderful person and has truly left an outstanding legacy.”

Thank you, Ginny.

PARAGON CLOSED JULY 4 - 6

Paragon will be closed July 4 – 6. We will be back on Monday, July 9. I hope you have an enjoyable fourth wherever you are in the world.

FLOODING

Ten years ago I was caught in a flash flood on Greenville Avenue in Dallas. My wife, son, and I stayed for over two hours in our Toyota van amidst the rushing water. We could feel the tires lifting off the pavement as the van floated down the street in water that reached the windshield. Finally, the fast-flowing water wedged one of the tires against the concrete curb by forming a trough in the dirt. This stopped the van from drifting toward deeper water.

We have had two weeks of rain here in Mesquite. This has given me the opportunity to use knowledge that I gained from the flood: Do not drive through water if you cannot see the curb by the side of the road. Unless you can see the curb, it is difficult to gauge the depth of water especially when you are driving.

Adding Silver to Fused Glass

CONTENTS

Adding Silver to Fused Glass

NEWS: Founder of Paragon dies; new ceramics website

Recent Q&As: The speed of an infinite switch; Firing slower than Cone-Fire slow speed; interpreting a humming noise during firing;

ADDING SILVER TO FUSED GLASS

If you ever file a fired silver clay piece for final shaping, do not discard the filings. They are beautiful when fused into glass jewelry.

Catch the filings with a piece of paper. After you have finished shaping the silver piece, fold the paper in half. Tap it so the silver powder falls into the fold. Then pour the filings from the corner of the fold onto a piece of clear fusible glass.

When fired between layers of clear glass, the silver will retain its original color and sheen, or it will turn yellow-gold.

In my desk I have an ugly silver clay piece that I made several years ago. One edge is bright where I sliced off tiny slivers with a knife. The photo above is clear Bullseye glass with the embedded silver.

NEWS

Frances Darby, the founder of Paragon Industries, died this week. She taught me a lot in the seven years that I worked for her. For instance, when I came to her with an idea, she analyzed it like a chess move by asking questions. After awhile I began to do that on my own.

You can read more about Frances Darby on Paragon's home page:

[paragonweb.com](http://www.paragonweb.com/)

Sign up for a ceramic glaze newsletter and receive a complimentary copy of a glaze booklet from Ceramics Monthly magazine:

[Ceramic Arts Daily](http://ceramicartsdaily.org/)

RECENT Q&As

Q. Is there any documentation that has the approximate rate of speed on the infinite control switch? For example, the heating rate when the knob is set to 2.5.

A. The heating rate at a particular infinite control setting varies from one kiln to another. This is because the rate at each setting depends on the size of the kiln, amperage, type of insulation, etc. Another factor is the age of the switch.

I suggest that you use a pyrometer to figure the firing rate at each setting on your particular kiln. The rate will be fairly repeatable. However, if you change the switch, you will need to figure the rates for the new switch too.

Q. Through trial and error I've come to the conclusion that I'm firing too fast. So far, I've used only the Cone-Fire mode of the Sentry controller. I used Cone-Fire Slow Speed for my last glaze firing, and I broke only one tile out of 16. That is better than before but still one tile too many. It appears to me that I need to fire even slower using the Ramp-Hold mode.

A. There is a way to slow down Slow Speed in Cone-Fire mode. That may be the easiest way to solve the problem of tiles breaking:

- 1) Program Slow Speed in Cone-Fire just as before.
- 2) From IdLE, press the Options key until SPd appears. Press Enter.

3) Using the 1 or 2 key, select S40.

4) Press Enter, then Stop. IdLE will appear.

This will fire the kiln 20% slower than the standard Slow Speed setting that you have been using.

Q. How can you tell the difference between the humming of a relay or other electrical part and the humming of a heating element?

A. The humming noise of a heating element lessens as the element gets hot. At around 1500 degrees F, the element is almost silent. A humming from a transformer would remain the same.

Holding Temperature with an Infinite Switch

CONTENTS

Holding Temperature with an Infinite Switch

Tool Suggestions

Recent Q&A: Slumped wine bottles are cracking

Kiln Maintenance Seminar October 5 - 6, 2007

The Glass Art Society show last week

HOLDING TEMPERATURE WITH AN INFINITE SWITCH

You can hold a temperature even if your kiln has an infinite control switch instead of a digital controller. You will need to make frequent adjustments to the switch using a pyrometer (temperature sensor) as a guide.

Holding a temperature with an infinite switch is similar to driving a car. You automatically make almost indiscernible adjustments of the steering wheel to keep the car moving straight down the highway.

Inside the infinite control switch is a strip of metal that bends as it heats. The bending of that metal cycles the switch on and off to maintain a heating rate. You will hear a clicking noise with every heating cycle. The higher the switch setting, the longer the switch stays on with each cycle.

To hold a temperature, sit in front of the kiln and watch the pyrometer. As the temperature begins to creep upward past the hold temperature, turn the knob to a lower setting. When the temperature dips too low, turn the knob to a higher setting. You will need to adjust the switch about every four minutes.

As you gain experience, you will learn that the switch should be adjusted in small increments. Large adjustments will cause the temperature to change too fast and will require additional switch adjustments to get the temperature back under control.

With practice, you can sense when to adjust the switch before the temperature drifts. This will take fairly close attention, so stay with your kiln throughout the hold period.

This is not as tedious as it sounds if you use your kiln time as a chance to catch up on your reading.

TOOL SUGGESTIONS

Norman Brock of Brock's Ceramics in San Antonio, Texas suggests that kiln technicians add the following to their tool kit:

small hand vacuum

soft paintbrush

small dust pan

extension mirror to check elements

extra self-tapping screws

element pins

RECENT Q&A

Q. I have recently tried slumping wine bottles in my kiln. After a few days, the bottom cracks off. What am I doing wrong?

A. It sounds like the bottles cooled too quickly. The thicker the bottle, the slower it has to cool. Bottles are especially prone to cracking if you fire them a second time to add a decal. This is because the glass is fused together and is thicker than it was as the original bottle in the first firing. The solution is to fire and cool the glass more slowly.

A bottle will also crack if it sticks to a shelf that does not have enough glass separator.

PARAGON IN-PLANT KILN MAINTENANCE SEMINAR

On October 5 - 6, 2007, Paragon will hold a 1-1/2 day Basic Repair and Maintenance Seminar at the Paragon kiln factory in Mesquite, Texas. This is about 30 minutes east of Dallas. Paragon's head engineer and staff will teach the seminar.

The seminar covers basic electricity, kiln electrical installation, the multi-meter, switch replacement, electrical troubleshooting, element replacement, the Kiln Sitter, electronic kiln diagnostics, and more.

The seminar includes two lunches, one restaurant dinner, and a 3-ring notebook of maintenance data on Paragon kilns. The seminar fee is \$95. To register, please call 800-876-4328 or send an email to teri@paragonweb.com . If you are flying and don't want to rent a car while you are at the seminar, ask the receptionist about Paragon's airport and hotel pickup schedule.

THE GLASS ART SOCIETY SHOW

I attended The Glass Art Society trade show last week at the David L. Lawrence Convention Center in Pittsburgh. This is where the NCECA pottery conference will be held next year.

The most prominent feature of the convention center is the natural lighting. At one end of the roof, canvas filters the light from a 20' x 200' section of glass. Strips of glass 4' wide span the entire curved roof.

At the trade show, long patches of sunlight crawled across the floor throughout the day. Sunlight hit the show booths like a stage spotlight and then moved on.

Cosmetically Challenged Kilns

CONTENTS

Cosmetically Challenged Kilns

Recent Q&As: Firing a kiln on a porch; the first firing of a glass kiln

A 45-foot Glass Mosaic

COSMETICALLY CHALLENGED KILNS

Kilns are hard working tools. They don't stay new looking for long. After the first few firings, the steel case of a new kiln discolors, and hairline cracks appear in the firebricks. This is normal. Yet it alarms some kiln owners.

Mel Jacobson of Minnetonka, Minnesota wrote, “Firebrick kilns all crack. It is natural. One of the most common complaints that come across the desks of kiln manufacturers is, ‘I have a crack in the floor of my kiln.’”

Mel is right—that is one of our most common complaints.

“It is like a tiny scratch in your new car,” Mel said. “Does it still run? Yes, of course. The cracked firebrick is cosmetic. But, most people don’t understand how kilns work, what they are made of, and the energy of heat, expansion, and contraction.

“A kiln is not handmade walnut furniture. It is a tool, and tools get dirty and crack. What is more beautiful than a hammer handle that has been used for 80 years?”

Though the insulating firebrick is fragile enough to carve with a fingernail, it is a miracle of physics. It can routinely withstand temperatures over 2000°F, which is hot enough to melt copper, bronze, brass, and aluminum. Nevertheless when properly maintained, firebricks can survive many hundreds of firings.

David Hendley, for instance, bought his 33-year-old Paragon kiln used in 1995. After installing new elements, he has fired it 250 times to cone 06. “My Paragon practically fires itself, giving me more time to make more pots,” said David. I’ve included a photo of David with his kiln to show you that the ancient kiln performs well even though it is cosmetically challenged.

RECENT Q&As

Q. Is it okay to locate a programmable kiln outside under a carport or covered porch?

A. As long as the kiln is protected from the weather and has a roof overhead, it is okay to keep it on a porch even in a humid area. But it will last longer if it is kept inside an enclosed building such as a garage. In the mornings, does water condense on the kiln case? If so, the kiln will rust quickly.

Q. I have a new Paragon glass kiln with element in the firebrick lid. Do you recommend a special first firing?

A. Fire the kiln to 1000°F and hold for 30 minutes with only the shelf and posts inside the kiln.

The element grooves in the firebrick lid are hardened with a refractory coating that helps to prevent brick dusting. As the elements expand during the first firing, any loose particles inside the grooves will fall harmlessly into the empty firing chamber. After the kiln cools, vacuum the lid grooves. Then the kiln is ready for the first glass firing.

A 45-foot Glass Mosaic

Paragon's home page features a 45-foot glass mosaic ocean wave that Leslie Perlis made with her Paragon kiln. You can see the wave at the Brigandine Restaurant, 3263 Camino Del Mar, in Del Mar, California.

Leslie's mosaic wave reminds me of the Isle of Hawaii, where I lived for two years. The beaches on the eastern side of the island are black volcanic sand that the sun turns hot in the daytime. Small green crystals glisten like glass, giving the black sand a greenish hue.

The beaches have a primitive, almost prehistoric beauty. And they are not always gentle. Several times the surf has knocked me down and dragged me.

Making Glass Streamers with the Vitrigraph Kiln

Caption: Becky Johnson pulling glass streamers at the Creative Arts Center of Dallas. (Last week's photo shows the same session from a slightly different angle.)

CONTENTS

Making Glass Streamers with the Vitrigraph Kiln

Reader Response: Frit; kiln wash sticking to the mold

Recent Q&As: Removing labels from glass bottles; books on glass fusing

MAKING GLASS STREAMERS WITH THE VITRIGRAPH KILN

You can save money by melting scrap glass into streamers (glass rods the size of pencil lead). So don't throw away fused glass pieces that have ugly bubbles or cracks.

Several years ago Bullseye Glass developed a way to make streamers with a technique they call the Vitrigraph kiln. You can twist the hot streamers into shapes as they flow from the kiln, and you can combine colors into new ones.

Since the Vitrigraph is an advanced technique, please attend Vitrigraph classes before you try it at home. These instructions are only basic guidelines to help you after you have received instruction from an experienced teacher.

The Bullseye Glass Co. uses the digital Paragon Caldera as a Vitrigraph kiln. (You can see the Caldera in the photo above.) Since the Vitrigraph is suspended several feet off the floor, it is essential that you follow safety precautions:

Remove flammable materials from the firing room, which should have a concrete floor.

If possible, do not use an extension cord.

Keep pets and unsupervised children away.

Fire only glass scraps that are fusing compatible.

Keep the electric cord out of traffic areas.

Fire the kiln only with the help of an assistant.

Pay undivided attention to the kiln. Do not leave it unattended.

Do not reuse the flowerpot that holds the scrap glass. Do not refill the flowerpot while the kiln is hot. Use only one flowerpot load of glass per session.

Wear safety glasses at all times. Small pieces of glass can scatter about when you break off the streamers.

Set up 2 sturdy steel tables (without casters) spaced about 10" apart. Place them where they will not be jarred by anyone passing by.

Stack 2 cinder blocks on each table. Span the gap between the tables by laying 2 steel straps 2 1/2" wide x 1/4" thick across the top of the cinder blocks. The straps should be about the length of yardsticks.

Cut a 2" hole in the center of a 14" x 14" piece of 1"-thick rigidized fiberboard. Place the fiberboard over the steel straps. Lay 2 - 3" x 7" cordierite ceramic shelves on top of the fiberboard and positioned on each side of the hole.

It is important that the steel straps support the kiln. Do not depend upon the stability of the ceramic shelves and fiberboard alone. A ceramic shelf can break without warning due to heat shock, and the fiberboard doesn't support much weight.

Place a small, unglazed terracotta flowerpot on top of the 2 ceramic shelves. The flowerpot should have a 1/2" hole in the bottom. Fill the pot with frit or small pieces of scrap stained glass.

Place the Caldera kiln (without the bottom section) on top of the fiberboard. The kiln must be stable. Test it to make sure it doesn't rock. Keep the cord away from the hot sides of the kiln and out of traffic areas. Place a large steel bowl on the concrete floor between the tables to catch the streamers.

Program the controller:

450 degrees F per hour rate

target temperature of 1700 degrees F

2.00 hour hold

When the kiln reaches approximately 1700 degrees F, the glass will begin to flow out through the hole in the flowerpot. You can adjust the thickness of the streamers by adjusting the temperature.

As the streamers flow from the kiln, break them off with large tweezers or needle nose pliers.

READER RESPONSE

Cindy Durant of Penong, Australia wrote, “One of my favourite ways to make frit is to heat the glass in the kiln. You will need to play around with the temperature to find what works best for you. I usually go to 400-500 degrees C (750 – 930 degrees F).

“Remove the glass using large tongs and high temperature gloves [and safety glasses], and drop the glass into a metal bucket of cool water. (Do not use a plastic bucket.) The glass fractures from heat shock and might then need a bit of a wrapping in paper and further assistance in breaking. But it is by far the best and easiest way I have found to make frit in quantity without too much waste.

“The stuck kiln wash can be a real drag! Overfiring is usually the culprit. There are so many solutions to the problem. For really special pieces that I want perfect, non-textured, and clean, I now always use Bullseye Thinfire shelf paper for my fuse. It can only be used once but is worth the small price. I also sometimes just give my molds a light dusting of dry kiln wash; they still have a good coating of brushed-on dried old kiln wash from years ago.

“I would say that if the kiln wash is sticking during the slump, it is definitely overfiring. I usually slump at a low temperature and soak for 20-30 minutes to get a good gentle and even slump. The temperature will vary depending on the type and the thickness of the glass. A good kiln wash should not stick if all of the other factors are right.

“Thanks for the kiln pointers. It is always an interesting read. I also agree with the woman's comments on how scary it must be to live in tornado alley.”

Thanks, Cindy, for the valuable glass firing pointers.

RECENT Q&As

Q. A liquor storeowner gave me his French champagne display bottles for glass slumping. I am having trouble removing the labels. Any suggestions?

A. Soak the bottles in hot water until the labels loosen. Then scrape off with a safety razor blade (the type available from paint supply stores).

Q. I would also like to slump glass. Can you recommend a book to get me started?

A. Please go to www.paragonweb.com and click on Products, then Books & Videos from the drop menu. Or click on this link:

http://www.paragonweb.com/Books_and_Videos.cfm

You will find a list of book reviews, which includes books on glass fusing. I especially recommend "Introduction To Glass Fusing," by Petra Kaiser.

Wishing you a joyous Mother's Day

How to Make Powdered Glass (Frit)

CONTENTS

How to Make Powdered Glass (Frit)

Announcement: Ray Shirley of New Zealand Passes Away

Reader Response: Tornadoes

Recent Q&As: slumping wine bottles; removing kiln wash from glass; connecting the controller to a computer

Another tornado in Dallas

HOW TO MAKE POWDERED GLASS (FRIT)

Along the way to becoming a great glass fusing artist, you will make pieces that you consider throwaway scraps. But no matter how disappointing the results, don't throw anything away. Every glass piece can be turned into frit (powdered glass) and used again as part of a new piece. A large cracked or bubbled plate can yield \$20 worth of frit.

Remember to sort frit by the coefficient of expansion (COE) rating of the glass. Otherwise the new pieces that you make may crack after the firing. The easiest solution is to use only glass with the same COE.

How to make frit:

1) Judith Levinson of Rockville, Maryland places her glass in newspaper and a plastic bag. Then she and her husband take the glass to the nearest road construction site. "Please

run over this,” she tells the steamroller operator. The road crew looks at her inquisitively. Some shake their heads and smile, but the steamroller operators always run over the glass. Judith then sorts the frit into different grades with sifters.

2) Cut dichroic glass over a large piece of paper. After making a number of cuts, you will find tiny shards of dichroic. Never discard these, because even the smallest dichroic particle glitters when fused onto a contrasting base color of glass. Fold the paper in half and pour the dichroic pieces into a jar.

ANNOUNCEMENT: RAY SHIRLEY OF NEW ZEALAND PASSES AWAY

Ray Shirley of Laville Studio in Morrinsville, New Zealand passed away two nights ago from a heart attack. For some time he had suffered from two broken hips and a gall bladder removal.

Ray had been a loyal Paragon distributor for many years and was known by ceramists throughout New Zealand as a man of integrity. He stood behind every Paragon kiln he sold.

At age 14 or 15, Ray joined the New Zealand Army and saw combat at Tarawa during World War II. He told me a little about his unforgettable experiences there.

I admired his loyalty, hard work, humor, and wisdom. We will miss him.

ANNOUNCEMENT: NEW CUSTOMER SERVICE MANAGER

Teri Trice is Paragon’s new customer service manager. She brings a wealth of customer service experience to Paragon. Teri, welcome to Paragon.

[Email Teri](mailto:ttrice@paragonweb.com)

READER RESPONSE

Carol Gross of Beaverton, Oregon wrote, “You don't know me, and it's not really important that you do. I just wanted to say that I'm glad the tornado didn't harm you. I was in Americus, Georgia, in March with the Red Cross after a tornado went through. It's not the first time I've seen the damage a tornado can do, but it reinforced in me the power of nature. Living in Oregon, we have a lot of rain and some flooding, but we can get out of the way (and Mt. St. Helens only blows once in a while!). I can't imagine what it must be like to huddle together in a bathroom hoping the funnel will pass over.”

Thanks, Carol.

Two nights ago winds of about 50 mph hit Mesquite, Texas. The power went off at my house as the sky darkened and the wind bent trees in the front yard. I opened my north-facing front door and watched the storm with complete protection from the rain, because it blew in from the south. In very high winds, the rain becomes a swirling mist.

When the power came back on, the television news showed a funnel cloud sighted near Dallas. But it never touched down.

RECENT Q&As

Q. When I'm slumping glass into a mold such as the wine bottle slumper, do I need the kiln shelf under the mold, or can I set the mold directly on stilts?

A. I recommend the shelf under the mold to protect the kiln from melted glass. If there is no danger from melted glass, you could eliminate the shelf. The mold should be separated from the shelf with short posts or stilts.

Q. What is the easiest way to remove kiln wash from molds and shelves? I have tried scraping with and without water, and it is very time consuming.

A. Is it necessary for you to fire to a full fuse, or have you overfired the glass slightly? The lower the temperature, the easier it is to remove the kiln wash.

You could change brands of kiln wash. Some are easier to remove than others. Also, some glasses hardly stick to kiln wash. You might try changing to a different brand of glass. I've seen glass that did not stick to kiln wash at even 1700 degrees F.

Q. I am interested in the computer interface for the Sentry 2.0 controller, but my laptop doesn't have the RS232 port. Is it possible to use a USB port to connect the controller to a laptop?

A. If your computer has only a USB port, you can connect to the controller with a USB-to-RS232 adapter. The adapter connects externally to the laptop USB port.

Do Kilns Fire Cooler on the Bottom?

CONTENTS

Do Kilns Fire Cooler on the Bottom?

Recent Q&As: A kiln's maximum firing rate; shelf placement in the Fusion-10 glass kiln

Tornadoes

You may remember from eighth grade science class that heat rises. This is called convection. Many years ago it was a common belief that large kilns fired cooler in the bottom because heat rises.

Kilns tend to fire cooler on the bottom, but not because heat rises. Movement of heat through convection ends at around 1100 degrees F. At 1700 F, a cubic foot of air has only

about one-tenth the number of molecules as at room temperature. This is why there is little airflow in an electric kiln at high temperatures.

The bottom and top tends to stay cooler because the brick bottom and lid are large thermal masses that absorb energy. Paragon compensates for this by making the bottom and top elements fire hotter than the center elements.

You can improve heat distribution inside the kiln by loading less ware in a cool section and more ware in a hot section. Slowing the firing also helps.

RECENT Q&As

Q. I got an error code FTH (Failed to Heat). When the temperature climbs to 1200F-1300F my kiln fires at a maximum rate of 440 F; at 1400F-1500F the maximum rate is 360, and at 1500F the maximum rate is 300. I don't understand why my kiln fires at a progressively slower rate as the temperature climbs.

A. Kilns slow down as they go up in temperature. Their fastest firing rates are in the lower temperature range.

The maximum firing rate of a kiln depends on the type of insulation, element design, amount of wear on the elements, the size of the kiln, the voltage available at the wall receptacle, and other factors. Ceramic fiber kilns fire faster than equivalent firebrick kilns. Our fastest kiln is the QuikFire 6, which can reach 1000 degrees F in five minutes. The larger kilns fire much more slowly.

The FTH (Failed to Heat) error message is to let you know that your kiln could not keep up with the rate you programmed. The kiln will continue the firing, though. It is not necessary to turn off the kiln when FTH appears.

It is good that you have determined your kiln's fastest firing rates for each temperature range. You should program rates that are no faster than your kiln will fire. Otherwise you will get the FTH error message again.

Q. What is the best height for the shelf in the Paragon Fusion-10 glass kiln? It has side elements in addition to the large top element.

A. We recommend 1/2" tall posts under the shelf in the Fusion-10. This height aligns the shelf with the side element for even heating. But you should feel free to experiment with shelf height too.

This week we had another tornado. It touched down between Dallas and Ft. Worth. But the tornado stayed away from Mesquite.

I've seen funnel clouds, but I've never seen one touch down. They look like a "V" when they begin taking shape, extending downward from a dark cloud mass.

After I had been working here a couple of years, a tornado came within four miles of the Paragon factory. Tree branches were strewn across the roads, and daylight turned almost as dark as night. The power went out. People in the office huddled together in a bathroom, lit by a candle. One woman prayed out loud, her voice barely audible over the roaring wind and the creaking of the steel building. A moment later the wind died, and all was calm again at Paragon.

How a Digital Kiln Turns on the Elements

CONTENTS

How a Digital Kiln Turns on the Elements

Reader Response: fear of kilns

Recent Q&As: the stages of glass fusing; digital kiln error message

HOW A DIGITAL KILN TURNS ON THE ELEMENTS

One of the most common questions I've heard is, "My kiln is making a clicking noise. Is there something wrong with it?" The clicking is the normal sound of the relays turning the elements on or off.

A digital temperature controller uses one or more relays to turn on the heating elements of an electric kiln. The controller operates the relay by sending it a 12-volt signal.

The most widely used relay in digital glass and pottery kilns is the mechanical relay. The 12-volt signal from the controller turns on a small electromagnet inside the relay, which pulls electric contacts together. Power flows to the heating elements through the contacts. Each time the relay receives the 12-volt signal, the contacts come together and make a clicking noise.

Another type of relay is the solid-state, which in theory outlasts the mechanical relay. However, the solid-state relay is more prone to fail due to overheating than is the mechanical relay. And when the solid-state relay fails, the heating elements stay locked on, overfiring the kiln. When the mechanical relay fails, on the other hand, the heating elements usually turn off.

A third type of relay is the mercury relay, noted for long life. It outlasts the other types of relays; its service life has been measured in millions of on/off cycles. When it fails, the

elements remain off. We have used the mercury relays for years in our larger pottery and glass kilns with outstanding results. Optional factory-installed mercury relays are available for many of our studio-size kilns.

We have found that glass kilns place more wear on relays than do pottery kilns. This is because the long firing cycles for thick glass, especially through the annealing range, require many hours of frequent relay clicking. Pottery kilns usually fire to a temperature and shut off.

READER RESPONSE

Carole Dwinell of Martinez, California wrote, "I had to laugh at your latest newsletter about fear of kilns. I had my kiln for more than a year and a half before I got up enough courage to fire it. Now it's simply no big deal. (Well, almost. There's still a minor tremor here and there.) I've gone from having almost everything break in the school kiln to NOTHING, absolutely nothing, failing at home, so I'm totally stoked!"

RECENT Q&As

Q. I make fused glass pendants but can never seem to get the layers of glass to have a smooth edge. The top smooths out and it looks great, but you can tell there are multiple layers by the edges. They just don't seem to meld into a smooth, rounded edge. What am I doing wrong?

A. Glass goes through many stages of fusing as the kiln temperature rises. At first, separate pieces of glass soften and stick together while still retaining their original edges.

As the temperature goes up, the glass gradually softens further, and sharp edges become rounder. Finally, separate layers merge together into one smooth surface.

The easiest way to fuse glass is to watch it as it goes through the stages of fusing. I fused glass in Paragon's first glass kilns, which had infinite control switches. The digital controllers came only years later. I watched the glass by cracking the door open a quarter inch as the kiln fired.

Be sure to wear firing safety glasses and protective clothing if you open a hot kiln. Open the door just enough to see inside the kiln. Look for a couple of seconds, and then close the door. Begin checking the glass after the interior turns orange. Depending on how fast the kiln fires, check the glass every five or ten minutes.

When the glass fuses exactly the way you desire, write down the temperature shown in the controller display window and turn off the kiln. The next time you fire that type of project, program the kiln for the temperature you noted above.

Q. The controller on my Paragon SC-2 jewelry kiln flashes FTL, but only when I include a controlled cooling. What is happening?

A. FTL means “firing too long.” The kiln is taking too long to fire, perhaps because an element burned out. But “firing too long” applies to cooling as well as to heating. FTL can appear if you program a segment for slow cooling and the kiln is taking too long to cool. Program a slower cooling rate. FTL will also appear if you program a cooling segment target temperature that is below or even close to room temperature.

Last weekend at Glass Craft and Bead Expo in Las Vegas, Leslie Perlis, a glass artist of San Diego, California, stopped by Paragon’s display booth. She gave me a small box of candy.

After she left, I offered a candy to Laura Lemons, another employee. Laura asked, “What kind of candy is it?” Inside the box were three small chocolates nestled in paper. Laura picked one up and said, “Is this candy or glass?” It was only then that I realized the candy was actually made of fused glass. Thank you, Leslie.

Speed-Drying Firebrick Cement

CONTENTS

Speed-Drying Firebrick Cement

Recent Q&As: Digital controllers

You can patch broken firebricks with kiln repair cement, which is sold as liquid or powder. Mix the powder with water or buy the same liquid formula that we use here at the factory.

Sometimes it is necessary to dry the cement quickly so the patched firebrick piece doesn’t fall out of place. This technique allows you to patch difficult areas such as a lid or roof. Without speed-drying the cement, you would have to hold a prop against the repaired lid with C-clamps.

After you have cemented the brick patch, heat the cement seam with a propane torch. Hold the torch 5 – 6 inches away from the firebrick surface for about 10 seconds. Let the patch dry overnight before firing the kiln.

You can purchase a propane torch from a home improvement center. Buy the type that has a push-button igniter. When you press the button, a blue flame appears. When you release the button, the flame goes out.

For kiln maintenance, do not use the older manual propane torches. Turning them on and off is awkward. You first turn a knob to start the flow of propane and then hold a match under the nozzle. The push-button type is much safer and worth the extra expense.

RECENT Q&As

Q. Does the HTDE error message on the Sentry controllers have an audible alarm?

A. Yes. The audible alarm sounds for one minute after HTDE appears. This applies to the 3-key and 12-key controllers.

Q. The top section of my 3-zone kiln is 200 degrees F hotter than the middle and bottom. I am firing at a FULL rate with the Sentry 12-key controller. Why is there such a large difference in temperature?

A. At FULL rate, the zone control system is turned off. This is because the controller assumes that when you program a FULL rate, you want to fire as fast as possible without slowing down the kiln to even out the temperature in 3-zone mode. Fire at a slower rate to turn the zone control back on.

By the way, a difference of 200 degrees F between the zones of a kiln is normal below around 1100 degrees F. As the temperature rises, the heat distribution will become much more even.

Last weekend, tornado sirens here in Mesquite woke me from a rare afternoon nap. The eerie wail came from sirens in different directions and reminded me of a war movie. Wind-driven rain pelted the roof and windows.

I went outside and looked for tornadoes. The light had a yellowish cast, and gray clouds sped by overhead. The sky was exquisite, something out of a painting.

The Kiln's Electrical Data Plate

CONTENTS

The Kiln's Electrical Data Plate

Reader Response: Fear of kilns

Recent Q&As:

A question about digital temperature display

Moving a Kiln Sitter to a different kiln

Announcement: A workshop in the UK

THE KILN'S ELECTRICAL DATA PLATE

When I first started working at Paragon, the information on the kiln's electrical data plate was stamped one letter or number at a time. When you passed by the inspection station, you would hear the ringing of a small hammer as the inspector tapped out the data plate. That seems primitive now; the data plate on new Paragon kilns is computer-engraved.

Few people know the model number of their kiln. The model is not the number shown on the digital keypad or the Dawson Kiln Sitter. The model is on the electrical data plate mounted on the side of the switch box. (On some kilns, the plate is on the back or side of the case.)

You must have the specifications from the data plate when you order parts or call for technical help. That information is so important that the plate is permanently riveted to the kiln. It is a good idea to copy the kiln specifications to the cover of the instruction manual for quick reference.

Look at the data plate when you buy a used kiln. The plate lists the electrical data and the kiln's maximum temperature, which will help you to determine whether to buy the kiln. Ask if the wiring has been altered since the kiln was new. Sometimes a kiln is converted to a different voltage. The used kiln that was converted to 208 volt operation may still have 240 volts listed on the data plate.

Similarly, if you convert a kiln to a different voltage, ask the manufacturer to send you a new data plate listing the new voltage. Otherwise, years from now someone may order the wrong elements for that kiln.

Some kilns have a removable section, or "collar," that plugs into the main kiln. The removable collar often has its own data plate. When ordering elements or other parts, be sure to supply the information from the correct data plate.

READER RESPONSE

The last Kiln Pointer included a question about fear of kilns. Hollie Trow of Franktown, Colorado wrote, "It's funny that this week's newsletter included someone who was afraid to fire their kiln. I can so relate. I have had my kiln for almost a year. I would get it all prepared and then either couldn't find the time to study it or was just plain scared to attempt to fire it.

“Finally,” Hollie continued, “this past week I got ‘fired up.’ Once we set the kiln up, it was pretty easy. The first thing I learned was that the kiln wouldn't retain the programming unless the Start button was pushed, but I was afraid to push the Start button until I was sure everything was correct. Then I learned I could start the kiln and stop it with no negative effect. It sounds simple now, but it was very frustrating in the beginning because I keep losing the programming.

“I found the book ‘Introduction to Glass Fusing’ by Petra Kaiser to be one of the more easy to read and understand instructions to glass fusing.”

[Paragon's recommended reading list](http://www.paragonweb.com/Books_and_Videos.cfm)

Dr. Judy Fisher of Mitchellville, Maryland wrote, “I really enjoyed this about the customer being afraid to fire their kiln for the first time. That's so cute...and true. That happened to me, too!

“My problem now is giving my Paragon SC-2 kiln a break! I am addicted to my baby, and I find every reason in the book to stay with her and fire her up with a load of glass! I just had my Comcast Internet extended into the same room with the kiln so that I can spend more time with her (the kiln).”

RECENT Q&As

Q. I thought the ramp-ups on my digital kiln would be linear in their temperature change. Example: for every minute, the temperature would increase 5 degrees in a program set for 300 degrees per hour. It appears that the temperature change is more stair stepped, i.e. heat to a certain temperature, then hold for a period of time, then go up in temperature, hold, so that the overall rate of change during the hour is 300 degrees. Is that correct? It seems especially so in the lower temperature range.

A. In theory, the heating ramps of a digital controller are linear. A rate of 300 degrees per hour will raise the temperature 300 degrees in one hour, or 5 degrees per minute. But instead of showing a perfectly linear rise in temperature, the display window will show the ‘stair step’ that you describe. It has no effect on firing results, however.

The stair step pattern is due to relays cycling the heating elements on and off to control the heating rate. As you observed, the stair step effect is most noticeable at low temperatures.

Q. Can I take a Kiln Sitter off my small kiln and install it on my large Paragon kiln?

A. The Kiln Sitter has a ceramic block that contains the electrical contacts. The Kiln Sitter contact block comes in two ratings: 50 amps or 75 amps. Most Kiln Sitters have the 50 amp contact block. Before transferring your Kiln Sitter to another kiln, make sure the contact block can handle the amperage of the new kiln.

You may also have to change the porcelain tube if the new kiln has thicker walls than the old kiln.

ANNOUNCEMENT: WORKSHOP IN THE UK

The Silverclay Studio is happy to welcome Michael David Sturlin, the acclaimed American goldsmith, for two master classes in silver crochet work.

Michael David Sturlin will present two two-day master classes on the fabrication of his signature-style hand-crochet chain, using just a needle and fine silver wire. The workshops are process oriented and suitable for any level student. No previous experience in crocheting, metalsmithing, or jewellery making is needed.

[More information](http://www.kitiki.co.uk/newx.htm)

[Email for information](mailto:petra@silverclay.co.uk)

Firing Glass on Multiple Shelves

CONTENTS

Firing Glass on Multiple Shelves

RECENT Q&As:

What is metal clay?

Fear of kilns

FIRING GLASS ON MULTIPLE SHELVES

By Cindy Durant
www.cindydurant.com
Australia

I have fired glass in several large kilns for up to 14 years now using varying layers of shelves. Here are guidelines that I have learned through much trial and error. Perhaps this will save you a bit of time:

- 1) I use varying lengths of posts to control heat flow. 2" posts are usually not long enough. I use short posts for pieces that I want to tack fuse or for jewelry made from thinner glass. I use 3" or 4" posts for glass that needs more heat.
- 2) I use different types of glass at different levels in my kiln. Float glasses and Desag glasses take a much hotter temperature than Bullseye or Uroboros. I have not used the Spectrum 96, but the old Spectrum takes a slightly higher temperature.

3) I slump glass in the cooler locations of the firing chamber.

4) I sometimes use a slightly lower temperature with a longer soak at top temperature to even out the heat. I even sometimes have a slightly slower rise.

You will need to do a little testing for each kiln, but there are ways to utilize your kiln's interior space. For one-off pieces of art that I really want to control, I just waste the energy and give them the whole kiln. It is not worth scrimping there.

Thanks, Cindy, for the valuable glass firing pointers.

Cindy lives in Penong on the far west coast of South Australia. She began fusing glass over 20 years ago when few stained glass artists had yet heard of fusing. She sells beautiful glass throughout Australia. Many of her designs are inspired by her love of the nearby ocean.

RECENT Q&As

Q. What is metal clay?

A. Metal clay is produced in two brands: Precious Metals Clay and Art Clay Silver. It is a pliable clay that when fired in a kiln becomes solid silver. The clay is also available in gold.

The clay contains finely ground silver particles suspended in a clay binder. The binder burns away, and the silver particles fuse together to form a solid piece. Since the binder disappears, the clay shrinks slightly during firing.

Q. I bought an SC-2 digital kiln but am afraid to fire it.

A. Many beginners are afraid of their first kiln. This is normal. Kilns seem mysterious because they reach such high temperatures.

But once you fire the kiln a few times, you will no longer be afraid. A properly installed kiln is extremely safe to operate.

Read the instruction manual, and enter several practice programs into the temperature controller. Imagine that you are programming a microwave oven instead of a kiln. If you look at it that way, you will realize that the controller is not much more complicated than an appliance that you are already using. With a little practice, you will find that programming the temperature controller is also similar to using the timer and alarm on a digital wristwatch.

As you read the instruction manual, highlight or underline sections that you want to reread. Don't skip over the safety rules and kiln set up. You will find that much of the manual is for reference and may not even apply to you now.

After you have practiced entering programs and you are accustomed to the display messages, test-fire the kiln. Write down the date, the starting time, the program you entered, and the total firing time. Fire the kiln empty so you won't worry about damaging a project inside the kiln.

As the kiln fires, notice the color around the door. Get accustomed to the sound of the element humming and the relay clicking.

Allow the kiln to cool to room temperature. Then load it with a project and fire it again to the correct temperature.

Once you have successfully fired a project, you will wonder why you were ever afraid of the kiln. Opening the kiln and removing the beautiful ware that you made with your own hands is like Christmas morning. Opening the kiln may well become one of the highlights of your week.

Mark Twain wrote, "Do the thing you fear most and the death of fear is certain." Over the years I have learned from experience that he was right.

Applying Ceramic Techniques to Metal Clay

CONTENTS

Applying Ceramic Techniques to Metal Clay

RECENT Q&As: FTL message, firing multiple shelves in a glass kiln

CONTENTS

Applying Ceramic Techniques to Metal Clay

RECENT Q&As:

FTL message

Firing multiple shelves in a glass kiln

APPLYING CERAMIC TECHNIQUES TO METAL CLAY

By Sallie Bly
www.salliebly.com

Connie Bailes teaches hand-built flowers to ceramic artists. Recently I asked her to teach a class in small flowers to metal clay artists in my studio. But she said she did not know how to work with metal clay. I explained that if she taught my students to make the flowers in porcelain, they could use the same techniques to make the flowers in metal clay. We had a great class with spectacular results in porcelain and later in metal clay.

Most metal clay teachers encourage students to work with polymer clay. It is a great way to work out your design, because you can reuse your polymer over and over again until it is baked. When you are happy with a design, you can bake it and use it for a mold.

So why would you want to work with ceramic clay? Because there are great ceramic clay tools and techniques that have been around for decades. Ceramic artists have been hand-building for a long time. Although the ceramic clay has a longer window of time before it dries, it works and feels a lot like metal clay.

There are so many other great techniques that you can learn and practice with ceramic clay before making your final project in metal clay. Wax resist, cut outs, and clay lifting are just a few that the metal clay artist can borrow from the ceramic artist.

Helpful hint to those who are doing enameling on metal clay: Traditionally creating the recessed areas on the metal for Champleve requires using chemicals and waiting for them work. With wax resist and metal clay, this process takes only a few minutes. To create the recessed areas for Champleve, use wax resist to maintain the top part of the silver project. Then use a sea sponge to remove the area that needs to be recessed. After firing, you have a great piece of metal to enamel.

When playing with ceramic clay and you get a result that you like, you can fire it and make a mold from it. You can also glaze it and have your project in ceramics as well as in metal clay.

Attend local ceramic shows. You will see a lot that you can incorporate into your metal clay. You will also find tools that you can use with metal clay. Members of the ceramic organization are usually available to answer questions. Ask where you can take hand-building ceramic classes.

RECENT Q&As

Q. In Cone-Fire mode, I set my Sentry 2.0 controller to cone 5. It ran for 15 hours and shut itself off with FTL on the digital readout. When I opened the kiln, the glazes looked great, just like they had gone to temperature like they were supposed to.

I started the kiln about 9:00 last night for a cone 5 firing, and it again did the 15 hours and FTL thing. It says it got up to about 2109 degrees F. Can you tell me what is going on here?

A. FTL means "Firing Too Long." This may indicate that your elements are wearing out. I suggest using witness cones in your next firings. When the kiln no longer fires your ware to maturity, then it would be time to replace the elements.

Q. I fire a full shelf with a half shelf of glass in my Fusion-8 glass kiln. I was advised that because the kiln has sidewall and lid elements, glass could be fused using both shelves at the same time. The half shelf is supported on 2" posts to allow air circulation. Pieces on the half shelf have slightly irregular edges, whilst anything placed underneath and in its shadow is not fused completely. Work on the rest of this lower shelf is perfect.

A. The Fusion-8 is designed to fire a single shelf of glass. The main heat comes from the lid elements. We added the sidewall element to improve heat distribution of a single shelf.

Nevertheless, you could fire a full shelf and half shelf by designing both low-fuse and high-fuse glass pieces. Place the low-fuse pieces on the cooler area of the bottom shelf.

Slowing down the firing may improve heat distribution. You might also get better results by experimenting with the height of the posts that support the half shelf.

Today we are holding a two-day kiln maintenance seminar here in the Mesquite, Texas factory.

Frances Darby, the company founder, taught the first ones that I attended. During a seminar one year, I worked at a light table in the background while listening to her teach the class. Students sat nearby while I cut and taped film for a catalog, the light from the glass table glowing softly.

In every seminar, Frances Darby painstakingly explained the difference between the green grounding wire and the white grounded wire. She emphasized "ing" and "ed" as would a school teacher in a language class. She finally started calling the white wire the "line neutral" instead of the "grounded wire" to avoid confusion.

Perhaps you can attend our next in-plant seminar. In the mean time, thank you for reading the Kiln Pointers and allowing me, in a small way, into your life.

Protecting a New Element

CONTENTS

Protecting a New Element

Reader Response: Shipping, Kiln Installation

As with any skill, changing heating elements is easy with practice.

Many years ago, I test-fired the new Paragon SnF-82, an 8-sided, top-loading ceramic kiln. It featured our first "tuned elements." I fired the kiln, studied witness cones, and after each firing replaced all the elements. (We changed the resistance of the elements after each test firing.) With a little practice, I could replace the elements in about 45 minutes, and without damaging the firebricks.

It is important to protect your new element from contamination before you install it. Keep the new element away from glazes, bits of glass, glass separator, and kiln wash.

Contamination of the element with foreign materials sometimes leaves a discolored spot in the groove. If the old element burned out, use a dental mirror to check the groove for discoloration. It will appear where the element failed. Always dig out discolored spots with a screwdriver or similar tool. If you can't get a screwdriver into the groove, use a curved dental tool. Before installing the new elements, vacuum the grooves.

The new elements could touch the floor of the kiln during installation. To protect the elements from contamination with kiln wash, lay sheets of newspaper in the bottom of the kiln.

READER RESPONSE: SHIPPING

Last week's Kiln Pointer was "Receiving a Kiln from a Trucking Line." Jeanne Rhea of Raleigh, North Carolina wrote, "When my kiln came, I had no idea that the trucking company would not bring it to the door or at least to where it would be covered from the pouring rain. I finally told the driver that if he was only going to leave it at the curb, then he could take it back, and that was that.

"I had \$25 to give him as a tip for wheeling it to my deck, but after he asked for \$50, I gave him \$10 and counted my lucky stars that I would never have to use that company again."

READER RESPONSE: KILN INSTALLATION

Before you assume that your elements are worn out, consider the electrical installation. You may have low voltage. Example: A customer's new kiln could not reach temperature. She wrote, "At first I had the kiln in a back room about 75 feet away from

the main power. When we moved it to within a few feet of the main box, it fired to the correct temperature. I have happily been firing dolls ever since.”

This week the snowstorm has been in the news. It reminds me of my elementary school days in Alaska. During the winters, we boys wore leather hunting boots. Long icicles hung from the windows of my fifth grade Quonset hut classroom. Daylight lasted only a few hours, so I went to and from school in the darkness. Those are treasured memories, but I am glad to be here in warm Mesquite, Texas.

Receiving a Kiln from a Truck Line

CONTENTS

Receiving a Kiln from a Trucking Line

Recent Q&As: Removing vermiculite that has fallen into the case of an SC-2 jewelry kiln

Announcement: Advanced Kiln Repair Seminar February 23 – 24, 2007

Trucking companies can be intimidating. The trucks are large and noisy, the drivers are in a hurry to meet a tight schedule, and the paperwork seems confusing.

I learned to deal with trucking companies as a teenager working for a computer company in Carrollton, Texas. I was a receiving clerk after school and in the summer.

The pointers here will show you how to receive kilns or other freight from trucking lines. This can help you avoid costly mistakes that are easy to make.

For instance, suppose you receive a kiln from a truck line, and the crate is in perfect condition. You sign the paperwork, and the driver leaves. Three days later you take the crate apart and discover that the lid is in pieces. Because you signed the papers and didn't notify the carrier right away of the damage, the trucking line will pay only 1/3 the cost of the damage, if anything.

WHAT TO KNOW WHEN YOU ORDER A KILN

LIFT GATES: Shipments to residences usually require a lift gate, as most houses do not have high docks. You must request the lift gate when you order the kiln so that this can be noted on the bill of lading. If it is not noted and you need the lift gate, there will be a redelivery charge.

Will you need help unloading the kiln? Package handling companies off-load and uncrate for a fee. Otherwise make sure you have enough people to help unload the kiln. Or ask for an inside delivery when placing your order.

DIFFICULT ACCESS LOCATIONS: Do you live where a large tractor-trailer would have difficulty maneuvering? Examples: a half-mile gravel driveway, narrow streets, dead-end streets. Notifying the trucking company in advance will prevent extra costs and headaches.

There are several options for delivery to a difficult location:

- 1) Meet the tractor-trailer at the end of the street.
- 2) Pick up the kiln yourself at the freight terminal, which will also save you the residential delivery fee.
- 3) At the time of order, specify that you will need a small box truck for delivery.

DELIVERY POINT IS THE CURB: Most trucking companies will deliver a crate only to the curb. It is the customer's responsibility to move the crate into the house or garage. Most companies offer inside delivery for an extra charge. For a little kindness and monetary appreciation, the driver may place the crate closer to the house or garage.

RECEIVING FREIGHT SHIPMENTS

Paragon ships thousands of kilns a year, and only a small percentage are damaged in shipment. Nevertheless it is important to know how to receive a kiln or other freight.

Our terms of sale are F.O.B. shipping point, meaning that title to these goods passes to you when the carrier receives the goods at our plant. If any part of the shipment is damaged, report the damage immediately to the transportation company. Here are some tips on how to receive freight shipments:

COUNT THE NUMBER OF PIECES.

One of the first things I learned as a receiving clerk was to count the number of pieces in a shipment, which is noted on the bill of lading. Make sure you received all items.

IMMEDIATELY INSPECT THE KILN AND CRATE FOR DAMAGE.

DO NOT SIGN THE BILL OF LADING CLEAR UNLESS YOU HAVE UNCRATED THE KILN AND INSPECTED IT.

The driver is normally in a hurry and puts the paper in front of the customer to sign. Signing it clear with no damage noted makes any freight claim difficult to process. If the driver will not wait for you to open and inspect the kiln, sign the bill of lading with the

notation "SUBJECT TO INSPECTION. DRIVER REFUSES TO WAIT." This statement offers you more protection if hidden damage is discovered later. Then inspect the kiln completely as soon as possible so you can quickly notify the trucking company of any damage.

VISIBLE DAMAGE FOUND AT TIME OF DELIVERY: You have the choice of refusing or accepting a damaged shipment. If the damage is major, refuse the shipment. Have the driver note the nature and extent of damage on the carrier's copy and the delivery copy of the freight bill. Save your copy. Paragon will file the damage claim for refused shipments and arrange to send you another kiln.

If the damage is minor and you can arrange to have damaged parts replaced, consider accepting the shipment. If you do accept it, you will be responsible for filing a damage claim.

Note the shipping damage on the bill of lading. Do not write "Carton damaged." Instead, describe the damage. For example, "Wood on left side of crate completely broken." You must leave the damaged goods in the original shipping container. Do not unpack the crate or fire the kiln.

Then notify Paragon immediately. We will either complete the claims process ourselves or assist you with it. Take pictures of the damage and send these to Paragon so we can assess the damage.

Contact the carrier immediately for an inspection of the goods. Write down the name of the person you speak to and the time and date of your phone call. After the inspection, carefully read the inspection report. Get a copy to support your claim. File the claim as quickly as possible, even if you have to estimate the dollar amount of damage.

You must request an inspection within 24 hours. If you call the carrier later than 36 hours, they may deny your claim.

Damaged UPS shipments: Call Paragon at 800-876-4328. We will file the UPS claim for you.

CONCEALED DAMAGE FOUND LATER: When you find concealed damage after the driver leaves, the trucking line ordinarily pays only a fraction of the cost of shipping damage. This is why it is important to inspect the kiln while the driver is waiting or to include the notation "SUBJECT TO INSPECTION. DRIVER REFUSES TO WAIT" with your signature on the bill of lading.

Note the shipping damage on the bill of lading. Do not write "Carton damaged." Instead, describe the damage. For example, "Wood on left side of crate completely broken." You must leave the damaged goods in the original shipping container. Do not unpack the crate or fire the kiln.

Then notify Paragon immediately. We will either complete the claims process ourselves or assist you with it. Take pictures of the damage and send these to Paragon so we can assess the damage.

Contact the carrier immediately for an inspection of the goods. Write down the name of the person you speak to and the time and date of your phone call. After the inspection, carefully read the inspection report. Get a copy to support your claim. File the claim as quickly as possible, even if you have to estimate the dollar amount of damage.

File the claim as quickly as possible, along with a copy of the carrier's inspection report. If necessary, estimate the amount of damage. After reporting the damage, the claim must be filed within 14 days, depending on the carrier.

You will need these documents to file the freight claim: 1) carrier's damage claim form 2) Paragon's invoice 3) bill of lading showing the notation describing damage 4) paid freight bill 5) carrier's inspection report 6) invoice for repair.

RECENT Q&A

Q. I have spilled vermiculite into the vents on the top of my Paragon SC-2 jewelry kiln. How should I remove it?

Note: The SC-2 is a small front-loading kiln. Between the ventilation slots in the top of the case and the firing chamber is a space about 1/2" wide.

A. Spilling vermiculite on top of the firing chamber under the ventilation slots is not serious. Nevertheless, to remove the particles:

- 1) Unplug the kiln.
- 2) Remove the back cover from the kiln, which is held in place by screws. This will give you access to the area under the slots where the particles fell.
- 3) Tilt the kiln back until the particles slide out toward the back of the kiln. It may be helpful to work the particles out with a long artist's brush. If necessary, vacuum the particles as they fall out toward the back of the kiln.
- 4) Before installing the back cover, make sure that no wire is touching an element connector.

ANNOUNCEMENT: ADVANCED IN-PLANT KILN MAINTENANCE SEMINAR
FEBRUARY 23 – 24, 2007

This 1-1/2 day seminar at our Mesquite, Texas kiln plant will cover basic electricity, kiln design theory, three-phase power, and a full tour of our manufacturing facility. The cost is \$95 and includes all meals. Please contact a customer service representative for further information by sending an email to info@paragonweb.com or calling 800-876-4328. I look forward to the opportunity of visiting with you here.

Cracks in Firebricks

CONTENTS

Cracks in Firebricks

Reader Response: a Christmas note

Recent Q&As: Program Review, cooling segments, glass slumping

CRACKS IN FIREBRICKS

A customer recently asked, “I have had my kiln for only a few months and I am starting to see hairline cracks in the firebricks. What is happening? Should I be concerned?”

Insulating firebricks are a miracle of physics. They routinely withstand temperatures over 2,000 degrees F. That is hot enough to melt most metals: copper, bronze, brass, and aluminum.

We are accustomed to using products that stay new looking for years—cars, furniture, cameras. But kilns are different. The high temperatures they reach generate tremendous stresses. Since the insulating firebricks expand and contract with each firing, hairline cracks will appear in the bricks while the kiln is cold--even in a new kiln. Do not be concerned with these. They are normal. The cracks close tightly when the heated bricks expand. The cracks function as expansion joints.

The same applies to ceramic fiber insulation.

READER RESPONSE

Thank you for the good wishes that many of you sent at Christmas. They were very touching.

Charlean Wilson wrote, “Opening the kiln is always a surprise--good, bad, or WOW, it is always a surprise. My husband and I have really gotten into glass. I have entered a craft show, and I have made many Christmas presents in my kilns. Everyone enjoyed their gifts. (We were still firing on Christmas morning!) Not bad for beginners. The QuikFire and Fusion-8 Paragon kilns were last year's Christmas gifts.”

RECENT Q&As

Q. When I used Program Review, my digital controller showed a target temperature of 964 that I don't want. How do I get rid of it?

A. Program Review shows the program that you last fired. If you have entered another program since the last firing, then that is the program that appears in Review.

It is possible that a target temperature of 964 was inadvertently part of the last program you entered. I wouldn't worry about the 964. I would simply reprogram the kiln. When you enter a new program, the old one is automatically removed from active memory.

Q. How do you program a cooling segment that will go from the fusing temperature, 1450 degrees F, to the annealing temperature, 970 degrees F?

A. If you want a fast temperature drop, program a rate of 9999 in the Sentry 12-key controller (1799 F rate for the 3-key Sentry Xpress controller). The kiln will cool down at an uncontrolled rate, meaning as fast as it is capable of cooling with the elements turned off.

Q. What is glass slumping? Is it like melting glass?

A. Glass slumping, or sagging, is the process of heating glass over a mold until the glass softens and sags into the mold. For example, if you heat a round glass shape over a bowl, the glass will take the shape of the bowl at high temperatures.

You can also lay a sheet of glass over a large hole in a kiln shelf. As the glass heats, it will sag down into the hole, forming a shape similar to a vase.

Q. I would like to melt stained glass into jewelry. Which is the best kiln for this and how much electricity do the models use?

I suggest a small kiln such as the Paragon Caldera for melting stained glass into jewelry. If you combine different colors of glass, they must be fusing compatible. This means that the glass expands and contracts at the same rate. If the glasses are incompatible, they will break apart after the piece cools. A small kiln uses about \$1.00 worth of electricity per firing.

Thank you for reading the Kiln Pointers. I wish you a successful, creative 2007.

More on the Digital Alarm

CONTENTS

More on the Digital Alarm

Reader Response: Glass Sinks

Recent Q&As

MORE ON THE DIGITAL ALARM

Last week's Kiln Pointer was "The Digital Temperature Alarm." Ron Reisman, a reader in the Northeastern U.S., wrote, "I too use a baby monitor, but I use it to guard against 'runaway kiln' while I sleep. I set the alarm for around 50 degrees higher than my top process temperature to allow for some overshoot by the controller. I keep the monitor volume very low so the clicking doesn't disturb me, but loud enough so that I will hear the alarm."

The "runaway kiln" that Ron wrote about is the rare circumstance where the relays on the kiln have locked in the "on" position. If the kiln has only one relay, then the "runaway" condition could cause the kiln to over-fire. This is why kiln manufacturers recommend that you do not leave the kiln unattended.

The temperature alarm on most digital controllers operates only during a firing. After the kiln fires to completion and begins to cool, the alarm is inactive. Here is how to use the alarm after the kiln fires to completion, as Ron is doing:

- 1) Program the alarm for 50 degrees higher than the temperature that you are firing to.
- 2) Add a cooling segment with a rate of 9999. This will turn off the heating elements as the kiln cools down. (To program a cooling rate, enter a target temperature that is lower than that of the preceding segment.)

After the kiln shuts off, it will begin the cooling segment. The alarm will continue to operate.

READER RESPONSE

Last week I included Barbara Hausman's request for a book recommendation on making slumped glass sinks. Charlie Spitzer of Cave Creek, Arizona wrote, "There probably isn't a book on it. Basically, you make a blank large enough for your sink when it's slumped at the depth you want it at, slump the glass in an appropriate mold or use a dropout cutout in some sort of fiberboard, and drill a hole for the drain. You can get the correct sized drill bit and beveller at www.hisglassworks.com."

Anne Neal of Dallas, Texas wrote, "There is an 8-hour class on making fused glass sinks at the Glass Craft and Bead Expo in Las Vegas, Nevada, March 28-April 1, 2007. Also, for a web site with lots of great glass tips including one on making glass sinks, go to www.warmtips.com."

RECENT Q&As

Q. The Orton Sentry controller can handle multiple kilns, but how is the cabling done? How do I use the RS232 ports on all three kilns with one computer? Do I need three ports on the computer also?

A. A special connection on the kiln, called the RS232 port, makes it possible to connect the kiln to a personal computer. This allows you to monitor the kiln from another room and to keep detailed records of each firing. You will need one COM port on your computer for each kiln.

Q. I fire the Paragon GL-24ADTSD kiln. Is it possible to use only the top elements for standard fusing and the combined top and side elements for casting and thick fusing?

A. Yes, you can turn off the side and door elements and fire only with the top elements. Turn off the switches labeled "SIDE." Turn the switch labeled "TOP" to MAX.

The kiln will fire more slowly using only top elements. However, it will still fuse glass. If you need more speed, just turn on the side switches. You can turn them on or off during firing at any time.

In the next few months I will be revising two instruction manuals: 1) the GF & GL series glass manual and 2) the S, SnF & TnF series ceramic manual. I would appreciate your suggestions on these manuals. What changes do you recommend? To send an email to me, press Reply. I welcome your input.

Merry Christmas from Paragon Industries

When I wake up in the mornings at this time of year, it is still dark out. Red and white Christmas lights on the house across the street glow in the cold morning air. The blinking pinpoints of light filtering in through the window blinds bring a feeling of peace to me.

Thank you for reading the Kiln Pointers during 2006. On behalf of all of us at Paragon, I wish you a Joyous Christmas and a Happy New Year, wherever you may be.

The Digital Temperature Alarm

Most digital controllers include a temperature alarm. (We have even added the alarm to our small Sentry Xpress 4.0 3-key controller.) The temperature alarm is similar to an alarm clock except that it sounds at a temperature instead of a time.

The alarm is sometimes a source of confusion. People call us because they are worried that their new kiln is beeping and ALAR is flashing in the display. To turn off the alarm, press any key except STOP.

Here are some of the reasons to use the alarm:

- 1) You want to watch glass slump through a drop ring so you can manually turn off the kiln when the glass has perfectly slumped. Set the alarm for 100 degrees before the glass will begin to slump. When the alarm sounds, watch the glass through the kiln's peephole.
- 2) Once you know the best shut-off temperature for a particular type of glass, you can program the kiln to automatically shut off at that temperature. But you have not quite perfected a glass fusing program and want to be near the kiln to turn it off. Set the alarm for around 100 degrees before you think the fusing will end. When you turn off the kiln manually, write down the shut-off temperature and program that into your next firing.
- 3) You have propped the lid of your kiln to vent fumes in a ceramic firing. Set the alarm to remind yourself to close the lid.
- 4) You are heat treating high-carbon tool steel. Set the alarm for the temperature at which you remove the steel from the furnace for quenching.
- 5) You are enameling on copper. Set the alarm for the enameling temperature. When you hear the alarm, you will know that the kiln is ready for your first enameling piece.
- 6) The witness cone on the shelf didn't bend quite far enough in your last ceramic firing, so you added 15 minutes of hold time. Set the alarm for the cone temperature. When the alarm sounds, watch the cones through a peephole during hold. Make a note of the hold time needed to bend the witness cone. Program that much hold time for the next firing.

It is difficult to hear the alarm from another room. If you are ordering a new kiln, you can have an AOP (auxiliary output) receptacle installed on the switch box. Plug an external alarm into that receptacle.

Or you could place a baby monitor near the kiln. It will allow you to hear not only the alarm from another room but also the clicking of the relays. Judith Levinson of Rockville, Maryland uses the Fisher Price Safety First baby monitor. From the clicking, she can tell how fast the kiln is firing and therefore where it is in the firing schedule. (Judith jokes that so far she has not heard hissing or growling from the kiln.)

I am interested in hearing about how you use the temperature alarm. Just press Reply to send me a message.

REQUEST FROM A READER

Barbara Hausman is looking for a book on making slumped glass sinks. Does anyone have a suggestion?

KILN POINTER FROM TONY RODRIGUEZ ON THE DOWNDRAFT VENT

Tony Rodriguez of GSM Enterprises in San Antonio, Texas wrote, “The lid air intake holes in top-loading kilns should be close to the walls of the kiln to prevent thermal-shock problems. Position the vent holes 1/2" to 1" at the most past the inside edge of the kiln wall. (For instance, if the kiln wall is 3" thick, position the vent hole 3 1/2" – 4" from the outside edge of the lid.) This will allow the colder air to come into the kiln alongside the elements, which will heat the air as it enters the kiln.” Thanks for sharing that insight, Tony.

Temperature Overshoot

CONTENTS:

Temperature Overshoot

Recent Q&A: When to replace a thermocouple

Pointer: Mixing greenware and glazed ware in the same firing

TEMPERATURE OVERSHOOT

A car traveling 30 miles per hour does not stop immediately when you apply the brakes. It has to first slow down before stopping. The same applies to kilns, both digital and manual.

Yesterday I dried shelves in a small jewelry kiln. I programmed a full rate to 200 degrees F with a 45-minute hold. But after the kiln reached 200 degrees and the element shut off, the kiln kept on climbing to 332 degrees before settling down to 200 in the 45-minute hold.

I have also seen temperature overshoot in a small switch-operated kiln. I was heat-treating a piece of high carbon steel using a pyrometer to monitor the temperature. I discovered that if the temperature climbed too fast, it overshoot the target, which was 1750 degrees F. I had to turn the switch to a lower setting before reaching 1750.

Temperature overshoot is normal. It is more pronounced in small kilns especially at lower temperatures. The faster the firing rate, the greater the temperature overshoot. In larger kilns, it may not even be noticeable.

At any rate, temperature overshoot rarely affects the ware. This is because the ware is exposed to the higher temperature for such a brief period.

To avoid temperature overshoot, fire at a slower rate. If you need to fire at a fast rate, then add an extra segment in a Ramp-Hold program to slow the firing. The segment with the slower rate should begin approximately 40 - 100° F below the target temperature.

I did a test firing today in a small ceramic fiber kiln to demonstrate how rate affects temperature overshoot:

TEST #1

Segment 1, FULL rate to 200 degrees F, no hold

Temperature overshoot: 132 degrees F.

TEST #2

Segment 1, 300 degree rate to 200 degrees F, no hold

Temperature overshoot: 6 degrees F.

Suppose you are firing at FULL rate to 1600 degrees F. If your kiln is overshooting past 1600, then program an extra segment:

Segment 1, FULL rate to 1500 degrees F, no hold

Segment 2, 300 degree rate to 1600 degrees F

By firing to 1600 degrees in two segments instead of one, you can avoid overshoot while still reaching 1600 rapidly.

RECENT Q&A

Q. How often should the K-Type thermocouple be replaced: after a certain length of time, or after a certain amount of temperature drift?

A. Instead of replacing the thermocouple by a time schedule or by how much it drifts, I suggest replacing it when it fails. Or replace it if the digital temperature readout fluctuates wildly when you move the thermocouple tip back and forth. That indicates that the thermocouple is about to fail.

POINTER FROM TONY RODRIGUEZ OF SAN ANTONIO

Do not fire glazed ware and greenware in the same cone 04 kiln load. This is because not all glazes are fired to cone 04--only specialty glazes such as bronze (metallics). There must be a 2 cone difference between bisque and glaze firing for good body fit. Otherwise the glaze can separate from the bisque and peel off.

Thanks, Tony, for the pointer.

An x-ray technician told me recently about the stress of her job. She is left shaken when x-rays reveal breast cancer in her patients. On some days, that happens to more than one patient.

When the technician gets home, she sits in front of her torch and makes glass beads. For an hour or more she is lost in the world of glass. When she emerges from that world, the stress is forgotten.

As Thanksgiving approaches, I thought of that technician. I enjoy being with glass, pottery, ceramics, and enameling artists like her, because they are happy making things. Thanks for reading these Kiln Pointers and for including us in your life.

With best wishes from all of us at Paragon,

Preventing Glass Bubbles, Part 2

CONTENTS

Preventing Glass Bubbles, Part 2

Recent Q&As: Wadding under flat clay slabs; applying rigidizer to a ceramic fiber kiln

Announcement: A glass fusing display at the Haitian embassy in Washington

PREVENTING GLASS BUBBLES, PART 2

“Cityscape” is one of my favorite glass pieces. A group of beginning students made it during a 1985 seminar taught by Roal Enix at the Paragon factory. (If you can’t see the photo of “Cityscape” in your email system, see the online version: Go to www.paragonweb.com, select Support, and then Kiln Pointers from the drop menu.)

I am using “Cityscape” to illustrate this article on glass bubbles, because even one bubble would have ruined this large piece. (To see Part 1 of this article, go to the online 02/02/2005 Kiln Pointer.)

To prevent glass bubbles in large projects:

1) Lay a ruler on edge along the shelf surface. Do you see a depression in the shelf where the bubble forms? If so, turn the shelf upside down and try using the other side. (Do not throw away a warped shelf. Save it for small glass projects such as pendants that won’t be affected by the shelf warpage.)

2) Moisture in the shelf and fusing molds can cause bubbles, because the moisture trapped under the glass forms steam. To be sure that a shelf is completely dry, place the empty shelf in the kiln and heat to 300 degrees F. Allow the shelf to cool. Load the shelf

with glass while the shelf is still warm. Some people pre-heat large shelves before every firing.

3) Debris on the shelf can burn and form gases under the glass, causing bubbles. Make sure the shelf is clean.

4) Ramp up slowly after you reach 1000 degrees F. Fast firing can contribute to bubbles in large pieces, especially between layers of glass.

5) A sheet of ceramic fiber paper between the glass and kiln shelf helps eliminate bubbles. The paper is porous and allows air to escape from under the glass.

6) Place several tiny slivers of glass under the outer edges of the base piece. As the glass softens, gaps under the edges will help air to escape. To blend in, the glass slivers should be the same type and color of glass as the base piece.

RECENT Q&As

Last week I included a pointer from Vince Pitelka on using what he calls “wadding” under large clay pieces.

Q. What is wadding?

A. Wadding is a strand of clay rolled out to the diameter of a pencil. You can make wadding by rolling the clay in your hands.

Q. I understand that wadding is used for high-fire pieces. Wouldn't stilts around the underside of a low-fire bowl or platter do just as well?

A. Yes. For earthenware pieces, stilts would serve the same purpose as the wadding that Vince described.

Rigidizer is a liquid that hardens the surface of a ceramic fiber firing chamber. (Ceramic fiber is a white material used in the SC-2, QuikFire, J-14 kilns.)

Q. How do you apply rigidizer to ceramic fiber?

A. Using a paintbrush, apply only one layer of rigidizer to the firing chamber. The fiber absorbs the rigidizer somewhat like a sponge, so you will dab it on rather than brush it on. That's why it takes only one application.

The ceramic fiber surface should be dry to the touch before firing the kiln. The first time you fire after applying rigidizer, hold the kiln at 200 degrees F for 20 minutes.

Q. Should you apply rigidizer to a ceramic fiber blanket?

A. Please consult your kiln manufacturer.

ANNOUNCEMENT: A GLASS FUSING DISPLAY AT THE HAITIAN EMBASSY

A Kiln Pointer reader and friend, Dr. Judy Fisher, of Mercy Outreach Ministry International, Inc. invites you to a benefit for the Clean Water and Sanitation Project In Haiti: "An Evening With the Ambassador" at The Embassy of the Republic of Haiti, 2311 Mass. Ave NW, Wash DC 20008.

Saturday, December 2, 2006, 6:00 – 9:00 PM

Come meet the Honorable Raymond A. Joseph, Ambassador to the U.S. and learn more about the Clean Water Project. View a collection of wearable glass art from the hot glass studio of Dr. Judy Fisher, a teddy bear showcase, handcrafted gifts for the holidays, and participate in a fundraising auction.

Dress - Business / Refreshments

301-390-0024 / mom@fishersworld.com

Dr. Fisher, I wish you much success with your laudable benefit.

The Infinite Control Switch

CONTENTS

The Infinite Control Switch

Firing Flat Clay Slabs, by Vince Pitelka

THE INFINITE CONTROL SWITCH

The infinite control switch makes a clicking noise during firing. This is the sound of a bimetallic timer turning the elements on or off to control the firing rate.

When the switch is about to fail, it sometimes makes a faint popping instead of a clicking noise. This is a sign to order a new switch.

Other than normal wear, here are reasons that an infinite switch fails:

- 1) New elements are higher amperage than the kiln was designed for.
- 2) Loose push-on connectors over-heat the switch by creating a tiny electrical arc.

3) The kiln's heat shield missing. (This is a sheet metal channel that helps guide heat away from the switch box. The heat shield is under the porcelain insulators of most kilns.)

4) A 120-volt switch is installed on a 240-volt kiln. Both switches look the same; the voltage is printed on the switch body.

5) There is too much heat in the kiln room. Switches burn up more frequently on hot summer days. In this case, use a fan to circulate air through the kiln switch box. But do not blow air against the outside of the firing chamber.

When you change a switch, remove and transfer only one wire at a time to the new switch. Be sure the push-on connectors are tight. Replace heat-damaged wires. Bend a wire to test it. If it sounds like it is cracking, replace it, because the insulation is flaking.

FIRING FLAT CLAY SLABS

By Vince Pitelka of Smithville, Tennessee (author of "Clay: A Studio Handbook")

The shelf is much thicker than the ware, and insulates the ware from heating and from cooling. So, if you are firing a large slab piece flat on the shelf, it heats up around the outside faster than in the center, and the difference can be extreme. And it cools off faster around the outside while still remaining hot in the center. Depending on the type of clay body and the rate of heating/cooling, this can be a serious issue and can cause flat slab pieces to crack, either across the center, or from the edge towards the center.

If you elevate the clay piece off the shelf surface with wadding, the heat and atmosphere can circulate around the piece, causing it to heat and cool much more evenly. The same is true of a large bowl or platter--the rim will heat up faster than the center, and cool off faster. So, cracking can be a serious issue there as well, again depending on the clay body and the firing/cooling rate.

The safest thing to do with large slab pieces, bowls, and platters is to fire them on wadding. With flat slab pieces I use parallel rows of wadding rolled as coils. For large bowls and platters I use a sunburst pattern of coils radiating out from the center.

Thank you, Vince, for the excellent pointer.

Click here for reviews on recommended books:

http://www.paragonweb.com/Books_and_Videos.cfm

Glass Separator Texture as a Design Element

For many years I've heard people ask, "How do you get rid of the brush strokes in glass separator?" The smallest imperfections in the shelf appear on the back of fused glass.

Sometimes, however, you can use that texture to enhance a piece. I hadn't thought of this until I visited Creative Arts Center of Dallas last week. Becky Johnson, the glass teacher, showed me a bowl that had been slumped over an upside-down mold. The glass surface that was toward the mold was the side facing up in the finished piece.

For a change, design a fused piece so that the side of the glass toward the shelf will be the side that faces up when the piece is displayed. Coat the kiln shelf with a paint brush instead of the smooth-bristle Chinese haik brush.

For interesting surface lines, fire two or more layers of glass leaving a gap between butted base pieces. Or randomly overlap base pieces.

This simple technique produces surprising results.

RECENT Q&As

Q. When I start my digital kiln, the alarm beeps.

A. The alarm sounds at the beginning of the firing because it has been set to a lower temperature than room temperature.

Q. If you stop/abort a firing to change a temperature and then resume firing, do you need to skip segments to get back to where you were before?

A. When you press Stop during a firing, reprogram the controller, and then press Start, the controller will go to the first segment that matches the temperature inside the kiln. For instance, if segment 3 starts at 1200 and ends at 1700, and the kiln temperature is 1600 when you press Start, the controller will go directly to segment 3.

Q. Is there anything that will prevent ceramic fiber particles from dropping onto the glass from the roof of the kiln?

A. To eliminate fiber dusting, vacuum the kiln. If that doesn't work, brush a coat of rigidizer onto the ceramic fiber firing chamber. You can order it from Paragon. A 4 ounce container is \$10.00.

On Halloween, Paragon's customer service representatives came to work in costumes. The plan was to come as either an angel or a devil. Most came as angels, complete with wings and halos. To see a group picture, go to www.paragonweb.com and select About Us > Paragon People.

The Shut-Off Temperature in Cone-Fire Mode

CONTENTS

The Shut-Off Temperature in Cone-Fire Mode

Archived Questions & Answers

A Glass Fusing Pointer

Recent Q&As: Firing moist greenware; When a kiln stops making a clicking noise; A firing schedule for glass slumping molds

THE SHUT-OFF TEMPERATURE IN CONE-FIRE MODE

Digital controllers sometimes do little things that baffle people. An example is the shutoff temperature in Cone-Fire mode.

Digital ceramic kilns in the U.S. have two firing modes: Cone-Fire and Ramp-Hold. Cone-Fire mode is based on the pyrometric cone numbers used in ceramic firings.

Sometimes the shutoff temperature in Cone-Fire mode varies from one firing to another for a given cone. This is due to the controller's automatic heat-work calculation that is built into Cone-Fire mode.

The firing rate for the last segment of a Cone-Fire program is 108 degrees F / 60 degrees C per hour. If the kiln fires at that rate during the last hour, the shut-off temperature will match the temperature on Orton's cone chart in the 108 degree F column. (You can view the cone temperatures in the controller's Cone Table. Instructions vary depending on the brand of kiln. For the Sentry controller, press 9 from Idle.)

If the kiln is firing slower than 108 degrees F / 60 degrees C during the last hour, the controller will compensate by shutting off at a slightly lower temperature. This is because firing slower does the same amount of heat work at a lower temperature as firing faster to a higher temperature.

Your kiln may be firing slower due to element wear, low voltage, or a heavier load of ware than usual.

By the way, Ramp-Hold mode does not include the automatic heat work calculation that is built into Cone-Fire mode.

ARCHIVED QUESTIONS & ANSWERS

We have upgraded our search line at www.paragonweb.com . You can now quickly search for questions and answers by entering a keyword such as “drying,” “greenware,” or “sounds.” When you have a moment, please try the search line and let me know what you think of it.

A GLASS FUSING POINTER

Dr. Judy Fisher of Mitchellville, Maryland fuses glass in a small front-loading Paragon SC-2 jewelry kiln. She wrote, “I fire on two shelves. I know just how to position the glass pieces. I put the thicker ones toward the back and gradually reduce the thickness as I come toward the front of the shelves. The pieces are always nice and rounded.”

RECENT Q&As

Q. What is your opinion on drying almost dry clay pieces in the kiln on a 150-180 degree F. temperature hold?

A. The ideal is to load only bone-dry ware into the kiln. However, if your schedule does not permit that, then candling the ware inside the kiln is fine.

It is important to vent moisture from the kiln during candling. Continue the candling stage until signs of moisture leaving the kiln have disappeared. Moisture at higher temperatures in the kiln will cause excessive rusting, will slow down the firing, and will waste electricity.

One method of detecting moisture is to hold a mirror near the upper peephole or vented lid. Moisture will fog the mirror. You can also feel the moisture with your hand.

Q. When a digital kiln is firing too slowly due to either worn elements or low voltage, should the relays continue to make a clicking noise?

A. No. The relays make a clicking noise when they cycle the elements on and off to control the firing rate. When the kiln is firing too slowly, the relays should give the elements 100 percent power by staying on continuously.

Q. I need to fire a bisque mold for glass slumping. What program do you suggest?

A. Here is a program for firing a glass sagging bisque mold to cone 06. Please make sure the clay is rated to that temperature.

Also, do not attempt to fire to cone 6 (1828 degrees F.) unless your kiln is rated to that temperature. You will find the maximum temperature listed on your kiln’s electrical data plate. (The plate is attached to the side of the switch box or the back of the kiln on most models.)

Cone 06

Segment 1: Rate 324 Temperature: 1022

Segment 2: Rate 153 Temperature: 1112

Segment 3: Rate 180 Temperature: 1720

Segment 4: Rate 108 Temperature: 1828

I hope you have a great weekend.

Troubleshooting a Blank Digital Kiln Display

Sometimes cherished memories are made from the smallest incidents. Below the Kiln Pointer, you will find such a story from a high school pottery teacher.

Q. What causes a digital kiln to shut off and the display to go blank right after you press the Start button?

A. The answer applies to any brand of digital kiln. There are two situations: The kiln shuts off because the circuit breaker trips, or the controller's display goes blank but the circuit breaker does not trip.

CIRCUIT BREAKER TRIPS

To turn on the heating elements, the controller sends a signal to one or more relays. They, in turn, send power to the elements. When the circuit breaker trips right after you press the Start button, unplug the kiln and remove the kiln's switch box. Look for an electrical short on the element side of the relay:

- 1) A relay-to-element lead wire is touching the heat shield. Find the two element connectors for each element. You will see wires attached to the connectors. Look for a wire with frayed insulation that is touching the kiln case. Also, check the wire terminals. If one is tilted far enough to touch the heat shield, it can shut off the breaker. Look for a small burn mark on the heat shield. It is a sign of electrical arcing between the wire terminal and the heat shield.
- 2) Place an ohmmeter probe on an element connector and the other probe on the kiln case. The ohmmeter should show no continuity.
- 3) Look for a disconnected element-to-relay wire that is touching the kiln case.

4) It is possible for element pins from two adjacent elements to touch each other inside the firebrick wall. This causes the elements to short out between each other. This will cause an ohmmeter reading that is much lower than normal for those elements.

DISPLAY GOES BLANK BUT CIRCUIT BREAKER DOES NOT TRIP

1) A defective relay is drawing too much current from the controller, making the display go blank. Unplug the kiln. Disconnect the two controller-to-relay wires from each relay, one at a time. (In Paragon kilns, they are the red and black wires.) Position the disconnected wires so that the wire terminals cannot touch each other or anything else inside the switch box. After you disconnect each relay, turn the kiln on again and press the Start button. Do this until you find the relay that is draining the controller. Replace that relay.

2) The transformer that powers the controller is wired incorrectly or is going bad. Study your kiln's wiring diagram to make sure the transformer is wired properly.

BAKED CLAY COOKIES

A story appeared on the Clayart email forum recently that I wanted to share. Mel Jacobson of Minnetonka, Minnesota related an experience from the days when he taught a high school pottery class:

“Kids would bring baked goodies to the clay room. We always had a few bites around. Often, uninvited guests would sneak into the room and snitch a few cookies...most often the faculty. ‘He he, they won't miss a couple of cookies.’

“We made soft clay cookies--nice and brown, fresh clay, and sprinkled bits of china clay on the tops. Or we would use a fork and make those wonderful peanut butter cookie patterns. Kids would mess with iron for days to get the color right. We added a touch of foil or Saran wrap. Remember, always keep an old brownie pan around your art room just for clay brownies. Soft, elegant, yummy.

“We set them out on the attendance table. Never had a complaint. But we counted cookies every hour. There were always one or two missing.

“At the end of the year we would fire up a few cookies and give them to deserving kids--you know, those kids who always gave back more than they got. On the back was just a simple ‘Above and beyond.’ They would cry. A 40-year-old woman stopped me at the mall one day. She said, ‘Mel, I still have my clay cookie on my dresser after all these years. My husband is very careful with it.’”

To read more about Mel, visit www.paragonweb.com and scroll down toward the bottom of the page.

A QUIKFIRE KILN POINTER

Ted Ricchiuti of Seaside Park, New Jersey uses a wind-up timer on his Paragon QuikFire kilns. (You can use this idea on any type of kiln.) He wrote, “Fifteen minutes is just about enough for a full fuse. I have not burned out the elements of my QuikFire kilns since I installed these timers. Before using the timers, there had been times when I walked away from the QuikFire during a busy day and forgot that I was firing something. The timers make a nice clicking sound as they wind down, which helps to remind me that the kiln is turned on.”

A RECENT Q&A

Q. Any suggestions on photographing glass jewelry?

A. There are many ways to photograph glass. To bring out the color of your piece, place it on a sheet of white translucent Plexiglas. Then shine a light from behind. To bring out the surface texture of the glass, also position a light in front.

Collect excellent photos of glass and jewelry. You can find them in catalogs and magazine ads. Then try the same lighting techniques that were used in the photos. The light source sometimes appears in a reflective surface of the jewelry.

How to Fire Silver Clay for Maximum Strength

Don't be disheartened if a fired silver clay piece is brittle. You can strengthen it by firing again using a temperature and hold time shown below. You can also repair and re-fire broken pieces.

Silver clay is composed of silver particles held in a binder. For maximum strength, the silver must be fired hot enough and long enough to completely burn off the binder. Only then will all the silver particles fuse together.

For maximum strength, fire silver clay to these temperatures:

PMC (all versions): 1650 degrees F, hold for one hour

Art Clay Silver (all versions): 1600 degrees F, hold for one hour

If you include glass or other materials that cannot fire to 1600 – 1650 degrees F, then use a silver clay version that is designed to fire to a lower temperature. Or for maximum strength, fire the silver clay twice. The first time, fire the silver alone to a temperature above. The second time, fire the silver combined with the other material (such as glass) to a lower temperature.

REPAIRING BROKEN PIECES AFTER THEY HAVE BEEN FIRED

A fired silver clay piece may have broken due to hidden cracks rather than to a low firing temperature. Handle unfired pieces with care. They crack easily, and the cracks are often difficult to see.

To repair a broken piece, first clean it. Then repair with silver clay paste and fire again to one of the above temperatures.

RECENT Q&As

Q. What causes purple spots in gold glaze?

A. Purple spots in gold can be caused by overfiring or by too heavy an application. However, this is very attractive when gold is crackled over a dark color of fired glaze.

Q. If I turn the Limit Time dial to 5, the Kiln Sitter always shuts off at around 4. What Limit Timer settings should I use for greenware, underglaze, and glaze?

A. If the Kiln Sitter shuts off at around 4, then turning the dial to 5 gives you a one-hour margin of safety. This means that after the cone bends and shuts the kiln off, there is still one hour of time left on the Limit Timer. If the cone failed to bend and the Kiln Sitter did not shut off, the kiln would continue to fire for another hour until the Limit Timer shut it off. I suggest setting the Limit Timer half way between 4 and 5 so that you have only a 30-minute safety margin.

Set the timer for 30 minutes past the shutoff time for each type of firing. If all firings shut off at four hours, then set the knob half way between 4 and 5 for all your firings.

Q. I work with several other glass fusers in a studio. We were thinking about putting all the kilns together in one room to save on space. Would having the heat from several operating kilns affect the digital controllers on the kilns? What should maximum kiln room temperature be for the kilns to operate properly?

A. A firing room that contains several kilns should be large enough to avoid a buildup of heat. Small storage rooms would not be suitable.

The kilns should be spaced about 3' apart to avoid overheating their electrical components.

Maximum room temperature is about 110 degrees F when measured 3' from the kilns.

Most brands of controllers will flash an error message and the firing will shut down when the switch box temperature is too high. (Paragon's controllers flash ETH--Electronics Too Hot.) To lower the switch box temperature, blow air through the switch box louvers with a small fan.

READER RESPONSE

Last week's Kiln Pointer included information on adhesives for glass. Paul Traskin of Clovis, California wrote, "I have been teaching a high school stained glass class for several years and have found that DAP brand Aquarium Sealant is an excellent adhesive for glass. It is 100% silicone, which allows it to expand and contract with temperature changes. I have found this expansion and contraction of glass to be the primary reason for the failure of many of the adhesives I have tried. DAP Aquarium Sealant is sold in hardware stores and costs about four dollars for a 2.8 ounce tube. I suspect it would work equally well on glazed ceramics."

Last week I asked whether you prefer Kiln Pointers in plain text or with graphics. Thanks to those who sent their opinions--your responses filled my email in-box. The answers were evenly divided between those wanting plain text and those wanting graphics.

We are trying to design the format so that the Kiln Pointer will appear in your email system as plain text if you have turned off html or with graphics if you leave html turned on. I don't know if this will work with all email systems, but we are working on it.

David Gustafson of The Plains, Ohio wrote, "Your information is valuable enough that you can decorate your email any way you wish. You can cut and paste the text into a new text-based document."

Dan Wade of Dallas, Texas wrote, "I do understand that downloading pictures takes time if you don't have a high-speed connection, but I like the graphics format (I have a high speed connection). The readers who don't want to download the pictures can turn them off. Just go to the Help menu and change the security setting. I use Outlook 2003, which even lets you do it by sender.

"I've not used some of the freebee email services, so I don't know if it can be done there. But have your readers go to the Help menu of their email service and do a search for 'pictures,' and it will probably give them options for turning off HTML content.

"In Outlook 2000, turning off pictures is under the Options / Mail Format / Internet format. Just click the block for downloading HTML formatted documents."

SPECIAL ON FUSION-7 KILN

We are offering the Paragon Fusion-7 kiln at the special price of \$735.00 from October 9 thru December 22, 2006.

Recently here at Paragon I was startled to see a mannequin. It was sitting at the front desk wearing a monster mask, its gloved hand resting on a phone. It is the first thing you see when you walk through the front door. When I was small living in Calgary, Alberta,

Halloween was a favorite time of year. It was one of the few nights that I was allowed to stay out past 8:00 P.M.

The Key to Understanding Digital Controllers

The most confusing thing about digital controllers is firing rate. Once you understand rate, the rest of the controller is easy to learn.

Rate is confusing because the rate on switch-operated kilns is adjusted by merely turning dials. You don't have to think about degrees of temperature rise. Microwave ovens require that you enter only High, Medium, or Low, and time at that temperature.

A car's speedometer measures speed in miles or kilometers per hour. To understand temperature rate, think of a speedometer that measures temperature change per hour instead of miles. This applies to both heating and cooling rate.

"Does the increase in temperature always assume a one hour time period?" someone asked. "If I need to get to 300 degrees in 30 minutes, would I set the ramp for 600 degrees per hour?"

The answer is yes. Rate is how much the temperature needs to go up or down in one hour. (Note: Degrees per hour is becoming our industry standard for controllers. A few controllers, however, use degrees per minute or number of hours to reach temperature. But once you understand rate, you can soon master any controller.)

At a rate of 100 degrees per hour, the kiln would take 10 hours to reach 1000 degrees.

Suppose you wanted to fire from room temperature to 1000 degrees in 2 hours. To figure rate, divide 1000 by 2 hours. The temperature needs to go up 500 degrees every hour. Rate = 500 degrees per hour.

If you need to be more precise, subtract room temperature from 1000 before dividing by 2 hours. If room temperature is 100, then subtract that from 1000:

$$1000 \text{ minus } 100 = 900$$

$$900 \text{ divided by } 2 = 450 \text{ rate}$$

Here is a sample 4-segment firing:

Segment 1) Go from a room temperature of 100 to 700 degrees in 2 hours

Segment 2) Go from 700 to 1000 in 30 minutes

Segment 3) Go from 1000 to 1400 in 2 hours

Segment 4) Cool from 1400 to 1000 in 7 1/2 hours

Figuring rates for the above program:

Segment 1) $700 \text{ minus } 100 = 600 \text{ divided by } 2 = 300 \text{ rate}$

Segment 2) You are firing from a temperature of 700 to 1000 in 30 minutes. First, subtract 700 from 1000. Answer: 300.

You are raising the temperature 300 degrees in half an hour. Since rate is measured in hours, and the temperature will rise 300 degrees in 30 minutes, rate per hour is $300 \times 2 = 600$.

Segment 3) $1400 \text{ minus } 1000 = 400 \text{ divided by } 2 \text{ hours} = 200 \text{ rate}$

Segment 4) $1400 \text{ minus } 1000 = 400 \text{ divided by } 7.5 \text{ hours} = 53 \text{ rate}$

If you are like most artists, who think visually, it is easier to understand the controller by drawing the program on graph paper. You can even make a rough sketch on plain paper showing slanted lines for rates and horizontal lines for temperature holds.

To master the temperature controller, first understand rate. Then segments, target temperatures, and holds will fall into place.

RECENT Q&A

Q. What is the difference in the cost to fire a kiln in a hot room compared to firing in a cold room?

A. Room temperature has almost no effect on the electrical cost of firing a kiln. However, if your kiln is under a carport that has open sides, protect the kiln from wind. Air blowing against the case can raise the electrical cost slightly. If you use a fan to lower the temperature of the switch box, position the fan so that the air blows into the switch box louvers but not onto the firing chamber case.

FROM A READER: A POINTER ON ADHESIVES FOR GLASS

Dr. Judy Fisher of Mitchellville, Maryland wrote, "E6000 is a better adhesive for glass than epoxy, because if there are spaces or gaps between the finding and the glass piece, the epoxy will have a weak bond. However, the Goop E6000 automatically fills in the spaces.

"Now that Goop has finally supplied a special tip for the E6000, one can use it more precisely than before."

Thanks for the pointer, Dr. J. It is always good to hear from you.

FROM A READER: FORMAT OF KILN POINTERS

Carole Dwinell of Martinez, California wrote, “Please, please go back to the old newsletter format. It was friendly, service oriented and you always added links to the website for those new items that we could check out. I miss it cause you're a most helpful person and this new format takes away from that. We sort of have to plow through all the ads to get to your information.”

Thanks, Carole, for your kind words and for sharing your opinion. It means a lot to me.

Do you agree with Carole, who wants a plain text newsletter, or do you prefer having pictures? If you have a moment, please press “Reply” to share your thoughts.

I will be visiting Orlando, Florida on November 10 at the Bead and Art Glass Fest. If you are attending the show, I look forward to meeting you.

Kiln Sitter Repairs

CONTENTS:

THE KILN SITTER

RECENT Q&As

MY FAVORITE WEBSITE TOOLS

READER RESPONSE

The Dawson Kiln Sitter is an automatic shutoff used on manual-fire kilns. When a small pyrometric cone that is loaded into the Kiln Sitter bends, the Kiln Sitter shuts off.

THE KILN SITTER PLUNGER OVERHEATS

If the Dawson Kiln Sitter overheats, the white plastic plunger can get so hot that it melts. Ways to prevent this:

- 1) Make sure the high temperature washer on the porcelain tube is pressed against the firebrick kiln wall. A spring wire retainer keeps the washer in place. This helps prevent heat from escaping the kiln.
- 2) It is also possible that the wires connected to the Kiln Sitter contact block are loose or corroded, causing the block to overheat. This, in turn, overheats the plunger. Heating and cooling of the kiln can loosen the screws over time.
- 3) Another reason for overheating is that the wires connected to the Kiln Sitter contact block are too light a gauge.

4) Circulate air with a fan if the firing room temperature rises past 110 degrees F. (Measure room temperature about 3 feet from the kiln.)

THE KILN SITTER PLUNGER DOESN'T STAY LOCKED ON

1) The plunger will not stay in unless you have time on the Limit Timer clock. If you have time on the clock, the Limit Timer may be burned up.

2) A wire may be in the way of the Kiln Sitter plunger mechanism, preventing it from locking in the on position. Sometimes heat causes a wire to move inside the switch box.

3) Something has fallen into the switch box and is interfering with the plunger: a matchstick, a piece of dried clay, a screw that has fallen into the switch box. If anything lodges where the contact blocks come together, the plunger will not stay locked on.

4) The locking catch is rusted or has material stuck to it.

5) The spring for the latch is broken.

RECENT QUESTIONS

Q. My digital kiln is taking too long to fire: 9 1/2 hours to cone 6. I want the kiln to fire in 4 hours.

A. 9 1/2 hours is the firing time programmed into the Sentry Cone-Fire mode at fast speed. The easiest way to go faster is to use Ramp-Hold mode, where you can program the exact speed that you want. Note, however, that the firing speed is limited to the kiln's heating capacity.

Q. Can oils from your hands damage a new element?

A. Oils will burn off harmlessly the first time you fire the element. Salts can damage an element. However, the amount of salt on the hands is so small that it would have no effect on element life. But do not allow kiln wash to touch a new element.

Q. If an element burns out in the fiber roof of a GL-24 kiln, must the entire roof be replaced?

A. The fiber roof with embedded elements comes in three sections, which are placed side by side in the kiln. If one section burns out, only that section has to be replaced. You do not need to order the entire roof.

Q. I have programmed a cooling rate of 400 degrees F per hour, which should take 4 hours to cool down to 100 degrees F. Why is the kiln taking 7 hours to cool instead of 4 hours?

A. The controller's cooling rate is limited by the cooling rate of the kiln's insulation. If the kiln takes 7 hours to cool to 100 degrees, then the controller cannot speed up the cooling rate, even if you program a FULL rate.

The purpose of a controlled cooling is to make the kiln cool down slower than it would if you turned it off and allowed it to cool on its own.

Q. I have programmed a segment for flash venting, which takes the kiln down to the annealing range. I open the kiln to bring the temperature down, but when I close the lid, the temperature shoots right back up again.

A. If you flash cool the kiln by raising the lid, the rate for that segment should be FULL. If you have programmed a slow rate, the kiln will heat back up in an attempt to slow down the cooling rate.

Another possibility is that the elements turned back on because the temperature dropped into the next segment, which had a slower cooling rate.

Another point: Kilns are subjected to temperature rebound. If you opened the lid for a moment to lower the temperature, the temperature would go back up a little after you lowered the lid again. This would happen even if the kiln was turned off.

MY FAVORITE WEBSITE TOOLS

Hold down the Ctrl key while you turn the wheel on your mouse to change the type size of a web page.

Hold down the Ctrl key while you press F. A search box will appear. Type a key word into the search box to find that term on a web page.

READER RESPONSE

In the last Kiln Pointer I mentioned the enthusiastic glass artists that I met recently while traveling. Joe Spitzer of Geneva, Florida wrote, “Your notes concerning the enthusiasm of the glass artists you visited reminded me of a quote from Charles Kingsley that has had a major influence on my life: ‘We act as though comfort and luxury were the chief requirements of life, when all we need to be really happy is something to be enthusiastic about.’”

Testing Glass for Fusing Compatibility

Here is a simple, interesting glass test you can perform with your kiln. In addition to glass samples, you will need two polarizing filters.

THE THEORY

When glass changes temperature, it expands and contracts. The rate at which glass changes size is called the coefficient of thermal expansion. If you fuse two glass pieces together and one changes size faster or slower than the other, the fused piece may crack--even several months after fusing.

When different glasses have a close enough coefficient of expansion to fuse successfully, they're called fusing compatible. Buy glass labeled fusing compatible. Or fuse glass that has been cut from the same sheet, which guarantees compatibility.

Fusing glass is rated with a coefficient of expansion number (i.e. COE 90 or COE 96). The pieces that you fuse together should have the same COE number. Carefully label glass storage containers with the COE number to avoid mixing different types of glass.

FUSING COMPATIBILITY TEST

- 1) To test glass for compatibility, fuse half-inch square sample pieces of different glasses onto a larger base piece of clear transparent. It should extend beyond the small sample pieces by half an inch on each side. One of the sample pieces should be cut from the base piece.
- 2) Heat the glass to a temperature that completely rounds the edges of the small sample pieces.
- 3) After the glass cools, place a polarizing filter under the glass and another filter over the glass. Look at the glass with light shining through it (hold it over a lamp). Turn one of the filters until the filters are at their darkest. (Polarizing sheets are available from Edmund Scientific and photo supply stores.)

RESULTS OF THE TEST

If you see a halo around the edges of the small glass samples, this usually means the glass is not compatible. If you see no halo, the glass is fusing compatible.

Why did we include a sample square cut from the base transparent glass? It tests for annealing. A halo around that piece means the glass was not annealed properly. Perform the test again, this time cooling more slowly through the annealing range.

ANOTHER USE FOR BROKEN KILN SHELVES

Five weeks ago I mentioned that you can sometimes salvage broken kiln shelves. Karen Sullivan in Claremont, California wrote, "I use broken cordierite/mullite kiln shelf pieces to prop up work that is glazed all over. I form a tripod support to balance the work. If the

contact area is small between the object and the shelf piece, the shelf will knock off easily, and you can grind off any small mark from the piece.

“I fire to cone 11. This method works with any clay including stoneware and porcelain. The broken shelf pieces that I use are small, 1 - 3 inches, uneven, ragged. I prop them on their side, so often only a small shelf edge touches the glazed piece. I hammer the shelf pieces to break off bits of glaze that stick, so my shelf pieces become a dwindling pile.”

Thanks, Karen, for sharing this pointer.

BOOK REVIEWS

Last week I invited readers to visit Paragon’s recommended reading list. Today I added more books and videos. Go to www.paragonweb.com . Select Products, then Books & Videos from the drop menu. Or click here:

http://www.paragonweb.com/Books_and_Videos.cfm

Paul Ringo of Lake Charles, Louisiana wrote, “Arnold, I’d like to suggest 'I’m all Clay, You’re all Clay’ by Jan Parzybok. It’s a very good instructional video for basics, it’s inexpensive, and Jan Parzybok is a good (almost playful) teacher. He’s also got a video about throwing one-piece goblets that is thorough and useful.”

Thanks for the recommendation, Paul. You can order the DVD at this link:

<http://coloradopottery.com/video.php>

NEW SC-SERIES INSTRUCTION MANUAL

We have just revised the SC-series instruction manual. It is crammed with new information, such as changing the door, adjusting the door latch, firing decals, etc. You can download the manual at www.paragonweb.com . Select Support, and then Instruction Manuals from the drop menu. Or click here:

http://www.paragonweb.com/Instruction_Manuals.cfm

Pointer for Internet searches: To find a publication in the list of manuals, hold down the Ctrl key and press F at the same time. Type a key word in the "Find" window of your browser. Example: For lid replacement, type "lid." I use this when I am visiting a website and want to locate a key word quickly.

JANUS KILNS

A question for those who own a Paragon Janus kiln: What are your favorite features of the kiln? What results are you having with a multi-purpose kiln?

RAIN STORM

Texas weather is unpredictable. Yesterday the sky was clear and bright as employees left Paragon for the day. A moment later the sky darkened, and rain pelted down. Just after I left, the sudden storm blew in one of our large plate glass windows. This was after a summer with so little rain that in Mesquite, it is illegal to water your yard more than once a week.

Choosing a Propane Torch for Element Repair

Sometimes the biggest improvement comes from making the smallest change. For instance, when I was building a house, I found that changing the position of my thumb when I gripped a hammer improved my efficiency.

This idea also applies to choosing a propane torch for element maintenance. The right torch makes a huge difference. (By the way, this pointer is for kilns that have sidewall element grooves.)

If a heating element bulges out of a sidewall firebrick groove, you should repair it as soon as possible. Heat the element with a propane torch until the element is red hot. Then shrink it into place with needle-nose pliers.

You can purchase a propane torch from a home improvement center. Buy the type that has a push-button igniter. When you press the button, a blue flame appears. When you release the button, the flame goes out.

For element maintenance, do not use the older manual propane torches. Turning them on and off is awkward. You first turn a knob to start the flow of propane and then hold a match under the nozzle.

Shrinking a bulging element is easy when using the propane torch with push-button igniter. First, press the igniter and hold the flame near the bulging element. You will see the element turn red in just a few seconds. Then release the push-button igniter. Shrink the element back into the groove. As the element cools, it will become stiff. You can feel it through the pliers. At the first sign of stiffness, press the igniter, reheat the element, and repeat the process until the element is in its groove. Do not bend the element while it is stiff, or it will break.

SAFETY PRECAUTIONS

- 1) Make sure the kiln is disconnected from the power before working on an element.
- 2) Use a propane torch only in an area that has good ventilation.
- 3) Clear the area of combustible materials before using the torch.

READER RESPONSE

Q. My Kiln Pointer email is blank. I am using Outlook Express. Do you know how to correct?

A. A few issues ago we added a photo to each Kiln Pointer. I hope this has not been an inconvenience for those who have turned off the graphics in their email system. To turn on the graphics in Outlook Express:

Click "Tools," then "Options" from the drop menu.

Click "Read," and clear the check box for "Read all messages in plain text."

Click "Security" and clear the check box for "Block images and other external content in HTML email."

MORE QUESTIONS AND ANSWERS

Q. When a digital kiln is taking longer than usual to complete a firing, how do you know whether something has gone wrong and the kiln is over-firing?

A: You should place pyrometric witness cones on the shelf so that you can see them through a peephole.

Here's another way to help prevent an over-fire: Learn to estimate kiln temperature by the color of light showing around the lid and peepholes. That way, you can tell at a glance if all is well with your kiln when you check it.

Q. Is it okay if the thermocouple extends into the firing chamber 1/2" farther than normal?

A. Yes. You will need to be careful not to bump it with a shelf, though.

As a rule of thumb, the thermocouple must extend into the firing chamber four times its diameter. Example: a 1/4" wide thermocouple should extend into the firing chamber by 1".

Q. What causes ceramic ware to break inside a microwave oven?

A. Ware that absorbs water can break inside a microwave. This is because the water in the clay expands and turns to steam. Pieces that are to be used in a microwave should be vitreous, which means they no longer absorb water.

Another reason is uneven heating.

Q. What type of glue do you recommend for glass fusing?

Use white glue, such as Elmer's diluted 1:1 with water, to hold the glass pieces together after you place them on the kiln shelf. Use the glue sparingly. Glue is especially important when fusing wire into the glass. The glue prevents the glass or wire from moving out of place before they fuse. The glue disappears during firing.

BOOKS

Have you read any good books lately? Here is a collection on glass fusing, pottery, enameling, and heat treating in all price ranges:

http://www.paragonweb.com/Books_and_Videos.cfm

It rained several inches here on Labor Day. I enjoy reading to the sound of rain on the roof.

How to Use an Ohmmeter

An ohmmeter is an inexpensive aid in determining if an element is broken. I saw an ohmmeter just a few weeks ago at a hardware store for only \$12.00.

The ohmmeter measures the electrical resistance of a wire in ohms. The higher the ohms, the greater the resistance. As an element ages, the resistance increases, and the ohms reading becomes higher.

There are two types of ohmmeters: the type with a needle indicator (analog), and digital. (The photo above shows an analog meter.)

Ohmmeters have two probes. When you touch the probes together, the analog ohmmeter needle should move all the way over. A digital meter should read zero ohms.

If your kiln uses 4-way rotary switches, an ohmmeter can check not only the elements but also the kiln's entire electrical system. The readings are taken at the cord plug; for that, you will need instructions from the kiln manufacturer, since it varies depending upon the kiln model.

If your kiln is electronic or uses infinite control switches, remove the switch box and check the elements at the element connectors.

1) The kiln should be cold when you test the elements. Unplug the kiln or shut off the circuit breaker.

2) The element connectors are covered by a switch box, which is usually on the front of the kiln. Remove the switch box. You will see two connectors for each element. There is

no need to remove the lead wires from the connectors provided you have only one wire attached to each element connector. If you have more than one lead wire on a connector, it may mean that your elements are wired in series/parallel. In that case, temporarily remove the wires from one of the connectors. Otherwise you could get a wrong reading. (Current from the ohmmeter battery can pass through other elements than the one you are testing.)

3) Place the ohmmeter probes against the two element connectors of the element you are testing. You may need to clean a spot on the connectors to get a good electrical contact. For best results, touch the probes to the element connectors and not to the twisted element ends.

If an element is burned out, it will show as infinity ohms on a digital meter or no needle movement on an analog meter.

A worn out element is roughly 10 percent higher in ohms than a new element. (See your kiln's wiring diagram for the ohms of new elements for your kiln.) However, if your ohm readings are high, that does not always mean the elements are worn out. Your meter may be inaccurate. A better indication of element wear is the length of firing time. As the elements age, the firing time will become longer and longer.

MY TRIP TO WASHINGTON, DC

Last Friday I taught sessions on kiln maintenance at Vitrum Studio in Beltsville, Maryland and Weisser Glass Studio in Kensington, Maryland. I always enjoy being with glass artists, because they exude enthusiasm. If you were there, thanks for attending.

I enjoyed viewing glass art in the galleries of Vitrum and Weisser studios. They contain some of the finest glass pieces I have seen. When Paragon first started making glass kilns in 1985, the selection of glass fusing was limited. Now you can find pieces of extraordinary design.

I asked Kevin O'Toole of Vitrum Studio for the titles of glass art showcase books for those who don't have a chance to visit galleries. He brought out several large, heavy volumes. I have added two of them—"International Glass Art" and "A History of Glassforming" to Paragon's recommended reading list:

<http://www.paragonweb.com/BookInfo.cfm?BID=35>

<http://www.paragonweb.com/BookInfo.cfm?BID=34>

(Or visit www.paragonweb.com and select "Products" and then "Books & Videos" from the drop menu.

VIETNAM WALL

Before I left Washington on Saturday, I had only enough time to visit one landmark, and I chose the Vietnam Memorial. I had always wanted to see it.

I was expecting a high wall. Instead, it is almost hidden below ground level. Looking from across the street, you won't even see it. A wide, v-shaped swath has been cut into the earth. Black granite panels are lined along that cutout, with a walkway in front. It is as if the ground had opened up to reveal the names of 58,000 dead etched into the black granite slabs.

Volunteers made pencil tracings of names from the granite. One man used a stepladder to reach a name for a young woman. He said, "We've had the wall now for 25 years, and it is still powerful." Then he pointed to a medal that had been placed at the base of the wall and said, "What would make someone leave his Bronze Star here?"

RAINBOW ART GLASS OPEN HOUSE

After seeing the Wall, I drove to Farmingdale, New Jersey for an open house at Rainbow Art Glass. That Sunday I enjoyed talking to glass people for most of the day. One story stands out:

A glass artist told me that her husband bought her a used ceramic studio kiln. Without help from anyone, he lugged that kiln down their basement stairs while she was away and later presented it to her as a surprise. I wish I had gotten his name. He deserves a Husband of the Year Award.

Cone-Fire or Ramp-Hold? (revised)

The modern digital ceramic kiln has two firing modes: Cone-Fire and Ramp-Hold. (Glass, heat treating, and jewelry kilns have Ramp-Hold only.)

Most people use Cone-Fire mode to fire ceramics. It is simple--just enter speed, cone, and hold time. Ramp-Hold mode, by comparison, seems complicated. Ramp-Hold divides the firing into segments, each with a rate, target temperature, and hold time.

But some people fire all their ceramics with Ramp-Hold instead of Cone-Fire. Their reasons:

- 1) The standard thermocouple (temperature sensor) used in ceramic kilns is the K-type. Over its life, the K-type thermocouple drifts in temperature. This means the temperature readout changes slightly with time and wear. To compensate in Cone-Fire mode for temperature drift, you calibrate the thermocouple using a feature called Thermocouple Offset. It raises or lowers the temperature setting of the thermocouple.

To compensate in Ramp-Hold mode for temperature drift, on the other hand, just alter the target temperature of the segment that fires the cone to maturity. You don't have to use Thermocouple Offset.

For example, the witness cone on the shelf needs to bend just a little farther. Merely add 5 degrees of temperature rise to the next firing. Instead of programming a target temperature of 2232 deg. F for cone 6, program 2237. If the witness cone is bent slightly too far, you can easily back off 5 or 10 degrees the next time.

2) The latest digital kilns have candling and slow-cool features in Cone-Fire. Candling helps dry the greenware; slow-cool gives certain glazes extra time for full development. In Ramp-Hold, you can program candling, slow cooling, and other features merely by adding more segments.

3) You learn more about firing when you program easy step yourself.

4) You can experiment in Ramp-Hold more than you can in Cone-Fire. Ramp-Hold simplifies the firing of difficult glazes such as crystalline. If a friend or teacher gives you the firing schedule for a glaze, you can modify it easily in Ramp-Hold to obtain the best results for your kiln and materials.

5) You want to fire faster than Cone-Fire will permit. For instance, firing to cone 6 in Cone-Fire at fast rate takes 9 1/2 hours. To fire faster, use Ramp-Hold.

Firing Moist Greenware

The most expensive way to dry greenware is to heat it in a kiln. The moisture in the clay rusts the kiln, wears out elements faster, wastes electricity, and can cause the ware to explode.

John R. Hohenshelt, who ran Paragon for many years, told me about a customer he met at a trade show who complained that her Paragon kiln fired slowly. Her face flushed with emotion as she spoke. John listened quietly, trying to think of solutions for her.

“And furthermore,” she said, “the kiln drips ugly black water around the case and makes a mess of my floor.” When she mentioned water, John knew the answer: She was using the kiln to dry the greenware on low heat.

During firing, moisture from the greenware turns to steam. As the heated air in the kiln expands, it escapes by pushing its way into the pores of the firebricks. When the moisture reaches the cooler stainless kiln case and galvanized steel base plate, it condenses, causing the water to drip around the kiln. This happens at the beginning of the firing. When the case and base plate become hotter than 212 deg F., the moisture no longer condenses on those surfaces.

The firebricks in a typical 8-sided kiln can absorb approximately 50 pounds of moisture from wet greenware. This reduces the insulating capacity of the firebrick. It also takes a tremendous amount of electrical power to convert water to steam during firing. This slows the kiln to a crawl.

John told the customer to fire her kiln empty overnight on low heat to burn off the moisture in the firebricks. "Load only bone-dry greenware in your kiln from now on," he advised. "Not only will moist greenware reduce the firing capacity of your kiln, but it will also rust it out." A few weeks later, she phoned to say the kiln was firing beautifully.

The following suggestions will help you determine when the greenware is dry and what to do if it won't dry completely:

1. Give the greenware enough time to dry--in most areas at least two days. Drying time depends on humidity and the thickness of the clay. In areas of low humidity, such as Tucson, blowing a fan on the greenware can dry it so fast that it has to be turned to avoid cracking from shrinkage. In humid areas, such as New Orleans, the greenware might not ever dry fully.
2. Touch the greenware to the inside of your wrist or to your cheek. If it feels warm, it is usually dry. Dry longer if it feels cool. Note, however, that in humid areas, even damp greenware can feel warm. Greenware feels cool due to evaporation. In high humidity, even damp greenware can feel warm when the moisture in it stops evaporating.
3. If you live in a humid area and the greenware is still moist after an extended drying time, load it into the kiln. Prop the lid about an inch using the kiln's lid prop. (If your kiln does not have a lid prop, use a scrap of firebrick.) Fire to 200° F. slowly. Maintain 200° F. until the greenware is completely dry.

Electronic kilns: Use the Preheat feature in Cone-Fire mode, or program a preheat segment in Ramp-Hold mode.

Manual fire kilns: Turn the bottom switch on low; leave the other switches off. (You may need to vary this switch setting for your kiln.)

If you have a downdraft kiln vent, keep the lid closed and leave the vent on during preheat. It will help prevent the kiln from rusting, because the vent will draw the moisture from the kiln.

The Dead Man Test: Checking for Dryness with a Mirror

(The term "dead man's test" came from the days of the old west, when a mirror was held under the nose of a presumably dead person to verify that they were actually dead.)

Hold a mirror above the lid or top peephole where hot air from the kiln will move across the mirror's surface. If the mirror fogs, the greenware is still releasing moisture. Keep the lid propped and maintain 200 deg. F. until the mirror no longer fogs. (If you are firing with a downdraft kiln vent, first turn off the vent. Then perform the mirror test.)

For this test to work, the mirror must be at room temperature. The mirror fogs when moisture in the hot air condenses on the cooler mirror. If you hold the mirror too long near the kiln, the mirror will heat up and will no longer fog when moisture hits it. So hold it at the lid for only several seconds at a time.

Coloring Silver Clay

By Martha Biggar

Biggar Handwrought Jewelry, Draper, Virginia

marthabiggar@yahoo.com

There is an easy way to control all the stages of patina color for silver clay. Combine the following:

1 cup hot water

1 tablespoon of ammonia (available from grocery stores)

1 small chip of Liver of Sulphur

Just plain Liver of Sulphur is harder to control and goes black very quickly.

I dip a piece of wire into the Liver of Sulphur solution, then into a cup of cold water. I look at it and repeat as needed.

I also have a quart Visions cookware pot that I've dedicated to Liver of Sulphur. It really helps to heat the water for the Liver of Sulphur. When making earrings, dip both into the solution together to get matching color. I also use this pot for quenching silver clay.

READER RESPONSE: SAFETY

The last two Kiln Pointers have included eye safety. James Little of Rockville, Maryland wrote, "My grandfather lost his left eye in the early 1890s while helping his father staple barbed wire to fence poles. A staple slipped on the hammer face and pierced my grandfather's left eye. This was before wonder drugs that could have stopped the infection, and the eye had to be removed. My grandfather wasn't even 18.

"I, too, had an experience with eye safety, but I was wearing safety glasses," wrote James. "I was working in a lab connecting 10 kW heaters for a bake-out oven. I thought the power was disconnected from the junction box, but one circuit was overlooked. When a screwdriver grounded a hot wire, a spatter of molten copper hit the lens of my safety glasses. It fused into the surface, but my eyes were okay.

"Three lessons: First, wear safety glasses. Second, use a voltmeter to verify that everything is really dead before working on electricity. Third, place a tag on the circuit box in the hall, basement, or wherever the feed is from. In the trade a lockout on the feed point is now required. But even with a lockout, the voltmeter should be the final test.

“A full-face shield would have been even better than safety glasses. The molten copper spatter could have burned my face, ignited my hair or worse.

“The learning lasts forever,” James concluded. “The copper splattered on my safety glasses in 1963, but for me it is still a reminder to be safe when working with power, heat, and even kitchen utensils. For instance, never sharpen a power tool when it is plugged in. It is not luck but care that ensures survival of ones senses and digits.”

READER RESPONSE: RECIPES NEEDED

Deborrah Morgan Simmons of Jasper, Texas wrote, “I am a ceramic artist and middle school art teacher in Jasper, Texas. I am also a director of the East Texas Art League and teach adult classes at East Texas Regional Art Center in Jasper. I am putting together a cookbook as a fundraiser for our organization and would like to include recipes from artists. Please send recipes to possmcreek@yahoo.com .

Repairing Cracks in a Firebrick Lid

A firebrick lid is surprisingly strong. A ceramics teacher told me about the time he came in early to class one morning to find the maintenance man standing on the lid of the kiln. He was trying to reach something overhead.

On the other hand, the lid can crack the very first time you close it too hard. Handle the lid with the same care you would use when lifting a computer or a television.

Dust sometimes falls from cracks in the lid. This does not affect ceramic greenware. However, dust can ruin glazed ware and glass. Before a glaze or glass firing, vacuum the lid cracks. If dust still falls onto the ware, then load the kiln so that ware on the top shelf is away from the lid cracks.

The easiest way to repair the lid is to stuff the cracks with kaowool. Press the kaowool into the cracks with a small stick or putty knife being careful not to damage the firebricks further.

RECOMMENDED BOOKS

If you have a moment, please look at our recommended reading list:

http://www.paragonweb.com/Books_and_Videos.cfm

(Or go to www.paragonweb.com and select “Products,” and then “Books and Videos” from the drop menu.)

Have we left out any important books? I would appreciate your opinion.

READER RESPONSE

In last week's Kiln Pointer I included an emergency room story about eye safety. Luanne Bushart of Elbridge, New York wrote, "Thank you for pointing out the importance of safety glasses. No one ever thinks it could happen to them, so sometimes a personal story makes an impression. Thank you for sharing yours.

"Nine years ago my husband and I were adding boards to a horse fence. I was NOT the one with the hammer--I was standing behind him with the measure, level, etc. The nail must have hit a knot in the board, because the nail popped back and hit me in the eye. It was not an air-driven hammer either, but it pretty much destroyed my left eye.

"I can relate, after five or six eye surgeries, to the part in your story about 'now hold very still'! When the doctor removes sutures from the surface of my eye, he uses a pointed #11 blade and tiny microsurgery forceps. You can bet I am going to hold very still!

"I spoke to a high school art class about fusing," Luanne continued, "and the first thing I talked about was the importance of safety glasses. One of the teenage boys just sighed and rolled his eyes...did one of those teenage "Yeah, yeah, lady" kind of things. So I got even with him by relating some of the gory details. And since I was both an eye trauma victim and also worked in an operating room as a surgical tech, I was able to make them very gory indeed.

"You need both eyes to have depth perception. Your brain triangulates the difference in distance between what you see with each eye, like your own personal GPS. Not being able to tell how far away something is complicates life in ways you would never imagine. I figured the driving part would impress the teenage boy, so I told him how I could no longer drive at night, because everything looks to me as if it were painted on the windshield.

"I have had to make lots of little adjustments, too, like making sure the pitcher is over the rim of the glass when I pour something. And when someone hands me something small, like change from a store clerk, I have to hold my hands out cupped together like Oliver Twist with his porridge bowl. ('Please sir, may I have some more?')

"A lot of things become more difficult and frustrating. Even walking. It is hard to walk over rough terrain. We went hiking in the mountains, and the trail was all rocks and boulders. Imagine never being quite sure just how far that next step is! Same with the depth of stair steps. Driving a car during the day is possible, but I almost have to unscrew my head to turn and check the 'blind spot' alongside the car.

"One fun side note: I now have a new part-time career as a lightshow director for a local classic rock band. I program and run a big light board with between 16 and 20 lights, 10 of which are movable. It is a time-honored tradition that the sound guys are deaf, so I think it only fitting that the light person is half blind!"

Thank you, Luanne, for sharing your difficult experience. I am glad you have retained your sense of humor.

Reminder: Wear clear safety glasses when cutting glass and firing safety glasses when looking into a hot kiln.

Ceramic Glazed Jewelry

To avoid stilt marks on glazed ceramic jewelry, suspend the pieces on a bead rod through a hole formed in the clay.

Two stacks of short posts on a kiln shelf support the 10-gauge nichrome bead rod. (A 6-inch length of nichrome wire costs only \$1.85.) After firing the piece, you can use the hole to thread a silver chain.

Andi Fasimpaur of Dayton, Ohio offers suggestions for suspending jewelry during firing: “I recommend adding holes to clay jewelry. If necessary, later you can cover or disguise the hole with a jewelry bail so that no one need ever be the wiser.

“I know jewelry artists who embed high temperature stamen wire into their pendants to make hanging loops for firing. You could embed a loop at the edge, suspend the piece for firing, and then cut the wire off. File, grind, and sand the edge that has the loop to eliminate almost every trace of the wire.

“I generally buy little packages of stamen wire from my local supplier. The Kemper brand of stamen wire is rated to cone 6 although I've had good results firing it to cone 10 for some of my pierced porcelain beads.”

You can read more about Andi Fasimpaur at <http://mysticspiral.com> .

SAFETY GLASSES

Wear clear safety glasses when cutting glass. Wear dark firing safety glasses when looking into the firing chamber of a hot kiln.

I learned the importance of safety glasses 20 years ago while building a house in Hawaii. My hammer knocked a fleck of zinc coating from a galvanized nail, and the zinc landed on my eye. Several hours later my sister took me to an emergency room in Hilo, Hawaii, where a doctor had me lie down on a gurney.

Holding up a small instrument, he said, “I’m going to swing this like a miniature golf club and remove the metal from your eye. While I do that, I want you to remain perfectly still. Don’t move a muscle.”

Several nurses and a janitor hovered over me watching intently as the doctor performed the procedure. It took only a few seconds.

Now when I use a hammer, I wear safety glasses.

READER RESPONSE

In last week's Kiln Pointer I wrote that if you buy glazed ceramic ware from abroad, make sure it is lead-free.

Q. Is there a surface test for lead in ceramic glaze? Even a destructive test would be helpful.

A. The book "Mastering Cone Six Glazes" by John Hesselberth and Ron Roy includes a test for glaze leaching (where glazes are unstable and dissolve in acids):

<http://www.paragonweb.com/BookInfo.cfm?BID=16>

Here is a lead testing kit for ceramic glaze. I haven't used it and do not know how effective it is:

<http://www.leadinspector.com/>

Last week's Kiln Pointer also included instructions on stacking kiln shelves:

Yvonne George of North Carolina wrote, "I enjoy reading and learning from the your 'pointers.' However, this one made me wonder why you recommend three posts instead of four on a full shelf. I have a 17" wide interior Paragon. I use four posts because I have only two large full shelves; the rest are halves. Using three posts would necessitate re-configuring the posts.

"I use my wonderful computerized kiln for glass and clay," Yvonne added. "It's great for both."

I recommend three posts instead of four because if one of the four posts is shorter than the others, part of the shelf will have no support. A cantilevered shelf can break from the stress.

Nevertheless, I can see why Yvonne uses four posts instead of three since she is loading her kiln with a combination of full and half shelves. I would continue loading with four posts since that is working for Yvonne.

By the way, if one of the four posts is shorter than the others, you can place a small wad of clay between the top of the post and the shelf above the post.

Q. What type of saw and blade do you recommend for cutting kiln shelves?

A. Use a tile-cutting wet saw with a diamond blade. You can rent one from a home improvement center. You could also have a tile center cut the shelves for you.

Kiln Shelves

If a kiln shelf breaks, you can sometimes salvage the pieces. Use a broken shelf section to load smaller ware around tall objects. You can also cut a cracked shelf along the crack to make half shelves.

A simple way to protect kiln shelves when test firing a glaze that might run: Place a small, flat slab of bisque clay under the ware. The slab should be about 1/8" thick, slightly larger than the ware, and kiln washed.

Apply several thin coats of kiln wash to the tops of shelves instead of one heavy coat.

Store shelves in a dry area. Moisture can cause shelves to crack or even to explode inside the kiln. A freshly kiln-washed shelf should be allowed to dry thoroughly, then fired slowly to allow any moisture in the shelf to evaporate.

Support full shelves with three posts instead of four.

Especially when firing heavy loads, the posts between shelves should line up vertically. This stabilizes the entire load and reduces stress on the shelves.

Six posts are often used to support two half shelves that are positioned side by side in a large kiln. However, you will save kiln space by supporting a set of half shelves with four posts instead of six. Position two posts in the center so that they support both half shelves. Place one additional post under the outer edge of each half shelf.

When possible, position posts toward the kiln walls and away from the center of the kiln. This places most of the weight of the kiln load close to the kiln stand and away from the kiln center, which has less support.

READER RESPONSE

These questions are about last week's Kiln Pointer on firing ceramic and glass decals:

Q. Should you kiln wash the tile holder supports?

A. If you are firing decals onto tiles, you do not need to kiln wash the tile holder. This is because it is unlikely that glaze will run at 1450 degrees F, the relatively low temperature used to fire decals. If you are firing higher, then it may be a good idea to kiln wash the tile holder.

Q. Where can I get those decals?

A. A local ceramic supply store is the best source of ceramic decals. Visit www.paragonweb.com and click on Where to Buy. Search by either state or zip code.

Or visit www.infospace.com and search for ceramic suppliers in your city. This is my favorite telephone directory website.

Q. I make dichroic glass jewelry. I ordered several decals from my glass supplier; however, no instructions were included. How does one fire decals onto dichroic glass?

A. Instructions for firing decals onto glass:

The first time you fire a decal, use a test piece of glass.

This is a general firing schedule that you may want to change to suit the types of projects you fire. The larger and thicker the glass, the slower the kiln should fire.

Up to around 700 degrees F, vent the kiln. (Leave peephole plugs out and lid propped.) When the smoke disappears, close the lid. Glass jewelry can fire rapidly after the smoke disappears.

Firing Schedule

Segment 1: Rate 300 deg. F, Temp 800 deg. F

Segment 2: Rate 700 deg. F, Temp 1080 deg. F

Q. When I'm firing dichroic glass jewelry, should the vent hole on the top of the Paragon SC-2 always be closed or open? I've done it both ways but haven't seen any difference.

A. Venting is important when firing a core material such as cork clay inside a silver clay piece or when firing china paints, decals, fiber paper, and ceramics. Vent all firings that produce vapor or fumes. Venting is not always necessary with firing glass, though, especially small jewelry pieces.

One last pointer on summer vacations: If you buy glazed ceramics during your travels abroad, do not use it for food or drink unless you can verify that the glazes are food-safe.

I hope you are enjoying your summer. This year it is especially hot here in Mesquite. Yesterday the temperature was 105 deg. F.

Coating the Kiln Lid

On a top-loading firebrick kiln, the inner side of the lid and top rim of wall bricks can be coated to last longer. Liquid Kiln Coating is a refractory cement that we have formulated

for coating firebrick lids here at the factory. The door or lid of ceramic fiber kilns and front-loading firebrick kilns do not need the coating. The door of a front-loading kiln is not subjected to as much wear as the lid of a top-loading kiln.

The coating hardens and protects the firebrick surfaces. One application lasts through many firings even though the coating will seem to disappear after you fire the kiln.

You can also use Liquid Kiln Coating to cement firebricks together. However, you must work quickly. The coating sets faster than kiln cement.

Avoid getting the coating on heating elements. If you splash the coating on an element, do not fire the kiln until the coating is completely dry.

Coating that is applied too thick will flake off the lid after you fire the kiln. If this happens, remove the flaked coating with sandpaper or grit cloth.

If you are coating over a patched firebrick surface, first allow the cemented patch to dry completely.

LIQUID KILN COATING INSTRUCTIONS

- 1) Shake the container until the coating is thoroughly mixed. Pour some of the coating into a bowl. Stir the coating just before you apply it to the firebricks.
- 2) Apply the coating with a large, soft sponge such as the type used for wallpaper. Moisten the sponge with water; then squeeze out the excess water.
- 3) Dip the sponge into the bowl of kiln coating. Wipe the coating over the lid surface. Work quickly, and wipe off the excess. The coating should be thin enough so that you can still see the brick seams underneath.
- 4) Allow the coating to dry completely before firing the kiln.

SHARING KNOWLEDGE

Gaff Pearce of Winston-Salem, North Carolina wrote, “Recently I fired student-made pots and a commissioned piece as a demonstration for a local high school. As we raised the kiln and started to pull pots there were oooo's and ahhhh's, but I found myself watching the students' faces as their pots came out of the fire and they saw color for the first time. I am now a believer...if you have never been involved with helping young people fire their pottery, you have missed a large part of life. My 'commission' for firing a pot for the school's office was free coffee until I retire (which is soon). But I really got much more than that. The point: Share your knowledge and joy!”

Last week I was off work for three days due to sciatica. This was the first time I had experienced sciatica in about eight years. I can walk without pain now; I treated the

condition with a heating pad. I have decided that one of our greatest joys is to stand straight and tall and to walk without pain, which I can do now. Most of us take the simplest joys for granted.

Loading Ceramics

When loading ware of differing heights on the same shelf, place the shorter pieces toward the outer edge of the shelf. This gives better heat distribution than when the short pieces are toward the center and surrounded by tall pieces.

On top-loading kilns, placing a shelf too close to the top of the firing chamber can lead to over- or under-firing.

Suggestions for placement of the top kiln shelf:

- 1) Mount the top shelf low enough so that element grooves show between the kiln lid and top shelf.
- 2) Place tall ware on the top shelf. This necessitates lowering the top shelf.
- 3) If the ware on your top shelf is over- or under-firing, try using two half shelves instead of a full shelf. Stagger the height of the shelves.

READER RESPONSE

In last week's Kiln Pointer, Dawn Christensen showed how to make a clay handprint keychain.

Roxanne Sprehe from Green Bay, Wisconsin wrote, "What a fun idea. I can see I will be busy this summer making PMC and clay fingerprint beads of my four granddaughters."

Jim Hatcher of Helena, Montana wrote, "We recently lost a beloved pet to old age. For remembrance we had paw prints made in clay. It is a delightful way to remember a darling kitty cat."

Jill Mooney of Temple, Texas wrote, "I so enjoy your pointers. I look forward to each new one. Having moved to Texas, it's a long way back to see my great nieces and nephew. I had their mom trace around their hands and send to me. I transferred the tracings to fiber paper and slumped one right hand each of the handprints in glass adding each child's name above the print for them to hang in their rooms. The left hands I slumped into a 10" circle for myself."

Martha Biggar of Art Works Studio in Chilhowie, Virginia wrote, "I make metal clay thumbnails of babies. Often their thumbprints are not fully developed, so I take a small lump of PMC and press the thumbnail into the clay. The image is darling. Then I slip the

clay into another piece of metal clay already cut out into a circular shape, make a small hole for attachment as a charm, and print in the baby's name and birth date.”

Firing Ceramic and Glass Decals

You can fire ceramic or glass decals in any kiln that can reach 1450 degrees F / 787 degrees C. Decals are an excellent beginner's project, because you can achieve success with your first firing.

You can fire decals onto glazed ceramic cups, tiles, light switches, photo frames, and much more. See your local ceramic supplier for blank ceramic ware and the decals to fire on them.

Don't worry if you ruin the first few decals. Applying them takes practice. Before starting, clean the ceramic or glass piece with water.

1) Cut out the decal and soak in lukewarm water until you can slide the image from the paper backing onto the ware. Slide the image off the backing rather than attempting to lift the image off.

2) Position the decal on the ceramic or glass piece. The side of the decal that was up on the paper is the same side that goes up on the ceramic or glass.

3) Use a damp sponge or rubber squeegee to squeeze out air bubbles and water from the decal. For flat surfaces, use a rubber squeegee; for curved surfaces, use a damp sponge.

4) Dry the ceramic or glass piece overnight before firing.

5) Fire a glazed ceramic blank on a stilt placed on top of a fireclay shelf. Glazed pieces must not touch each other. Fire glass directly on a fireclay shelf. The shelf must be coated with kiln wash or glass separator.

6) Fire in a well ventilated area. Keep the top vent plug out during the first hour or until the smoke and odor disappear.

7) Fire at a rate of 500 degrees F / 275 degrees C to the recommended temperature for the decal you purchased. Most decals fire to cone 015 - 018. Use the Orton cone chart to convert the cone number to a temperature.

8) After the kiln shuts off, leave the door closed until the kiln cools down to room temperature.

READER RESPONSE

Last week's Kiln Pointer was coating the firebrick kiln lid with Liquid Kiln Coating. Here is a related question that came in:

Q. I have applied kiln wash to my shelves. Should I also kiln wash the underside of the lid? Also, on some of my shelves the wash is flaking off.

A. Please do not kiln wash the lid. The coating I was referring to in the Kiln Pointer is a special cement that hardens the firebrick surface. Kiln wash, on the other hand, is a fine powder that does not fuse at high temperatures. It protects the shelves from glaze drippings. Kiln wash should never be applied to the lid or walls of the kiln. It is especially important to keep the kiln wash away from elements.

If the kiln wash is flaking from the shelves, you can reapply more wash on the bare spots.

I trust that you are having an enjoyable summer. Making projects in your kiln is a nice way to spend time with your children during summer vacation. My 18-year-old son, Patrick, made small ceramic pieces when he was around seven. We cherish those hand-made pieces, as I'm sure his own children will one day—and perhaps even his grandchildren.

Patching Firebricks

Patching a broken firebrick is not difficult. It just requires patience and a little practice. Here is a technique that you can use to repair broken firebricks in the lid, walls, and floor of a kiln. Do not breathe the brick dust. Wear a mask.

MAKING FIREBRICK SANDING BLOCKS

First, you will need to make a firebrick sanding block. Use very coarse sandpaper such as 285 grit. Use the self-adhesive type that has a peel-away backing so that you can stick the sandpaper to the sanding block.

For sanding small firebrick sections, you may need a sanding block as small as 1/2" x 1". Banding steel, which is used to reinforce shipping crates, makes a good miniature sanding block. Take a 6" piece of banding steel and bend it 90 degrees at one end. The length of the bend should be whatever size you need, such as 1". Then cut the sandpaper to the correct size, peel off the sandpaper backing, and press the sandpaper onto the outer bent end of the banding steel.

You could also make sanding blocks out of sheet metal, wood, etc.

REPAIRING THE DAMAGED BRICK

Patching a broken firebrick is not difficult. It just requires patience and a little practice. Here is a technique that you can use to repair broken firebricks in the lid, walls, and floor of a kiln. Do not breathe the brick dust. Wear a mask.

MAKING FIREBRICK SANDING BLOCKS

First, you will need to make a firebrick sanding block. Use very coarse sandpaper such as 285 grit. Use the self-adhesive type that has a peel-away backing so that you can stick the sandpaper to the sanding block.

For sanding small firebrick sections, you may need a sanding block as small as 1/2" x 1". Banding steel, which is used to reinforce shipping crates, makes a good miniature sanding block. Take a 6" piece of banding steel and bend it 90 degrees at one end. The length of the bend should be whatever size you need, such as 1". Then cut the sandpaper to the correct size, peel off the sandpaper backing, and press the sandpaper onto the outer side of the bent end of the banding steel.

You could also make sanding blocks out of sheet metal, wood, etc.

REPAIRING THE DAMAGED BRICK

Practice patching firebrick scraps before working on your kiln.

- 1) Use a hacksaw blade to cut an outline around the broken brick section. Cut a small rectangle or square.
- 2) Use the hacksaw to remove most of the brick within that outline. Then sand the brick to smoothen the bottom of the recess. If the repair section is small, you will need a miniature sanding block.
- 3) After the recess is smooth, make a firebrick plug to fit into the recess. The plug should be a little smaller in width and depth so that the brick seam is 1/16" on all sides. Spend time to make the plug fit precisely. The seam should be only 1/16" on the sides and bottom of the plug. A thicker seam will likely break later due to the difference in expansion between the firebrick and cement.
- 4) Use a vacuum cleaner to remove the dust.
- 5) Spray a little water onto all mating brick surfaces.
- 6) Working rapidly before the water dries out, wipe a generous amount of firebrick repair cement onto mating surfaces.
- 7) Press the plug tightly into place. Do not move it once the mating surfaces make contact. Hold the brick piece for one minute.
- 8) Allow to dry for 24 hours. Then sand the surface smooth.

REPAIR SEMINAR

We are holding a Basic Kiln Maintenance Seminar June 2 – 3, 2006. The seminar fee is \$95. You are most welcome to attend.

When the Breaker Trips During a Firing

One time when I was 11 years old living in Tripoli, Libya, I touched a lamp, and all the lights in our apartment went out. Contact between frayed wires inside the lamp blew a fuse. This is called a “dead short.” If your kiln has one, a circuit breaker will trip or a fuse will blow immediately after you turn on the kiln.

Sometimes the breaker trips after the kiln has fired for some time. It doesn't happen immediately. Here are reasons for a delayed tripped breaker:

- 1) The fuse can blow or breaker can trip in hot weather because the kiln is right in front of the electrical panel. Keep the kiln at least 3' - 4' from the panel. Circuit breakers are triggered by heat, and a nearby kiln can raise the temperature of the electrical panel.
- 2) A loose connection at the fuse or breaker will generate heat. If the fuse or circuit breaker panel feels unusually warm, have your electrician check for loose connections.
- 3) A circuit breaker may become weak as it ages and become more prone to tripping.
- 4) Two element pins that touch inside the firebrick wall can pull more amperage, tripping the breaker.
- 5) An element pin that is long enough to touch the kiln case can pull more amperage.
- 6) Water in the firebricks can pull more amperage than normal.

READER RESPONSE

Marc Hines of Hines Glass Studio in Tigard, Oregon wrote, “In February, 2006 I bought a Paragon Fusion-10 glass kiln and have been having a load of fun with it. I have gone from an obsessed hobbyist to running my own little glass studio.

“My kiln runs about two 12-hour cycles a day and has been extremely well behaved and reliable,” wrote Marc. “The lid top of the Fusion-10 also makes a great surface for warming up tortillas! OK - I'm joking about the tortillas – besides, who wants kiln wash dust in their quesadillas?”

THIS DAY IN HISTORY

I have always admired the men who invaded Normandy, France on June 6, 1944. Thousands died on that stormy, overcast day. Many were only teenagers. That is what I think about on June 6.

Supporting Silver Clay with a Firebrick

Especially delicate silver clay pieces such as hollow spheres should be supported in the kiln. They may distort if placed on a flat shelf. You can support them on a small piece of ceramic fiber blanket, or a mound of vermiculite or alumina hydrate inside a ceramic bisque bowl, a small terra cotta flowerpot, or a stainless steel bowl.

Another method is to use a piece of firebrick formed to the shape of the silver clay. Insulating firebricks are porous, lightweight, easy to cut, and last through many firings.

Use a hacksaw to slice off a 1” section from an insulating firebrick. Shape the firebrick with a screwdriver or knife. You can also fill the recessed area of the brick with vermiculite or even powdered firebrick.

You can see a photo of a shaped firebrick at www.paragonweb.com. Click on Support, and then select Kiln Pointers from the drop menu:

http://www.paragonweb.com/Kiln_Pointers.cfm

I hope you have a pleasant Friday tomorrow. We are having visitors here at the Paragon factory for a kiln maintenance seminar.

Keeping a Firing Logbook

One of the easiest ways to learn about your kiln is to keep a firing logbook. If you are firing the kiln for the first time in several months, you can review your logbook to regain a quick “feel” for the kiln. The logbook is vital if you are experimenting with glazes or other materials.

Paragon prints Ramp-Hold and Cone-Fire firing records for digital kilns. You can download them from www.paragonweb.com. Select “Support,” and then “Instruction Manuals” from the drop menu:

http://www.paragonweb.com/Instruction_Manuals.cfm

You can use those firing records even for manual kilns. Keep them in a 3-ring notebook.

You can also record a lot of information with a simple sketch. I include one with most firings. You can see a sample sketch from my logbook at www.paragonweb.com. Click on “Support” and select “Kiln Pointers” from the drop menu:

http://www.paragonweb.com/Kiln_Pointers.cfm

In your sketch, include shelf spacing inside the kiln including the height of posts; the type of ware on each shelf; a sketch of pyrometric cones showing how they bent; and description of firing results on each shelf, such as color of glazes. By sketching the bent cones, you won’t need to store the cones.

As you will see if you visit our website, my sketches are crude and quick. But they still contain a lot of information.

Kiln Worries

To help you have peace of mind when you fire your kiln, I've listed two types of kiln worries:

NEEDLESS WORRIES

- 1) The light around the edge of the door or lid: The line of light that glows under the lid is normal. As long as the lid or door is closed all the way, there is little heat loss.
- 2) Discolored paint: This is inevitable and doesn't affect firing results.
- 3) Clicking noise: It is the sound of relays or infinite control switches cycling. Once you become familiar with the sound, you may find it reassuring that the kiln is firing normally.
- 4) Cracks, chips, and breaks in the firing chamber: Ceramic fiber and insulating firebricks undergo tremendous stress during firing. These imperfections are inevitable and do not affect the firing.
- 5) The digital controller shutoff temperature varies for repeat firings to a particular cone: Controllers are designed to change the shutoff temperature to compensate for firing speed. All is well as long as the witness cone bends correctly.
- 6) The pilot light flickers: This doesn't indicate low voltage. It is normal for the small neon lights.
- 7) The elements hum: This is only the sound of element coils vibrating in their brick grooves.
- 8) The inner lid surface peels: Kilns have a refractory coating that hardens the brick surface. If the coating is too thick, it will peel. Simply remove the old coating with grit cloth and apply a new one with a paint brush.

VALID WORRIES

- 1) Bulging element: Repair bulging elements before you fire the kiln again.
- 2) Popping noise from switch: A popping noise means the switch is about to fail. Keep a spare on hand.
- 3) Chattering noise from relay: A chattering relay is either about to fail or is not receiving enough power to operate properly. Keep a spare relay on hand.

- 4) Water dripping from the kiln case: You are most likely firing moist greenware. This increases electrical consumption and also rusts the kiln.
- 5) You smell burning plastic: Please check the wall outlet. A loose connection may be overheating the wiring.
- 6) You hear a crackling noise: This is the sound of a loose electrical connection.
- 7) Your ceramics or glass makes a plinking noise: This is the sound of clay or glass breaking inside the kiln. The clay and glaze probably have a poor fit, and the glass pieces are either incompatible or they were fired or cooled too rapidly.
- 8) The lid rises in the front: If you have a lid counter-balance spring system, it is probably out of adjustment. This should be repaired before the next firing.

READER RESPONSE

Last week I wrote about the kiln stand. Eddi Reid in Powell, Ohio wrote, “For my little front-loading E-series glass kiln, I found a metal rolling cupboard such as those used for workshop and garage storage. It is sturdy and I can store essentials underneath. It is the perfect height as it is counter high and works just like a stand for a microwave oven, for instance. It is next to an old kitchen cupboard with a tiled top--a handy surface for placing finished items from the kiln.”

John Hohenshelt, president of Paragon, wrote, “Another work surface idea for table-top furnaces is a 12” x12” ceramic tile or slate from Home Depot. Probably more available, costs less than a kiln shelf, and just as good.”

ANNOUNCEMENT

We are holding a Basic Kiln Maintenance Seminar June 2 –3, 2006 at the Paragon factory in Mesquite, Texas. This is 20 minutes outside Dallas.

I wish you a happy Mother’s Day this Sunday and I look forward to hearing from you.

The Kiln Stand

The kiln stand is something we rarely think about. But like the foundation of a house, it must be rock-solid.

SMALL TABLETOP KILNS

Small tabletop kilns such as the Paragon SC-2 should be placed on a fire-resistant surface. A large ceramic shelf is a good choice. It should extend past the kiln, especially in the front. You can sometimes buy “scratch-n-dent” ceramic shelves at half price. Their

only flaw is that they are slightly warped. They make a good work surface for a small kiln.

Even though a ceramic shelf is fireproof, it can transfer heat to the table underneath. For this reason, do not place hot items on the ceramic shelf.

THE KILN STAND ON LARGER KILNS

Most large kilns are designed to be fired on a kiln stand. It raises the kiln off the floor and helps to dissipate heat under the kiln. The top of the stand should be directly under the kiln walls. A stand that is too small for the kiln will strain the brick bottom.

Do not push the kiln to move it. That could damage the stand. Instead, lift the kiln as you slide the stand.

The kiln should be centered on the stand. But before sliding the kiln to center it, find out if your kiln has a galvanized steel base between the brick bottom and kiln stand. Check with a mirror or reach down and touch the kiln bottom where it rests on the stand. If the brick bottom rests directly on the stand, then lift the kiln to center it. If you slide the kiln, the stand could dig into the brick bottom.

Cementing Flat Sections of Firebrick

The men in our kiln brick department have cemented enough bricks to make the equivalent of entire neighborhoods of houses. They make the process look utterly simple.

When cementing firebricks together, make the cement seam as thin as possible-- $1/32''$ – $1/16''$. This is because the firebricks expand more than the cement. If the seam is too thick, it will break due to the difference in expansion between the bricks and the cement.

The ideal way to cement bricks together is along flat surfaces, because sliding the surfaces together after applying the cement makes a thin seam.

First, the bricks you are cementing should fit as precisely as possible. Rub the surfaces with a sanding block, and then rub them against each other until they slide smoothly. Vacuum all surfaces.

We use K Bond cement, diluted with roughly 1 part water to 4 parts cement. Pour the cement into a 12" x 36" galvanized tray.

Do not spray or soak the mating brick surfaces in water. That is unnecessary, because by dipping into a tray, you can coat the entire brick surface with cement in several seconds leaving plenty of time to work with the cement.

Of the two surfaces you are cementing, dip only one surface into the cement tray. Leave the mating surface dry of cement.

After dipping the bricks into the tray, do not wipe off excess cement. Also, do not be concerned with trying to cover the entire brick surface with cement. The cement may cling to the outer edges and not the inner section of the surface that you have dipped. That's okay.

Slide the mating surfaces together. If the cement is mixed with the proper proportion of water, the brick surfaces will slide together smoothly. To achieve a 1/16" - 3/32"-thick seam, slide the surfaces back and forth about 5 times, sliding about 3" before changing the direction. Each time you change directions, the seam will become thinner.

Allow the cement to dry. After 24 hours you can lift the brick sections without breakage.

READER RESPONSE

Last week's kiln pointer was "Opening a Kiln at Higher Temperatures." You can read it at this link:

http://www.paragonweb.com/Kiln_Pointers.cfm

(Or go to www.paragonweb.com and select Support, and then Kiln Pointers from the drop menu.)

Brad Bachmeier in Fargo, North Dakota wrote, "Related to your last article, how much am I going to shorten the life of my elements by raku firing in my electric and opening up at 1800 F? After I get the pieces out and the kiln closed up, it is around 1300 F."

Brad, from our experience, you will not reduce element life to a noticeable extent by opening the kiln at 1800 F. We sell kilns to heat treaters, and they routinely open the kilns at that temperature range to remove steel parts. Judging from our sales of replacement elements, the element life of their kilns is excellent.

NEWS: KILN MAINTENANCE SEMINAR

On June 2-3, 2006, Paragon will hold a 1-1/2 day Basic Repair and Maintenance Seminar at the Paragon kiln factory in Mesquite, Texas. This is about 30 minutes east of Dallas.

The seminar includes two lunches, one restaurant dinner, and a 3-ring notebook of maintenance data on Paragon and Duncan kilns. The seminar fee is \$95. To register, please call 800-876-4328 or email info@paragonweb.com. If you are flying and don't want to rent a car while you are here, ask the receptionist about Paragon's airport and hotel pickup schedule.

Opening a Kiln at Higher Temperatures

Someone asked recently if opening the lid of a hot kiln would damage the firebricks. The answer is usually no.

Kiln manufacturers recommend that you wait until you can unload pieces bare-handed before opening the lid of the kiln. This is to prevent damage to the ware rather than to the kiln. For instance, if you remove glass too soon, it may break as it cools.

Most electric kilns are made with K-23 firebricks, which have a low alumina content. (K-25 bricks have a higher alumina content.) Low-alumina firebricks can withstand dramatic temperature change without cracking. That's one of the reasons we use K-23 bricks in electric kilns.

It's better to wait until the kiln has cooled to room temperature before opening it. Nevertheless you can open a hot electric kiln to remove raku pieces without undue damage to the bricks. Glass fusers can open the lids of their hot kilns to rake or emboss the surface of softened glass.

It is also okay to open ceramic fiber kilns at higher temperatures. You can open the SC-2 at 1600 degrees F, for instance, to remove silver clay.

Rapid firing should not harm your kiln, either. The K-23 bricks and ceramic fiber are less susceptible to cracking from rapid firing than any clay you will ever place inside the kiln. The bricks and fiber are soft and fragile yet also surprisingly durable.

READER RESPONSE

Kate Schatz of Richardson, Texas wrote, "Thanks for your story about finding the ancient pot when you were young. I tell my students about the history of clay and that their fingerprint will be there forever in their clay piece."

Memories of a Kiln Repairman "Down Under"

David Coggins shares valuable pointers on element repair, preventive maintenance, and cleanliness in the ceramic studio.

Memories of a Kiln Repairman "Down Under"
By David Coggins
Queensland, Australia

ELEMENT TWISTERS

Some kiln users repair burned-out elements by twisting the broken ends together. After unplugging the kiln, they use a small gas torch to heat the two ends to red heat and twist the wire together with pliers. This rarely works for long, because the element has a protective oxide coating after many firings. The oxide coating not only protects the wire from further oxidation (or burning away), but it is also a good electrical insulator, so the

connection made by twisting is electrically poor. The poor connection will not conduct current very well and will get extremely hot during the firing, most likely burning out again.

On very rare occasions if you are lucky, the wire gets just hot enough to weld itself together without melting, thus making a good connection. Usually the twisted joint burns out near the end of the firing when the kiln is hottest, so the user gets "just one more" firing out of the element. The faulty element is then promptly forgotten until the next firing, when it is too late to call a kiln technician, so the process is repeated and so on.

These sorts of spot burn-outs in elements are usually caused by poor kiln house-keeping--not regularly vacuuming all the bits of clay and glaze that collect in the element grooves. One little spot of glaze on an element has a "fluxing" action on the wire. (That is, the glaze causes the wire to melt at a lower than normal temperature.)

A collection of dust in the bottom of a groove can cause a localized overheating of an element. Both of these conditions will cause a premature failure of the element, usually with a little ball of melted wire at the point of failure.

I have seen kilns with dozens of these "temporary" element repairs. The users were lucky to get one good firing every second or third attempt due to all the element failures. This was very poor economy; wasting all that power just to avoid the cost of getting the kiln repaired properly. It also had another very undesirable side effect: Every time the twisted element failed, it caused an electrical arc, which melted some of the element wire into the brick groove. By the time I was called to repair the kiln, so much element wire melted into the brick that it would have to be dug out, damaging the element groove and creating a weak spot where the element would not be held securely.

The moral of this story is to use only the element twist repair as a real emergency measure, and be sure to call a kiln technician to replace the faulty element straight after the firing. Better still, keep the kiln element grooves clean, and avoid the problem in the first place!

DUST UP

One of my pet hates while visiting studios to repair kilns was clay dust. Most studios were very clean and aware of the risks of dust, but I visited a few exceptions.

Probably the worst I ever encountered was a commercial studio that cast large urns and vases. They had several large electric kilns that required regular attention. Unfortunately, the kilns were near the cleanup area, where the worker fettled off the mould marks and sanded down large greenware pieces. He would then blow off the dust with a compressed air gun, all the time unmasked and with a cigarette dangling from his mouth. Several times I had to make quick exits to allow me to breathe. When he was in full flight, I had trouble seeing him for the dust. I shudder to think what the inside of his lungs must have been like. He is probably very ill by now.

Another ceramic "studio" I visited was in a country area on an acreage property. The studio was originally in a large shed behind the house. The shed became full of moulds and casting gear, but instead of building another shed for cleaning, glazing and firing, they simply moved those operations into their house. The cleaning and glazing were done in the kitchen and dining room, amongst the food and crockery and cutlery. The kiln was in the lounge room, right beside the sofa and stereo. I didn't get to see where they slept, but that was probably a good thing.

Everything in sight was liberally coated with dust and glazes. They were living with dust 24/7 and probably ingesting glazes with their dinner. I don't think they will live long.

It always amazes me how people are terrified of asbestos and ceramic fibre and the risks of smoking yet think nothing of living at least 8 hours a day (or 24 hours in the case of our friends above) completely surrounded by a cloud of fine clay (read silica) dust. Sometimes I was reminded of the Peanuts character Pigpen; as he walked about, a cloud of dust followed him.

Moral of this story: Clay contains silica. Dry clay contains free silica. Silica in the lungs causes silicosis. Silicosis causes illness and premature death. Always work in a well-ventilated area and/or wear a dust mask. Always clean up the work area of dry clay powder. Be kind to your lungs-- it is hard to breathe without them!

Cheers for now - have a good Easter!

Thank you, David, for the kiln pointers.

READER RESPONSE

Charles Fulks of Southington, Ohio wrote, "My wife works with stained glass and glass beads. My hobby is ham radio. She works on one side of the rec room and I have my 'ham shack' on the other. Our hobbies really make for some 'togetherness.' By the way, the quality of your kiln is to be commended.

"The wife gives away everything she makes as gifts," he wrote. "Costs a fortune, but she is happy. Makes for a happy marriage."

Two weeks ago I wrote about an ancient pot that I found at Leptis Magna, Libya. Linda Gray of Tulsa, Oklahoma wrote, "About 10 years ago I was with a group touring Israel, and archeologists excavating in Caesarea Phillippi let us scrounge through their pile of small pottery shards. I came away with a 5" piece from a wheel-thrown Roman urn.

"As a potter," Linda wrote, "I instinctively placed my hands as if I were throwing the pot on a wheel and discovered that my hands fit perfectly. Obviously that Roman potter

nearly 2,000 years ago was similar in size to my 5' 3" frame. Also, his fingerprint remains inside where the handle was pressed onto the pot. This piece is my favorite piece of pottery that I own."

You can see a photo of Linda's pot by visiting www.paragonweb.com and selecting "Support," and then "Kiln Pointers" from the drop menu. Or click on this link (or paste it into your Internet browser window):

http://www.paragonweb.com/Kiln_Pointers.cfm

Last week I mentioned the Factory Tour at Paragon's website. (The tour is under "About Us" on the site.) In addition to the article above, David Coggins wrote, "I particularly enjoyed looking at your photo gallery of the factory. It reminded me of the trip I made to Paragon in Texas for the 2002 kiln seminar. I really had a great time at the seminar. It was all too short. I was fascinated by the factory and all the methods used to make the kilns, probably more so because I was repairing and rebuilding kilns myself at the time."

Wishing you a happy Easter,

Glass Embossing and Raking

Several weeks ago I wrote about a silver clay pendant that I made. "Inscribe a personal message into the piece. This is easy to do with clay, whether it is silver or ceramics. You could also paint a message onto porcelain or glass. You could even emboss a message into hot glass if you had the right tools."

Rose-Marie James of New Prague, Minnesota wrote, "I would like to know where to find glass raking and embossing tools."

Jayne Persico has designed a collection of glass embossing tools. Her website:

www.jpglassworks.com

If you are inventive, you can also have custom copper embossing dies made by a graphic arts company such as A & G Engraving in Los Angeles, California (323-583-9085). Dies are used in the printing industry to emboss letterheads and book covers. The price is around \$50 for 20 square inches. The die looks like a rubber stamp except that it is copper instead of rubber. You would need to attach a handle to the die.

A bent 1/4" steel rod works well for glass raking. Years ago my wife and I had a glass fusing business called Fire Jewels. We embossed small fused jewelry pieces and refrigerator magnets.

When raking or embossing, please take safety precautions. Wear long high-temperature gloves and a full-face mask. Glass raking and embossing is not for the faint-of-heart.

To rake or emboss, first turn off the power to the kiln. This is to avoid shock should you touch an element with the tool. Turning off the power is the most important step.

Then open the kiln lid or door just wide enough to insert the tool. Drag the rod across or press the embossing tool into the glass surface. It takes very little pressure. Then remove the tool and close the kiln. Turn the power back on if necessary.

You can read more about embossing in “Jayne Persico Presents Kiln Formed Bracelets.” The book shows in great detail exactly how to make glass bracelets and wristwatch bands. It is only 79 pages but includes over 250 color pictures.

Jane has developed a detailed system for making stunning bracelets complete with wrist-sizing chart. Her book shows how to cut, fuse, and then slump the bracelet blanks. Jane uses special bracelet slumping molds and tongs to press the ends of the softened glass around the mold. She also shows how to adjust the bracelet size by firing again.

Her book includes advanced techniques such as wire wrapping, twisting, and embossing the bracelets. Learn to drill holes with a Dremel tool and then fire-polish the holes in the kiln. Jane even shows how to make your own pattern bars.

As an artist you will want to go beyond Jayne Persico’s book and develop your own ideas. But her book is a great idea starter. I’ve listed it on Paragon’s website:

<http://www.paragonweb.com/BookInfo.cfm?BID=28>

(Or go to www.paragonweb.com and select Products, then Books & Videos from the drop menu.)

READER RESPONSE

Last week I wrote about an ancient ceramic bowl that I found on the beach at Leptis Magna in Libya. I also described the handful of Roman tiles I collected that washed up on the beach near my house. A couple of readers asked if I still had the artifacts. No, I left them in Libya. They are probably covered with sand again and perhaps under the foundation of a house built since I left.

Jenni Hearne of Hayden, Idaho wrote, “Oh my gosh! I was born in Libya--Benghazi, 1960. My dad was with US AID, and I grew up all over Africa and Asia. My parents loved Libya. They still talk about the ruins of Tripoli and Cyrene. From Libya we moved to Nigeria, then Congo/Zaire, Pakistan, and the Philippines.

“Living overseas was a good education and gives a unique perspective on life,” Jenni added. “I wouldn’t trade my childhood for anything, and it definitely gave me an appreciation for art and design.

“It's always wonderful to find another person who knows what that global nomad childhood is like! I would love to travel to Libya again to see where I was born. Thanks for sharing your memory.”

Mary Jane Thomas of Columbus, Georgia wrote, “My father, Paul David Klotz, was born in Alsace Loraine, France. He lived in the village of Wissembourg. Around the village were substantial remains of an ancient wall wide enough for two Roman soldiers to walk abreast.

“Later his family moved to Strassbourg,” Mary wrote. “While digging the foundation of the new house, he found many Roman artifacts. He told me about finding large jars filled with Roman coins. When I grew up, ceramics and Roman history were very real to me.”

Claudia MacPhee of Tagish in faraway Yukon Territory wrote, “During the time I lived in Mexico, I collected shards, arrowheads, and lance points. They were everywhere. Sitting around in the evenings while waiting for the parrots to fly across the valley to their roost trees, I would dump my box of shards out on the table and go through them. I would imagine the people who made them. The marks on the pots weren't just artistic designs but religious symbols. The pot shards were a window into the past. They still had the power to 'speak.’”

NEW FACTORY TOUR

I have worked at Paragon for many years, but the factory still fascinates me. Skids of bricks and rolls of stainless steel and element wire somehow become kilns. A factory is a focal point of intense energy perhaps like a very busy pottery studio.

I just added a virtual factory tour to Paragon's website:

http://www.paragonweb.com/Factory_Tour.cfm

I invite you to visit and hope you have a moment to email your opinion to me.

Silver Clay

Sallie Bly and her friend Patricia Walton, silver clay teachers, stopped by Paragon this week and shared pointers on silver clay:

1) When using cork clay or other material to make a hollow silver piece, vent the kiln from the beginning of the firing. Do not begin venting after the piece has fired for some time. Delayed venting can cause the cork clay to ignite inside the kiln. After the cork clay has burned out, insert the plug in the kiln's vent hole.

2) You can place the silver clay on a ceramic fiber shelf or a hard ceramic shelf. In either case, raise the shelf with 1/2” posts. This heats the silver clay more evenly by allowing air to circulate under the shelf.

3) Do not use paper clay as a filler material for making hollow silver pieces. Paper clay is made from volcanic ash and does not burn away.

4) You can fire the lower-temperature silver clays to 1600 F even though they are not rated to that temperature.

5) You can remove the silver clay piece right after it has finished firing. (Wear long protective gloves, face shield, and firing safety glasses whenever opening a hot kiln.) After the elapsed hold time at the recommended temperature (i.e. 1600 F), turn off the kiln and remove the silver piece with an 8"-long putty knife or similar tool. (You can remove the soft ceramic fiber shelf, but do not remove a hard ceramic shelf at high temperature. The sudden temperature change could destroy the shelf! Allow ceramic shelves to cool to room temperature before removing from the kiln.)

6) You can apply enamel to silver clay. If you use opaque enamel, you can apply it to the unfired silver clay and fire the silver and enamel together in one firing. For transparent enamel, fire the silver clay separately. After you have cleaned the fired silver piece, apply the enamel and fire again to the enameling temperature.

7) As a rule of thumb, the silver clay piece should be dry before firing. But you can place a moist piece in the kiln so long as you let it dry before heating higher than 200 F. To dry a small piece in the kiln, program to a target temperature of 125F – 200F with a 20-minute hold. To dry large silver pieces, use a one-hour hold.

Thank you, Sallie and Patricia, for generously sharing these tidbits.

READER RESPONSE

Last week I described a silver clay heart that I made for my wife. I explained that after I fired the heart, “The silver was covered with a white coating, which took a couple of minutes to scrub off with a small wire brush. The crude little heart that I squeezed out of a syringe was no longer clay. Now it glistened.”

Peggy Koop of Insomniac Beads in Plymouth, Minnesota wrote, “By the way, the silver is not covered with a white coating. That’s actually the way fine silver looks. It’s that color because of the way the light hits it and reflects the particles. It is not some type of substance that you brush off.

“The silver starts to glisten when you brush it because you are changing the plane of the particles and hence the way the light hits it. If you burnish the silver, you change the surface further and get an even brighter surface. Tim McCreight wrote an article on the subject some time ago, but for some reason this myth seems to keep circulating.”

Beverly Keener of Northford, Connecticut wrote, “I am a retired primary school teacher and taught for 46 years. During the early years I supplemented our family income by

producing miniature pots. Many were the days when I came home from teaching and worked all night glazing and firing pots for my husband to take to a show.

“I have had my Paragon Home Artist kiln for about a month now,” Beverly continued, “and after the initial stages of apprehension, I am now firing away. It has been more than 20 years since I worked with clay, and it took me a long time to decide to purchase another kiln. I kept thinking at age 71 that it's probably too late to turn the pages back to when I used to make tiny pinch pots.

“Well, last evening we went to the home of old friends for dinner. I took two of the very first ‘new edition’ pots, little vases no more than 1-1/2" high, and my friend wept as I gave them to her. You can see from this story why your kiln pointer about the gift medallion resonated so with me.”

Thank you, Peggy and Beverly, for the wonderful letters. I look forward to hearing from others.

We have just released a new oval glass fusing kiln called the Ovation-10. It is a digital top-loader with a 41" wide, 11.25" high, and 22.5" deep interior.

This morning was unusually cold for March. My gloved hands were numb after my five-mile bicycle ride to Paragon. I worked hard against a strong head wind all the way here. But I always feel clear-headed after my morning ride to work.

How to Estimate Firing Cost

Last week's Kiln Pointer was about an experiment with kiln wash. You can see the photo from my experiment at this link:

http://www.paragonweb.com/Kiln_Pointer.cfm?PID=164

(To read back issues of this newsletter, visit www.paragonweb.com, place the mouse cursor over Support, and select Kiln Pointers from the drop menu.)

HOW TO ESTIMATE FIRING COST

The cost of electricity is figured in kilowatt-hours (KWh). A kilowatt-hour is 1,000 watts of electricity running for 1 hour. (10 – 100-watt light bulbs glowing for one hour consume 1 KWh of electricity.)

To find what the power company charges you for a kilowatt-hour, look at your electric bill, call your power company, or visit their website. The electric rate usually varies

depending on the time of year and amount of electricity you use. In the summer, rates in most areas are higher. Also, add the other costs listed on your electric bill, such as power transmission charges, taxes, etc. In some areas electricity is less expensive during low-demand times, such as nights and weekends. Call your power company to find out if this is available where you live.

Look at your kiln's electrical data plate. It is usually on the side of the switch box. The data plate lists the watts, amps, and volts. If watts are not listed, multiply amps x volts. (Example: 15 amps x 240 volts = 3,600 watts.)

Divide the wattage of your kiln by 1000, which gives the kilowatts. (Move the decimal point 3 spaces to the left.)

Examples:

$$10,800 \text{ watts} \div 1000 = 10.8$$

$$4,800 \text{ watts} \div 1000 = 4.8$$

$$800 \text{ watts} \div 1000 = .8$$

To figure kilowatt-hours for your kiln, multiply the kilowatts by the number of hours that all the elements are turned on.

If the heating elements for a 10.8-kilowatt kiln stay on continuously for 5 hours, the kiln would use 10.8×5 kilowatt-hours.

$$10.8 \times 5 = 54 \text{ KWh (kilowatt-hours)}$$

Then multiply by the amount your power company charges for a kilowatt-hour.

$$\text{Example: } 54 \text{ KWh} \times .09 = \$4.86$$

However, the heating elements do not stay on throughout the firing. If your kiln uses infinite control switches or a digital controller, the elements cycle on and off to control the heating rate. The clicking noise that you hear during firing is the sound of the switches or relays turning the elements on and off.

The faster or hotter your kiln fires, the longer the elements stay on per hour. As a rough rule of thumb, figure that the elements stay on 1/2 – 3/4 of the total firing time.

Example:

A kiln draws 10,800 watts and the firing lasts 5 hours. You estimate that the elements remain powered during half the firing.

$$10,800 \text{ watts} \div 1,000 = 10.8 \text{ kilowatts}$$

$$10.8 \times 5 \text{ hours} = 54 \text{ KWh (kilowatt-hours)}$$

$$54 \div 2 = 27 \text{ KWh used during a 5-hour firing}$$

READER RESPONSE: KILN WASH

Jana Glass of Petra Potter Studio in Troy, Ohio wrote, “I usually apply my kiln wash with those sponge paint brushes, as they hold a fair amount of the wash, and I don't have to use my expensive Hake brushes for that chore.”

An Experiment with Kiln Wash on Firebricks

A glass artist recently overfired her kiln. She was slumping glass bottles. The kiln overfired while she was away, and glass dripped over the edges of the kiln shelf onto the firebrick bottom.

After the kiln cooled, she opened the lid and found splotches of glass embedded into the firebrick bottom. She thought her beautiful kiln was ruined. But after reviewing a picture she sent, I assured her that the damage was minor. (Near the end of this message, I've included instructions for removing embedded glass from firebricks.)

I asked her if she had coated the firebrick bottom with kiln wash. She said no. She had heard that it wasn't necessary in firing glass.

So I decided to experiment with kiln wash, which is a finely ground powder that mixes with water. At high temperatures, the kiln wash does not fuse. Thus, it acts as a barrier against melting ceramic glaze or glass.

For my experiment, I found two scrap firebricks in the Paragon factory and coated one with kiln wash. I left the other bare. I placed the two bricks side by side on a kiln shelf in a Paragon Fusion-10 glass kiln. Then I laid a clear glass bottle across the two bricks and fired the kiln to 1700 degrees F with a one-hour hold at the end of the firing.

I checked the Fusion-10 from time to time. Through the peephole I could see the glass turn red, bright orange, and then yellow. It sagged and finally flattened against the firebricks. The next morning I opened the lid. The overfired glass bottle was now an ugly melted blob.

To remove the glass from the bare firebrick, I had to dig it out with a screwdriver. A 1/4"-layer of brick adhered to the glass. But the surface of the kiln-washed firebrick remained smooth. The only particles that adhered to the glass were from the side of the brick where I had not applied kiln wash.

SUMMARY

- 1) Coat the firebrick bottom of your kiln with kiln wash. Do this even if you are firing only glass and feel that you will never overfire your kiln. For kilns rated over 1700 degrees F, the kiln wash must be rated to 2400 degrees F.
- 2) Pour a little water into a disposable container and add powdered kiln wash until it has the consistency of coffee cream. Stir until lumps dissolve.
- 3) Apply three thin layers of kiln wash rather than one thick layer. You can use a small paintbrush, but I prefer the haik brush, because it applies a smooth coat and holds a large amount of kiln wash. Allow the kiln to dry before firing.
- 4) To avoid dust, vacuum the kiln frequently. Use a brush nozzle on a vacuum cleaner. (By the way, avoid breathing the dust.)
- 5) If the kiln wash cracks or flakes off, reapply it only to the bare spots. Do not remove the kiln wash from the firebrick bottom and apply a fresh coat. This is unnecessary and very messy.
- 6) Avoid splashing kiln wash onto the firebrick walls, especially if you have sidewall elements. Kiln wash and glass separator destroy elements, so keep the bag of powder sealed.
- 7) Do not apply kiln wash to ceramic fiber firing chambers. Kiln wash is meant for firebricks and ceramic shelves.
- 8) If glass or glaze embeds into a firebrick bottom, the damage is often minor. Wearing protective gloves, remove the glass with a screwdriver. You can fill in the gouges with a 1:1 mixture of kiln cement and powdered firebrick. If the gouge is minor, I would not even repair it. Minor gouges in the bottom will not affect your firings as long as you have smooth areas to support kiln posts.
- 9) Do not leave your kiln unattended, especially near the end of the firing.

10) Leave the bottom uncoated if your kiln has an element in the bottom. Be careful not to drop dust onto that element.

ON-LINE GLASS TECHNICAL POINTERS

I have just added Bullseye Glass to Paragon's list of website links:

<http://www.paragonweb.com/Links.cfm>

<http://www.bullseyeglass.com/connection/education/>

(Click on the above links, or go to www.bullseyeglass.com and click on Education.)

Bullseye offers downloadable pdf files for glass artists:

TechNotes 1: Knowing Your Kiln

TechNotes 2: The Vitrigraph Kiln

TechNotes 3: Compatibility of Glasses

TechNotes 4: Heat & Glass

TechNotes 5: Volume & Bubble Control

TipSheet 1: Kilncarving

TipSheet 2: Accessory Glasses

TipSheet 3: Working Deep

TipSheet 4: Design Your Own Art Glass

TipSheet 5: Bullseye Box Casting

TipSheet 6: The Amazing Roll-Up

TipSheet 7: Platemaking

You would think that firing kilns is routine for someone who works in a kiln factory. But it is not. I enjoy even test-firing a kiln. It reminds me of my 8th grade science class.

Making Clay Tiles

How to Make Clay Tiles

By Laura Reutter

We've read a lot about sandwiching tiles between drywall (sheetrock), flipping them, turning them, covering them, etc. to prevent warpage. I can tell you that none of this is necessary. Why spend countless hours handling, coddling and fussing over tiles? Not efficient! Not cost effective for a professional tile-maker. I have developed a technique that is almost 100% foolproof for making flat tiles and greatly minimizes handling.

First, use a heavily grogged clay that is sculptural or tile quality, not a throwing clay (not plastic). I use an off-white stoneware called Crystal Stone that fires to cone 6. (I usually

glaze fire to cone 5 - 6 after a bisque firing of cone 05.) Crystal Stone is available at Seattle Pottery Supply. I tested dozens of clay bodies before I found this one. It had the least warping and shrinkage of all their clays that I tried. I'm sure other pottery suppliers will offer something similar.

Second, I like the clay on the dry, stiff side. Too much water makes it dry slowly and promotes warping. Wedge it a lot if it is too wet.

Supplies you will need:

Several pieces of drywall (small enough to handle easily--18" by 24"). Tape the drywall edges with duct tape to avoid the nasty plaster interior from leaving dust everywhere.)

Rolling pin or slab roller

Trimming knife

A pattern slightly larger than the final size of tile you want. (My clay shrinks about 10%, so I make my pattern large enough to compensate for that.)

A couple of sturdy metal racks, the type you find for closet organizers (available at Target, K-Mart, or hardware stores). The racks are used for drying. An oven rack might also work. The bars need to be fairly close together to support your tiles fully. (Tip: thrift stores, junk stores, and salvage stores often have these racks for sale at a fraction of the retail cost.)

To begin, I cut approximately 1"-thick slabs off my bag of clay. Wedge the clay as needed. Then I hand-roll the slab with a sturdy rolling pin in both directions to get the approximate thickness needed. Most of my tiles are press-molded in plaster molds. If you use molds, drop your completed tile right onto a piece of drywall as it releases from the mold.

If you don't use molds, don't worry. The tile making process works the same way without molds. Just roll out your slabs directly onto a piece of sheetrock using wooden spacers or dowels under your rolling pin for the correct thickness. (I like 1/2"-thick tiles myself.)

Once you have rolled the clay slabs out, don't move them! Don't lift them or turn them or anything. (If you do move the clay, it will remember and will warp, bend, and curl during drying and firing.) Just trim the slabs in place, cutting them to the desired dimensions using your trimming knife and pattern. Remove the scrap clay around the edges and re-wedge. Allow the tiles to sit on the sheetrock for 8 to 12 hours, give or take a couple of hours. (Overnight is usually good.) The drywall will suck a lot of water out of the clay!

Now your tiles will be stiff enough to handle without flexing; test a tile and see if you can pick it up safely. At this point, trim and smooth the tiles' edges, and then place them directly onto a rigid metal storage rack. Because air circulates on all sides of the tiles,

they dry very evenly without warping. No flipping is needed. No covering is needed. No weighting or stacking is needed. Keep the tiles on the rack until they are completely dry and ready to bisque fire.

There is no need to score the backs of tiles unless you want to. This has nothing to do with the warping or drying process. It helps the tile adhesive cling to the tile and hold it to the wall or floor during installation.

In all, you should need to handle your green tiles only about three times: once to roll out and cut the clay, once to smooth the tile edges and place the tile on a drying rack, and once to put it into a kiln for your bisque firing.

I fire tiles flat on the kiln shelf both for bisque and glaze firing. I have made tiles by the thousands, big and small, and perhaps have a warped tile once in every hundred.

Other notes: While your tiles dry, avoid direct sources of warm air (like a register vent or portable heater) that might dry one area faster than another. You want nice, even drying, at top and bottom. At 55 to 60 degrees F in my studio, my tiles take about a week to fully dry with no warping. If you want to hurry the drying you may use a fan to gently circulate the air in the room; this might dry the tiles in a few days. Drying will be slower in a cool, damp environment.

I built my tile drying rack from two shelf units made of rigid metal rod. Each shelf unit measures 12" wide by 36" long. My two racks are supported side by side on a wooden framework with legs. The total drying surface from these two racks is 24" wide by 36" long. It will hold quite a few tiles. It's good to have the racks well off the ground and to allow plenty of air to circulate. Because I make lots of tiles, I bought enough racks to have several levels available to dry tiles, all supported by the wooden framework. (You could support the racks between two chairs or counters or improvise something if you don't want to build a permanent drying rack.)

Laura Reutter
Ravenstone Tiles
1633 Cherry St.
Port Townsend, WA 98368
www.ravenstonetiles.com
cedar@olypen.com

Laura, it was very kind of you to share your experience in making tiles. Thank you.

The topic of tiles takes me back to my childhood. When I was 11 years old living near Tripoli, Libya, I could see the glittering Mediterranean from where I lived. In the early mornings I would walk along the beach collecting 1/2"-square Roman tiles that occasionally washed up on the sand. They had once decorated the ancient coastal cities of Sabratha and Leptis Magna.

READER RESPONSE

Charles Hall sent a note about glass cracks: “If the crack is ‘healed,’ meaning the edges are softened, it means it cracked on the way up and then melted together at slump temperature. If the crack is sharp and distinct, it broke below fuse temperature (approx 1100 degrees F) on the way down. A crack can also be due to incompatible glasses.”

Last week’s Kiln Pointer included a letter from Don Pearse about quenching silver clay. Martha Biggar of Biggar Handwrought Jewelry in Draper, Virginia, adds more details: “Before you quench PMC or Art Clay, be sure to let the silver lose its cherry red glow. Quench in water. Also remember to NOT quench any metal clay with inclusions like natural or synthetic stones or glass. This can cause the inclusion to crack out. While stones do not have to be annealed, glass does.”

Glass Slumping

Glass slumping is the process of heating a sheet of glass until it softens enough to take the shape of a mold. Some of the most dramatic results in warm glass are achieved by slumping.

To slump a fused piece, fuse and slump in two separate firings. Fuse the glass in the first firing; slump it in the second firing.

Here are a couple of questions and answers on slumping:

Q. How do you apply kiln wash or glass separator to stainless steel molds such as a bowl? For me, it always falls off.

A. Heat the stainless steel mold to 250 degrees F in your kiln, in an oven, or with a hair blow dryer. Then spray on the glass separator using an airbrush or even an inexpensive pesticide sprayer available from a building supply store. Shake the glass separator mixture often, because the particles settle to the bottom quickly.

If you heat the mold with a hair dryer, heat from the outside while you spray on the glass separator inside the mold.

The stainless steel mold shrinks more than the glass during cooling. For this reason do not use a stainless steel mold that has vertical sides, such as a steel cup. The sides must be slanted so that the glass can move upward as the stainless steel mold shrinks during cooling. If the glass is stuck inside the mold during cooling, the glass will break.

Q. My slumped bowl cracked. How do you tell if the glass cracked while it was heating up or while it was cooling down?

A. Cracks in slumped glass almost always form as the glass heats up. A hint from Bullseye Resource Center: Do the broken glass pieces fit together?

1) If the pieces do not fit, the glass broke while the kiln was heating up. The pieces do not fit because the glass deformed (slumped) after it broke.

2) If the pieces fit perfectly, the glass broke during cooling. The pieces fit because the glass broke after it had already deformed during slumping.

READER RESPONSE

Last week's kiln pointer was "Working with Silver Clay." Don Pearse of Sunbury, Ohio shares additional pointers on firing silver clay:

"You can program a FULL rate to the specified firing temperature of the silver clay. After the prescribed hold time at that temperature, the kiln may be shut off and vented to cool quickly, or the silver may even be removed with long tongs and quenched if desired. (Wear proper protective clothing and glasses.)

"Do not fire the silver on the kiln shelf. It may leave a stain that will be picked up on glass in future firings. Fire the silver on a piece of unglazed tile. I also use a thick layer of dry kiln wash to help support curved silver pieces during firing."

Thanks, Don, for the useful silver clay pointers.

I always enjoy being with kiln users, whether they fire glass, pottery, china, or silver clay. What they all have in common is the joy of creating. Frances Darby, who founded Paragon, told me, "They are the givers of the world."

When you fire a kiln, you are pursuing ancient forms of art. The Corning Glass Museum owns glass fused pieces dating back to the ancient Romans and Egyptians. Maybe a thousand years from now, long after other signs of our civilization have disappeared, your pieces, too, will appear in a museum.

Working with Silver Clay

Silver clay looks and feels like clay and can be shaped with simple tools. Yet once it is properly fired in a kiln, it becomes real silver. The clay burns away during firing, allowing the silver particles to fuse together into a solid piece.

In 1997 I visited the Clay Pigeons, an Art Clay Silver group in Dallas, Texas. Here are my notes from that meeting. They apply to both PMC and Art Clay Silver. These are the pointers that the members shared that day:

1) Store silver clay in a small plastic bag instead of plastic food wrap. After you've used all the clay, turn the bag inside out. The thin layer of clay inside the bag will flake off. Collect the flakes and place them in a small jar with several drops of water. The clay will

turn into paste. (Plastic cling food wrap is not as good for storage as a plastic bag, because it is more difficult to remove the clay residue from the cling wrap.)

- 2) Use a plastic sheet protector, not wax paper or plastic cling wrap, to cover the clay while working with it. Place the clay inside the folder as you work. Lift the top plastic when working, and place it down when pausing.
- 3) Use a small artist's brush to apply water to the clay as the clay begins to dry out.
- 4) To carve a design into a clay piece, brush water onto the clay. Then cut the design.
- 5) Rub a little olive oil onto the hands to prevent the clay from sticking.
- 6) If the piece does not dry completely before firing, it may warp inside the kiln. Use a hair dryer to speed drying. If a flat piece curls during firing, you can straighten it with a rawhide mallet.
- 7) If you break a clay piece before it's fired, coat paste onto the break. Then fire. Or put a drop of water over the break. If the break spreads during firing, fill the fracture line with silver clay and fire again.

For more information, read "Art Clay Silver and Gold: 18 Unique Jewelry Pieces to Make in a Day:"

<http://www.paragonweb.com/BookInfo.cfm?BID=24>

Some people are astonished that clay turns to silver in a kiln. Years ago after I first heard of Art Clay Silver, I placed a freshly fired piece against a grinding wheel. Sure enough, the piece really was solid silver. It glistened where the wheel ground away the surface oxidation.

Reducing Damage to Top Firebricks

This kiln pointer is for top-loading firebrick kilns. If you have a ceramic fiber kiln (white firing chamber, no visible brick seams), you might want to skip down to the Reader Response section.

The area of a top-loading kiln that is most prone to brick damage is the top rim of sidewall firebricks. This is because people lean against the edge of the kiln to load and unload.

To reduce brick damage, cut a piece of plywood about 3" – 4" wide and shaped to fit over the edge of the kiln when the lid is open. Lean against the plywood instead of directly against the brick rim. The plywood should be curved to the shape of the kiln. The plywood will help to distribute weight evenly against several bricks instead of only one.

Close the lid gently. If your kiln has a locking support arm, be sure to fully disengage the arm before lowering the lid. Otherwise you can break the lid near the hinge.

Allow only trusted people to load or unload your kiln. They must be gentle, or your kiln will quickly show wear. Do not let your students touch your school kiln until you have given them a lesson in care of the kiln.

READER RESPONSE

The topic of the last Kiln Pointer was “The Three Stages of Learning in Glass Fusing.” (If you missed it, please visit www.paragonweb.com and click on “Support.” Then select “Kiln Pointers” from the drop menu. This is where you can look up the previous Pointers.)

Laura Mullen of Live Oak, California wrote, “Arnold, your newsletter about the learning ‘curb,’ as I call it, couldn’t have come at a better time. I’m in between the Process and the Design Stage, so today, I was pretty frustrated with so little time left to make masterpiece gifts for family.

“I don’t have the skill to make masterpieces yet. But the magic of glass is that it brings a sparkle and wonder to everyone who sees it. So, no matter what I make, my family will still be amazed at both the fusing process and the creativity it took me to make a plate or a pendant. As I improve, they’ll appreciate it even more.”

Terry of Ancon, Rep de Panama, said, “Am laughing, Arnold, for I’m in all three stages at the same time.”

Kathi Martin of Artistry Glass Studios in Tempe, Arizona wrote, “I think I am at the top of my Design Stage, but just anal enough not to have yet ventured into the Creative Stage. Will somebody PLEASE push me?!”

Julie Jurow wrote, “Thank you so much for your information about glass fusing. If one weren’t able to find a class in their neck of the woods and needed to get the basics, can you recommend a book?”

I think you will enjoy “Introduction to Glass Fusing,” by Petra Kaiser:

<http://www.paragonweb.com/BookInfo.cfm?BID=22>

(If the link doesn’t work, visit www.paragonweb.com, click on “Products,” and select “Books” from the drop menu.

By the way, if you have a moment, please let me know what you think of Paragon’s website. We have completely redesigned it.

I hope you are enjoying the beginning of a new year. Texas is unusually warm for January. I will probably not even wear a jacket as I bicycle home today.

Electrical “Noise” and Digital Kilns

The digital temperature controller on today’s electric kilns is very reliable. However, occasionally something in the environment causes a controller to display unusual error codes or erratic temperatures. Here is a list of the most common causes of these errors. This list applies to all brands of digital controllers.

PROBLEMS OUTSIDE THE KILN

If your controller begins to show error codes or erratic temperatures after you move the kiln to a different location, the source of the problem is probably outside the kiln:

A loose electrical wire at the breaker box or the wall outlet

A loose grounding wire in the electric circuit

A phone line that is grounded to the electrical system

In an industrial setting, a large motor that has lost its capacitor. (This same problem causes a radio to buzz.)

Nearby arc welders

PROBLEMS INSIDE THE KILN

A loose or corroded wire connection inside the kiln:

Connections on the transformer

Connections on the fuse holder

Connections on the relays

Connections on the controller

Loose element connectors

Thermocouple problems:

Thermocouple lead wires that are too close to an electrical wire inside the kiln switch box, causing electromagnetic interference

A thermocouple that is shorted to the kiln case (This will cause a thermocouple failure message or make the temperature reading less accurate.)

A loose thermocouple connection, either at the lead wires or ceramic connection block

A cracked lead wire under the screw in the thermocouple connection block

A damaged thermocouple tip (Reach inside the firing chamber and wiggle the thermocouple tip. If the display makes a sizable jump in temperature, or the temperature becomes erratic, replace the thermocouple.)

Thermocouple lead wires with bare insulation that touch a grounded object

Relay problems:

A chattering or buzzing relay (A normal relay makes a clicking noise. A buzzing or chattering noise, however, is a sign that a relay is about to fail. Such a relay can cause electromagnetic interference.)

A relay with a short, which drains the power from the controller

Mercury relays that do not have MOVs (electrical “noise” reducers)

A Thermocouple “Short”

Contents:

A Thermocouple “Short”

Reader Response:

 Kiln Sitter Maintenance

 Fire Safety

 A Kiln Story: Firing Moth Balls

A short in the thermocouple is rare, but you should be aware of it if you own a digital kiln.

The thermocouple is a temperature sensor used on digital kilns and on pyrometers. It is the small rod that protrudes into the firing chamber.

The thermocouple is made of two dissimilar metals joined at the tip. Amazingly, when the thermocouple tip is exposed to heat, it generates its own tiny voltage. The controller or pyrometer converts that voltage to a temperature.

Two wires (called lead wires) connect the thermocouple to the controller or pyrometer. If the lead wires touch at a bare spot where the insulation has worn off or where it has been stripped back too far, they will “short out.”

A short in the thermocouple lead wires cuts off the voltage generated at the thermocouple tip. A partial short can throw the temperature off by as much as several hundred degrees, causing the kiln to over-fire. It can also cause the temperature display to bounce.

A complete short will make the controller display room temperature no matter how hot the interior is. This, too, can over-fire the kiln.

- 1) When you replace a thermocouple, examine the lead wires for bare spots. Gently arrange the wires inside the switch box to avoid damage.
- 2) Do not twist the thermocouple inside the firing chamber. In some cases, that can cause it to short out where it goes through the kiln wall.
- 3) When you replace a thermocouple, do not enlarge the thermocouple hole in the kiln wall. That can expose the lead wires to excessive heat.

READER RESPONSE

KILN SITTER MAINTENANCE

Tony Rodriguez, a kiln technician with GSM Enterprises in San Antonio, Texas, comments on a recent Kiln Sitter article:

"Do not blow compressed air into the tube assembly from inside the kiln. This will lodge particles into the pivot area of the sensing rod. Cleaning the porcelain tube with a long Q-tip will not work.

"After every firing, remove and clean the cone supports. Hold them back-to-back up to a light to check them for warpage. Replace if they are bent. If the bend is outward away from the sensing rod, the kiln will underfire. If the bend is inward toward the sensing rod, the kiln will overfire."

FIRE SAFETY

Charlie Spitzer wrote, "Kitchen grease fires are better put out with a box of salt and/or a lid. A fire extinguisher tends to blow the burning grease all over the place causing bigger problems."

Jim Simmons wrote, "Do NOT store the extinguisher right next to the place that is likely to catch fire. If you do get a fire, you want to be able to reach the extinguisher."

Thanks, Tony, Charlie, and Jim, for your valuable pointers.

A KILN STORY: FIRING MOTHBALLS

In a previous kiln pointer Dave Coggins from Queensland, Australia, discussed firing flammable material inside kilns. Louis Katz, a potter in Corpus Christi, Texas, shares a story on a related topic:

“I had been asked to take care of reducing a friend’s kiln to produce lustered surfaces. I had read about the procedure and was in my own naive way comfortable with the idea.

“The procedure was to put mothballs into the kiln a few at a time to put it into reduction as the kiln cooled. When the kiln was below red heat, I followed the instructions. The kiln started to smoke. When the concentration of gas in the kiln reached a critical point, it exploded, pushing the door bricks out a few inches. Fortunately the kiln was small enough that there was not much force.

“The idea of heating naphthalene, a potent poison, as a fuel to reduce a kiln now seems completely foolish (not considering the explosion hazard). I would strongly recommend against it.”

Thanks, Louis. Your experience may benefit some of our readers. Paragon has always warned against using mothballs for reduction inside a kiln.

Yesterday we had one of our first cold mornings of the year. It was still dark as I rode my bicycle to Paragon, enjoying passing through the stillness of a quiet residential street. Burning wood from a fireplace smelled like incense and reminded me that we are beginning the Christmas season. I hope it is a joyous one for you.

Lessons from a Kiln Repairman “Down Under”

Dave Coggins, a friend in Queensland, Australia, kindly shares kiln stories. Each one has a lesson that you might one day remember and find useful.

LESSONS FROM A KILN REPAIRMAN “DOWN UNDER”

By Dave Coggins

Hearing your story about carbon blackening the interior of a kiln reminded me of incidents that happened to me during my kiln repair days.

I have had quite a few frantic calls from customers after flammable organic material was accidentally introduced into the kiln. When smoke started pouring out, they shut down the firing in a panic. After everything cooled off and they opened the kiln to be greeted by a sooty blackened interior, they called me saying their kiln was burned to a crisp, everything was destroyed, a total disaster!

If only they had just ignored the smoke and kept firing, there would have been no problem at all. By the time the kiln reaches red heat, all the organic materials are burned away.

There were lots of phone calls from customers about the dreaded overfiring. It didn't matter how many times I stressed that kilns should never be left unattended, especially at the end of the firing, people still completely trusted the Kiln Sitter or automatic

controller. I must say that electronic controllers were usually quite reliable; the major cause of overfirings in ceramic kilns was the failure to carry out any sort of maintenance on the Kiln Sitter.

I have seen kilns where the Kiln Sitter rod was shaped like a banana and the cone supports were almost burned away. The customer said, "It still works OK. Don't replace anything!" Needless to say, there was wailing and gnashing of teeth when the kiln overfired on the most vital load of the entire year.

The Moral - ALWAYS stick to the recommended Kiln Sitter maintenance schedule.

One of my favourite stories is about the doll artist whose kiln overfired, and when we opened the kiln, we were greeted with all the melted and flattened little doll faces peering accusingly up at us from the kiln shelf, as though they were saying, "Look what you have done to us. We're all melted!" It was like the Wicked Witch of the West melting, with just the eyes looking out, and it was really a sad and pitiful sight. But we couldn't help laughing. I wish I had taken a picture.

It's amazing how runny ceramic becomes at a high enough temperature. I saw a few meltdowns in ceramic firings where the entire load ended up as a solid 3"-thick slab on the kiln floor. Of course the kilns were complete write-offs. Many people don't realise that overheated liquid ceramic or glazes actually dissolve the firebrick used in most kilns, like hot water on honeycomb candy. Once the ceramic melts enough to run down the bricks, the kiln is usually beyond repair.

Even pottery clay can melt. When we were teaching pottery, one time a thrown pot melted completely into a bubbly mess on the shelf at stoneware temperatures. Of course none of our students owned the pot. We didn't find out who the owner was until years later when we were looking at a bit of the melted pot and saw someone's initials!

There were also meltdowns in glass kilns as well. One of my customers had a very successful business screen-printing drinking glasses with company logos for breweries, hotels, etc. He fired the printed glasses in a modified front-loading, ceramic-fibre-lined pottery kiln. He had automatic controllers to switch the kiln off, but one day one of the controllers failed and the whole load of several hundred glasses melted down to a large slab of solid glass in the bottom of the kiln. Fortunately, the glass didn't stick to the fibre too badly, so we were able to rescue the kiln by removing the slab in several pieces. But he had to explain to his customer where several hundred of their glasses had gone! After that, he had me install a back-up system to shut down the kilns in case of an overfire. You can't have too many back-up devices.

Even with the best control system, I still recommend that every kiln should be checked when it is due to shut down. We could never sleep with a kiln firing. Many times we got out of bed in the middle of the night to make sure the kiln had switched off.

I used to build a few kilns as well as repair them, and one of my good customers had two of my 7 cubic foot top loading, brick lined kilns. She used to fire pottery to high stoneware--1300 deg C or 2370 deg F--using a programmable controller. One day the controller went a bit crazy and overfired the load, soaking at maximum temperature for many hours. The result was a solid block of pottery, props and shelves.

The kiln itself wasn't in too bad condition, but we had to get the load out without further damaging the bricks. Nothing for it but to lift the whole lot in one go. You just can't imagine how heavy 7 cubic feet of pottery, props and shelves really is. I just managed to get it out, but my back has never been quite the same. We dragged the heavy lump outside, and the customer used it as a decoration in her back yard. It certainly was an unbreakable sculpture!

Many of my customers were schools and colleges. Among these were a few Art Colleges that could be relied on to destroy kilns at regular intervals with their "experimental" firings. Many foreign substances were introduced into pottery just to "see what happens," the results of which was usually a call to me to remove molten material from the brick or ceramic fibre floor or wall, or worse still, from among the elements.

Many strange items were introduced, including rocks and minerals of all types, various types of wire, and in one case a kitchen tap (faucet)--it melted! But the best of all would have to be the student who decided to make some sort of peculiar artistic ceramic statement using a bicycle. Yes, a full-sized bicycle complete with all fittings, and in quite good condition as well. She coated the entire bicycle with clay slabs held on with wire, then placed the entire mess--sorry, artistic creation--into a kiln and fired it to stoneware temperature. The kiln was a large gas trolley kiln lined with bricks, so luckily there was no damage to the kiln. But the bicycle was a different story. By all reports, the firing of the bicycle was accompanied by a considerable amount of smoke and a horrible smell. I saw the result of the firing, and it was a sad and sorry looking artistic statement as well as a waste of a perfectly good bicycle. I can now state that a bicycle frame will not melt at 1300 degrees C!

I have another story from our own painful experience. Some people approached us to test fire a new product that they were developing from recycled materials. We were very suspicious, of course, and tested small samples in a test kiln. The results were quite OK, so we agreed to do a larger quantity in our big kiln. Unfortunately we didn't allow for the fact that a large mass of the material would not heat sufficiently quickly and get enough oxygen to burn properly, and the kiln produced very large volumes of foul smelling smoke, much to the annoyance of our neighbours. Even after we shut down the kiln, it continued to smoke for several hours due to the material's own self-combustion, and as a result several very expensive kiln shelves were cracked. Needless to say, NO further experiments were carried out!

Of course, the moral of all these stories is NEVER FIRE ANY FOREIGN MATERIALS IN A CERAMIC KILN.

I have a bad story against myself as well. It was many years ago when I was learning to build and repair electric pottery kilns by re-assembling an antique front-loading brick pottery kiln for my wife. The kiln's elements were mounted in two large cast ceramic plates, one on each side of the kiln. Each plate had many grooves cast into its surface to hold the elements. The original plates were broken, and I needed to make new ones. I made a very fancy casting box to reproduce them, and purchased some castable cement.

I cast two plates and cured them slowly as per the directions. When they were dry, we fired them in our gas kiln over a 48-hour period, and the result was two beautiful cast element plates. I assembled the kiln, fitted the plates and the elements, and did a test firing. Great--the kiln worked perfectly. Another firing, this time to a higher temperature. Everything went really well until we got to about 1100 degrees C (2012 degrees F). Then some strange noises started coming from inside the kiln. Very peculiar--more noises--then the lights in the kiln room started dimming. There was obviously an electrical storm going on inside the kiln; time to shut down.

When the whole glowing mass cooled down, I discovered that large chunks of my beautiful new element plates were melted along with several of the elements. What had gone wrong? This material was rated to over 1200 degrees C--plenty of margin.

After a few enquiries the truth was revealed: The components of the castable included iron, and at that high temperature the iron in the element plates allowed electrical current to flow between the elements THROUGH the castable material. This was a large kiln, with beefy wiring, so the results would have been similar to an electric arc welder: The castable had melted and run like water!

Needless to say, the next castable material I used for the element plates had ZERO iron content, and the kiln lasted for many years' service.

Carbon on the Walls of the Kiln

THE KILN WITH A BLACKENED INTERIOR

Mary Clark, a subscriber to this newsletter, recently told me this story about her Paragon Pearl kiln:

"I thought I was firing two pieces of clear glass over a bas-relief ceramic base. However, once foul odor and smoke began to emerge from my kiln, I realized that my 'ceramic' mold was resin. When I summoned the courage to open my kiln the next day, I discovered that the interior was covered with black soot.

"I feared the worst. However, since the controller display came on when power was restored, I removed the wreckage and the kiln shelf and ran a full-fuse program with nothing in the kiln. Miraculously, all the scary black stuff disappeared. Encouraged, I ran the full-fuse program again with the blackened kiln shelf. Once again, the kiln faeries

visited and there was a 'healing.' The only remaining evidence of trauma is a bit of crispiness to the blue paint on the hinges. Thank you for making such a resilient product."

Just a reminder: Many foreign materials can deposit carbon inside your kiln. If you use the kiln for the lost wax process, do not heat the wax above 300°F/148°C.

Place the jewelry molds on a wax tray and heat the kiln to 300°F/148°C. Hold at that temperature for at least one hour. Then remove the wax tray from the kiln before going to higher temperatures. If you leave the wax inside the kiln as the temperature rises past 300°F/148°C, the wax may smoke and deposit carbon inside your kiln, causing expensive damage. Carbon on the walls of the kiln can cause electrical arcing across the heating elements.

If you ever fire something in your kiln that leaves carbon on the interior, you may be able to save your kiln as Mary did:

1 Open the vent cover(s) or leave the door ajar ½”.

2 Fire the kiln empty to 1500F / 815C at a rate of 300F / 166C with a one-hour hold (01.00).

I welcome kiln stories. They often contain lessons that will help others. To send me an email, just press "Reply."

Basic Glass Fusing with a Digital Controller

These general guidelines explain how to fuse glass in a digital kiln. You will likely need to alter the firing schedule for your kiln and brand of glass.

The basic firing schedule:

Alarm 500°F

Segment 1: rate 300°F to 750°F target temperature

Alarm 1300°F

Segment 2: rate 750°F to 1500°F target temperature

Segment 3: rate 9999°F to 900°F target temperature

Segment 4: rate 100°F to 700°F target temperature

1. Vent the kiln by propping the lid 1/2" and leaving the peephole plugs out. Press Start. Segment 1 will begin at a slow rate.

2. At 500°F, the alarm will sound as a reminder to close the lid or door from the venting position. Turn off the alarm (on most controllers, by pressing Enter). Program another alarm for 1300.

3. As the temperature rises, look at the glass through the peephole. (Always wear firing safety glasses.) When the glass has fused to your satisfaction, write down the temperature displayed on the controller. Press Skip Segment. That will take you from segment 2, which was programmed for 1500°, to segment 3.

(Note: if the glass needs more heat when segment 2 ends at 1500°, press Stop. Reprogram segment 2 to a higher temperature. Turn the kiln back on. At this point, most controllers will skip segment 1 and go right to segment 2 again. When the glass fuses, press Skip Segment.)

4. After you press Skip Segment, raise the lid or open the door 2” to flash cool the kiln. This will take a moment. Some artists prop the lid with a post during flash cooling. When the temperature display reads 900°F, close the lid/door. Insert the peephole plug and leave the lid closed until the glass cools to room temperature.

Digital Programming Explained

Most digital controllers have similar features, no matter which brand of kiln you buy. They divide the firing into sections, or segments. Each segment consists of three pieces of information: a temperature, a heating rate, and a hold time. This is entered into the controller through number keys on a keypad, or by pressing arrow keys. The heating rate is figured in degrees of temperature rise per hour. Not every segment needs a hold time (maintaining the temperature for a specified period). In that case, the hold time is not entered.

Most controllers can fire in multiple segments. Every time you need to change the heating rate, you will need an additional segment. The heating rates can be up or down to control cooling as well as heating.

In the program I used for the above firing, segment 1 takes the kiln to 750°F in 2 ½ hours. Rate is figured in degrees per hour. I divided 750 by 2.5 to come up with a rate of 300°. (If you needed to be precise about firing rate, you would subtract room temperature from 750.)

The alarm set for 500° is to alert the artist to close the lid from the venting position. The alarm on most controllers is faint. To hear it you will have to be close to the kiln. Some controllers have an external outlet that you can plug a loud electric bell into. When the alarm sounds, turn it off and program it again for 1300°, which is to alert you to go back to the kiln to watch the glass through the peephole. (1300° is only an example. Use a temperature best suited for the brand of glass you fire.)

Segment 2 speeds up the firing. When the glass fuses to your satisfaction, write down the temperature. Next time you fire that glass, program segment 2 with the shutoff temperature from this first firing.

Segment 3 is a flash cooling segment. Notice that I used a high rate. (On some controllers, 9999 automatically becomes full speed.) If I had used a slow rate, the controller would have raised the temperature again from 900°. The fast rate will prevent that.

Segment 4 keeps the glass warm through the annealing range. One of the advantages of a digital controller is that you can fuse very thick glass without spending extra time monitoring the kiln.

Conclusion

Whether you fuse glass as the ancients did, with a fire in the desert sand, or you use a digital controller, the kiln is only a tool. No matter what type of control system you use, the results, ultimately, depend solely upon your own creative judgment.

How to Prevent Glass from Cracking

Most problems in fusing are caused by rushing the firing. The glass must heat slowly during the critical temperature range of 100 – 500 degrees F.

The second critical temperature range is annealing, which is the cooling range of 950 – 750 degrees F average. Cool the glass slowly in this range so the stress in the glass will have time to dissipate.

If you become impatient after the glass has fused and you crack open the lid of the kiln for a few seconds to peek inside, you may hear a “ping,” which is the sound of glass cracking. Avoid the temptation to open the lid. Wait until the kiln has cooled to room temperature. Some artists schedule their fusing so that it is completed before they go to bed. That way they will be asleep while the glass cools and they won’t be tempted to open the lid.

After each firing, examine the shelf. Recoat if the kiln wash is chipped. When glass sticks to a bare section of the shelf, the glass cracks.

If the cracks appear along the edge lines of glass pieces that are fused together, then the cracking may be due to incompatible glass. This may happen if you fuse different brands of glass.

If the edges of cracks are rounded, then the glass probably cracked as it heated up. If the edges of cracks are sharp, then the glass probably cracked during cooling.

Type-K and Type-S Thermocouples

If you have a digital kiln, you will notice a small rod projecting into the firing chamber. It is the thermocouple, which reads the kiln temperature. Ceramic kilns use two basic types of thermocouples: Type-K or Type-S. Most kilns are equipped with the Type-K, which is less expensive than the Type-S.

The Type-K shows very little wear below 2000F. It is ideal for glass, silver clay, and low-fire ceramics.

Type-S is ideal for porcelain and stoneware. At these high temperatures, Type-S thermocouples show little wear. Some people claim that they last for years of heavy use. Type-S failure is ordinarily due to breakage rather than to wear.

Type-K and Type-S thermocouples are not interchangeable. Some controllers, such as the DTC 100, 600, 800, and 1000 series, and Sentry 3-key accept only Type-K thermocouples. The Sentry 12-key controller accepts either type, but you must select the correct thermocouple in Options. Some brands of controllers require a change in computer chip to accept the Type-S thermocouple.

If you have the wrong thermocouple type wired to the controller, the temperature will be wrong:

Type-K thermocouple wired to a controller that is adjusted for Type-S: The kiln will under-fire.

How far the kiln will under-fire depends on the temperature. The higher the temperature, the greater the error. At 75 deg. F, the controller will think the kiln has reached 100 deg. F. At 500 degrees, the controller will think the kiln is at 2000 deg. F.

Type-S thermocouple wired to a controller that is adjusted for Type-K: The kiln will over-fire. The higher the temperature, the greater the error. At 75 deg. F, the controller will think the kiln has reached 75 deg. F. At 2000 degrees, the controller will think the kiln is at only 500 deg. F.

Type-K and Type-S thermocouples each require a different type of thermocouple wires:

Type-K

Yellow wire (+ terminal)

Red wire (- terminal)

Brown or yellow outer wire insulation

Type-S

Black wire (+ terminal)

Red wire (- terminal)

Green outer wire insulation

If the controller is matched correctly with the thermocouple, you can still get an error in temperature by using the wrong thermocouple wire. However, the error is not too noticeable: 10 – 30 deg. F when the thermocouple wire is only a few feet long. The error becomes greater when the wire length increases, however.

Basic Kiln Switch Box Maintenance

There are two basic parts of a kiln: the firing chamber and the switch box. (If your kiln doesn't have a switch box, it is probably because the electrical parts are kept inside the enclosed base of the kiln. An example is the Paragon SC-2 silver clay kiln.)

When you need to remove the switch box, such as when you change elements, it is a good idea to perform the following maintenance steps. I would also do this after purchasing an older used kiln.

However, these maintenance steps are usually unnecessary for the small tabletop kilns such as the SC-2. The small jewelry kilns operate on only 120 volts, fire to relatively low temperatures, and are usually subjected to less dust than the larger studio kilns.

SWITCH BOX MAINTENANCE

1) Always disconnect the power. Then remove the switch box following the instructions in your kiln manual. If your switch box has a Kiln Sitter, pull straight out to avoid damaging the Kiln Sitter tube.

2) Unless your switch box is hinged, find something to prop it up so that it doesn't pull against the element wires. Position the switch box so that you can see inside it easily.

3) Dust can cause parts to overheat, because dust acts as an insulator. After changing the elements or thermocouple, blow dust out of the switch box using canned air. (It is available from computer or camera stores or even Wal-Mart.) Wear a facemask. Do not hold the canned air upside down, and never spray yourself. (The air gets cold enough to cause injury.) Hold the air nozzle 6" away from the parts you are spraying.

You could also use a vacuum cleaner and a dry paintbrush to clean the switch box of switch-operated kilns. But I do not recommend them for cleaning digital kilns. They can create a static charge that could damage the electronic controller.

4) Examine the wires. Use a flashlight if lighting around the kiln is dim. After decades of heat, the insulation on wires becomes brittle. Signs of aging insulation are white wires that are brownish and colored wires that are fading. When you bend wires, do you hear or feel the insulation cracking? When insulation cracks off the wires, it is also likely that strands of wire are breaking, too, which can raise the resistance and cause the wires to overheat. Replace damaged wires. Make sure the terminals are tight when installing new wires.

Do not use electrical tape to repair wiring inside a kiln switch box. When I first started working at Paragon, electrical tape was not even allowed inside the building.

5) After cleaning the switch box and checking the wires for heat damage, then check the wire terminals for tightness. If terminals seem corroded, but everything is working, I would not clean the terminals. I would leave well enough alone. (On the other hand, if a switch has stopped working, sometimes just cleaning the terminals can get it working again.)

READER RESPONSE

Last week I wrote, “Frequently plugging and unplugging heavy-amperage cords will weaken the wall outlet.” A reader asked, “Should you leave the kiln plugged in all the time?”

No. You should disconnect the power when the kiln is not in use. For large studio kilns, I recommend an electrical shutoff box in addition to a circuit breaker at the electrical panel.

The shutoff box should be positioned on the wall near the kiln, between the kiln and the door to the firing room. The shutoff box disconnects the power without having to unplug the kiln.

Reasons That a Wall Outlet Gets Hot

Years ago I smelled burning plastic near a kiln that was in operation. The wall outlet was too hot and had to be replaced. Another warning sign is a crackling noise, which indicates a loose electrical connection.

Reasons that a wall outlet becomes too hot:

- 1) A connection in the wall outlet is loose. A loose connection produces heat, because the gap inside the connection forms an arc that causes sparks.
- 2) You may have a loose connection somewhere else in the electric circuit. Heat can travel through the wires from another location in the circuit to the wall outlet. Does the breaker box feel too warm?
- 3) You may have a loose connection inside the kiln switch box. Heat from that connection may travel through the cord to the wall outlet.
- 4) Does your kiln have the original factory cord set? If you replace the cord with a smaller one, you will definitely burn up a wall outlet. The common dryer cord is

especially notorious for burning up wall outlets. Replacing the cord on a kiln voids the warranty and may void the kiln's UL Listing.

5) Is the circuit wire (the wires that run between the circuit breaker and the wall outlet) of proper size? Wire that is too small will burn up the wall outlet.

6) Do you have aluminum wire in the circuit? If so, you must use a special paste when connecting aluminum to a copper connection. I suggest replacing aluminum wire with copper.

7) Frequently plugging and unplugging heavy-ampere cords will weaken the wall outlet. When the plug is easy to insert into the outlet, the outlet is too loose. This, in turn, will produce heat in the outlet.

8) The cord should hang down loosely from the wall outlet. If the kiln is too far away and the cord is pulled to one side or the other, the cord may twist the plug in the wall outlet. This can cause the outlet to fail eventually.

How to Use Accent Gold on Silver

ACCENT GOLD FOR SILVER

Robin Cameron

Accent Gold for Silver paint is used to apply 24-carat pure gold accents to fine-silver jewelry, including pieces made from Aida Art Clay or Mitsubishi PMC silver clay. The AGS bottle contains one gramme of pure gold powder dispersed in a non-toxic water-based binder.

AGS can be applied with a small brush or a shaped tool to an already-fired silver piece. After drying, the piece is fired again to sinter the gold and bond it to the silver. After cooling, the gold can be burnished or given a matte, textured, or lustre finish.

Accent Gold is similar to Aura 22, made by Mitsubishi, except that it's 24 carat gold not 22 carat, easier to work with, and can be thinned with water instead of a special medium.

For most effects, Accent Gold is easier to use and less wasteful than gold leaf, especially on contoured surfaces where gold leaf is hard to apply without tearing it.

For more information, look at www.accentgold.co.uk. However, your dealer should be able to give you advice too.

STORING AGS

Accent Gold will last a very long time at room temperature with the top on. You can add a little water to freshen it up, but be very careful not to over-dilute it as it will be too thin

to use successfully. To minimize waste, stir it with a piece of thin wire, such as a paper clip. Always keep the bottle the right way up so that the paint settles in the bottom of the jar.

USING AGS WITH ART CLAY OR PMC

Before using AGS on Art Clay or PMC, the piece must be fired and allowed to cool. Don't touch the area where you'll apply the paint. And don't polish or burnish the surface first as a little roughness helps adhesion. Generally, apply the AGS with a small brush or a shaped tool in a reasonably smooth, thick layer, which will need firing only once. If you get it on unwanted areas, clean up very carefully with a modeling knife, returning any clean bits to the bottle. It's a good idea to keep a brush just for AGS.

Let the AGS dry. If you can see through the paint, it's not thick enough, so apply a second layer. Dry your piece naturally or in a kiln at about 200°F/95°C. Don't dry the paint too fast, such as with a hair dryer, or it may not adhere well to the silver after firing.

FIRING IN A KILN

Fire the piece on a kiln shelf. Preheat the kiln and shelf to 1650°F/900°C. Put the piece on the shelf, close the kiln door, and let the temperature return to 1650°F/900°C: no higher. Fire it for 7 minutes, remove it, and let it cool naturally. If the paint is thin, longer firing may cause discolouration, as the silver diffuses into the gold. It's OK to fire several pieces at once, although the time required for the kiln to return to 1650°F/900°C will be longer if more silver is used. If coverage of the gold is incomplete, apply more AGS in the areas where the silver is showing, dry the piece, and fire it again.

FINISHING

After firing, let the piece cool naturally. It can be polished with a burnishing tool, matted with a wire brush, or lustered by tumbling with stainless steel shot in water. If the gold layer comes off the silver piece, the firing temperature may have been too low. Add paint to the bare areas and repeat the firing process.

Robin Cameron lives in picturesque Corfe Castle, Dorset, England. He is a Paragon, Art Clay, and Accent Gold distributor, trading as Kitiki. Thank you, Robin, for generously sharing this information.

Robin Cameron / Talking Technologies / The Eye, Higher Filbank, Corfe Castle BH20 5EX England / VOX: 01929 477137
www.talking.co.uk / mail@talking.co.uk
reg: 2675608 England / vat: 538799574

READER RESPONSE: FEAR OF KILNS

In last week's kiln pointer I wrote, "People are afraid of the high temperatures inside kilns. I know of customers who wait for months to fire their new kiln. If the kiln is installed properly and you monitor the kiln during firing, there is no reason to fear it. The heat is contained safely inside the kiln."

An anonymous reader offered very good advice: “Now I don't feel so odd! I had my kiln at least six months before I got over the fear of firing. I was afraid I wouldn't program it correctly and of the high temperatures. I got over the fear by reading the manual cover to cover, highlighting the sections that pertained to my particular kiln, and just firing. I realized it's actually very user friendly and not all that complicated even when it comes to repairs.

“I recently had someone change elements and thermocouple, and I watched while it was being done. I now say – get to know everything about your kiln--how to operate and repair it (even if you have someone else do the repair). It won't be so mysterious, and you'll realize that your fear was misplaced.”

Joanna Lloyd of Woking, Surrey, England wrote, “I bought my kiln only last November and yes, it did take a few months to summon up the courage to fire up the first time. It's good to know I am not alone - even though I am over here in England.” (By the way, Woking is the home of H. G. Wells and the setting for the Martian invasion in the original “War of the Worlds.”)

Kathi Martin of Tempe, Arizona wrote, “When I got my first kiln, it sat in my classroom for a year before I ever plugged it in. The warranty had expired and there were problems - too bad for me. It wasn't a Paragon but it was a great lesson.

“Now when I sell a kiln, I preach, ‘Don't be afraid to fire it - you paid good money!’ Sometimes I give the customer a project suggestion as simple as taking two pieces of the same sheet of glass, cut 2 – 4” x 4” pieces, clean them, make sure something is protecting the shelf (paper or wash), and then I give them the exact sequence of programming their controller. Then I tell them to call me and I ‘ooh and ahh’ over their success. Now they're usually ready to go forth and fuse!

“I never forget how scary that first kiln was for me.”

Kathi is with Artistry Glass Studios, 904 N Scottsdale Rd #D, Tempe, AZ 85281 / 480-966-6167 / artistryglass.com

READER RESPONSE: CIRCUIT BREAKERS

Last week I wrote, “To reset the circuit breaker, press it all the way to the Off position before you press it back to the On position.”

Manuel R. A. Diaz Rodriguez, a kiln technician in San Antonio, Texas wrote, “Sometimes the breaker will not reset. Even new breakers can be faulty. I just replaced a breaker four times with new ones. The first three were bad from factory.”
GSM_ENT@MSN.COM

When the Circuit Breaker Trips

Your kiln should operate on its own “dedicated” electric circuit. (This is a circuit that powers only the kiln and no other appliance.) Find out which fuse or breaker controls your kiln’s circuit so that if the power to the kiln ever shuts off, you will know which fuse or breaker to check. It is a good idea to label that circuit breaker.

Wire heats when an electric current passes through it. If the same current passes through both a small wire and a large wire, the smaller will reach a higher temperature. A fuse uses this principle to protect the wiring in a building. It has a small, short wire of low melting temperature metal connected in such a manner that all current passing through the circuit must also pass through the fuse. A circuit breaker uses a tiny heating element to heat a thermostat, which interrupts the current when the maximum safe amount is reached.

FUSE BLOWS IMMEDIATELY

If the kiln blows a fuse or trips a breaker immediately, the problem is a short in the kiln wiring or circuit wiring. Do not attempt to fire until corrected.

A wire has probably shorted out inside the kiln’s switch box. Have you worked on the kiln since the last time you fired it? If so, a wire may be pinched under a screw. If you replaced an element, did you cut off the excess ends of the element that extend past the element connector? Some people bend the twisted element ends to the side instead of cut them off. The twisted ends can short out inside the switch box.

FUSE BLOWS AFTER KILN HAS FIRED FOR SOME TIME

Sometimes the fuse blows/breaker trips in the summer time because the kiln is right in front of the electrical panel. Keep the kiln at least 3’ - 4’ away from the electrical panel. Otherwise, the breakers may trip more easily on a hot day. Circuit breakers are triggered by heat, and a nearby kiln can raise the temperature of the electrical panel.

A loose connection at the fuse or breaker will generate heat. If the fuse or circuit breaker panel feels unusually warm, have your electrician check for loose connections. The circuit breaker may also be weak from age.

Fear of Kilns

Recently a friend told me that she had been afraid of her Paragon glass kiln until she began firing glass bottles. The bottles were free, so she could experiment all she wanted without worry about ruining expensive stained glass. Firing bottles took away her fear. She now enjoys glass fusing more because the fear had been a brake on her creativity.

Experiment with inexpensive materials in your kiln before investing a lot of time or supplies on new ideas. When you fire a load of ceramics, place experimental glazed

pieces on empty shelf areas. Before firing a full load of production ware, perfect single pieces.

For instance, if you are making glass pendants, fire one pendant at a time in a small test kiln such as the Paragon QuikFire. Perfect the design before you fill a larger kiln with duplicates. A small test kiln takes away the stress of firing a large kiln.

People are also afraid of the high temperatures inside kilns. I know of customers who wait for months to fire their new kiln. If the kiln is installed properly and you monitor the kiln during firing, there is no reason to fear it. The heat is contained safely inside the kiln.

Some people find digital controllers intimidating. It may be because the manual is so thick. But most of the information in the manual is for reference. For instance, the section on options contains information on advanced features that you may never use.

READER RESPONSE

Last week I sent a kiln pointer on circuit breakers and fuses. A customer wrote that her breaker shut off and would not turn back on.

To reset the circuit breaker, press it all the way to the Off position before you press it back to the On position.

When a Firing Takes Too Long

When your kiln takes too long to fire, it is not always because of worn heating elements. Low voltage can double firing time.

Electrical current in most of the United States is so reliable we take it for granted. Voltage levels rise and fall regularly, though usually not enough to matter. When it drops too low, however, problems arise.

Autry, a master electrician, described one of his experiences. In a customer's home, light bulbs kept burning out, and the air conditioner and other appliances did not operate properly. He took a voltage reading from the receptacles in their home. "There is nothing I can do to help you," he told his customer. "Your problem is low voltage."

The power company insisted that the voltage in that home was normal. Eventually, a power company supervisor met Autry at the customer's home with a voltage recorder. The supervisor recorded 190 volts for a 240 volt system. "That was the lowest voltage drop I had ever encountered," Autry said. The power company changed the transformer to raise the voltage.

Some power companies do not have enough generating capacity to correct low voltage. In those cases, changing the power transformer won't help. A maintenance supervisor of a school called us because his Paragon kilns were not reaching firing temperature. Voltage was low. Yet the kilns were the least of his problems. "What I'm worried about are the

motors that keep burning up around here," he said. His local power company did not have enough generators to raise voltage.

Voltage commonly drops during periods of heavy electrical demand, such as summer. In Dallas, voltage drops during summer days between 4:30 and 8:30 p.m. This is when people come home from work and turn on air conditioners. During these hours, voltage can drop from 240 to as low as 190.

Utility companies kick in extra generators during peak periods to raise voltage. To help further, some high rise buildings cut back air conditioning during summertime peak demand. Air conditioners in the building are timed to turn on in rotation. One will stay on for, say, fifteen minutes while the others are shut down. When that one shuts off, another will turn on. This keeps the temperature at a tolerable level throughout the building.

Making Useful Objects from Glaze Tests

Instead of making glaze test samples on throwaway clay scraps, create something useful. For instance, make glaze tests on clay disks that include a hole for a chain and a rubber-stamped design on the front. Give them away or sell them as pendants. What you consider glaze imperfections or ugly test colors may be beautiful jewelry to others.

The following story by Kathy Rhoades reminds me of a message in a bottle washed up on the beach. Kathy has sent out thousands of clay messages on coin-size disks. Her story may give you ideas for other ways to use glaze test samples. In the distant future people may hunt for her fingerprint disks the way collectors look for arrowheads.

Twenty-Five Thousand Clay Thumbprints

By Kathy Rhoades

Strattanville, Pennsylvania

While attending the University of New Mexico 13 years ago, I began to record my thumbprint in small, coin-size porcelain clay pieces. I fired them to cone 9 and stained them at bisque to enhance the marks. I made 25,000 thumbprint disks while sitting in front of the TV at night so I could be with my family. It reminded me of my grandmother stitching quilts.

I gave the thumbprints away at exhibits. People carried them in their pockets like worry stones. One student even rubbed the coin during his review. Several students sent their extras to family back home in other states.

I started leaving them all over campus, just to see what would happen. I left them near entrances to buildings, near a pond, and on sidewalks. They began to move and have a life of their own. I found them circling a tree or arranged on the lawn as a smiley face. I noticed them in offices on campus.

Later I included my email address on the back of the thumbprints. On a trip from New Mexico to Pennsylvania, I left piles of them at stopping places. By the time I reached Pennsylvania, I had emails from people who had found the thumbprints: from a teacher in Kansas who had stopped at the Dairy Queen with her children; from a woman and her husband heading home to Washington State from Texas who had stopped on the New Mexico-Colorado border for a break. One lady wrote, "Just wanted you to know that some people do look for signs of life." People were excited to participate and receive emails from me as well.

I now have clay thumbprints all over the world. People dropped them off on their travels for me, coast to coast in the USA, Japan, Mexico, England, and Italy. Connecting with people through the thumbprints has made the world smaller for me.

I shared the clay thumbprint idea with a fifth-grade class as a way to introduce the next generation to a war memorial that the school had built. The memorial recognized past and present soldiers, but not future soldiers. Every year new fifth-grade classes leave their clay thumbprints around the rocks at the memorial with a little ceremony.

Kathy's Background

I graduated from the University of New Mexico in 1999 with an MFA in Sculpture and a concentration in ceramics under Gina Bobrowski and Bill Gilbert. I received my BFA from Clarion University of Pennsylvania with a double concentration in painting and ceramics in 1995.

My sculptural work is often figurative, either literally or metaphorically. I was heavily influenced by the New Mexico landscape so my surfaces are usually dry, slips stains, engobes. Because of where I am in my life at the moment, I am working more on the wheel with some hand-building thrown in, making functional ware, working with stoneware in the cone 6 range.

READER RESPONSE

Two weeks ago I sent a Kiln Pointer on supporting silver clay with a carved firebrick. Rebecca Skeels of Farnham, UK wrote, "Just a small point about the cutting bricks idea: I recommend that people wear a dust mask."

Rebecca has been a jeweler for 11 years and has been firing PMC (Precious Metals Clay) since it first arrived in the UK. She teaches PMC and enameling and works at the University College for the Creative Arts in Farnham. "If you're ever over here," Rebecca added, "Farnham is the place to visit, especially as there is a big ceramic conference next year here. And we do have ceramic, glass, and jewellery kilns. It'll be like home from home!" Thanks, Rebecca, for the safety reminder and the invitation.

Making a Clay Handprint Key Chain

Last week's Kiln Pointer included a story by Kathy Rhoades on how she made 25,000 coin-size thumbprints in clay. She has scattered them all over the world.

After reading about Kathy's thumbprints, Dawn Christensen wrote to me about a handprint key chain that she made for her daughter. I have included instructions below. If you don't work with clay, you can make similar key chains from other materials, such as clay silver.

By Dawn Christensen

Menomonee Falls, Wisconsin

As a middle school art teacher I am always exploring self-portrait ideas. I recently became a grandmother and put my grandson's feet and handprints in clay. It has become my daughter's favorite key chain and is a form of child identity should we ever need it.

Here are directions for a baby footprint or handprint with variations for bead fingerprints. This works better if you have someone to help.

- 1) Roll a soft freshly wedged piece of clay on canvas between two – 1/4"-thick cedar slabs. For thinner slabs use two paint-stirring sticks. As you roll out the clay, rotate and flip the slab to prevent curling during drying.
- 2) Make sure baby's hands and feet are free of lotion so the clay does not resist glaze at firing. Press the feet firmly into the clay (6 inches apart if doing pairs).
- 3) Trim around the hand or footprint in any desired shape with a fettling knife.
- 4) You can make a hole for a key chain using a straw about 1/4 inch from the edge of the clay.
- 5) Place the clay on a small piece of construction drywall (also called sheetrock) for even, slow drying.
- 6) Fire to bisque. (I use 04 clay.)
- 7) Glaze or stain as desired. I like to wipe the glaze so it stays in the indents of the prints.

Bead variation

When I did this the first time at three months, my grandson would not unclench his fist, so I made rectangular beads out of his thumb and fingerprints.

- 1) Using a small amount of clay, shape 5 ovals or rectangles. Run a nail or wooden skewer through shapes and keep it there. You can also use spaghetti noodles. They burn out during firing and help keep the holes open while you impress the fingerprint.
- 2) Gently press each finger tip dry.
- 3) Fire to 04 on a bead tree.
- 4) Glaze or stain as desired. The beads can be strung on five separate macramé cords at various heights, knotting above and below to keep the beads in place.

READER RESPONSE

(Last week's Reader Response included a letter from Farnham, UK.)

Eddi Reid of Powell, Ohio wrote, "I love Kathy's idea of leaving messages as unexpected gifts. As I write this, ideas are rushing through my mind on how to leave little pieces of gorgeous glass for others to find. I work with fused glass, but all the talk of ceramics has me itching to expand. Thank you to everyone who shares their enthusiasm and talents through your newsletter.

"And then an email from Farnham, where I lived for a while," Eddi added. "Farnham is a lovely old place, full of history, and the college is famous for its arts programme. It is not far from London along the M3. Get off at Junction 5 and have a wonderful visit."

An Ancient Ceramics Lesson

An Ancient Lesson in Ceramics
By Arnold Howard

Ceramics is one of the world's oldest arts. I learned how special it is when I was 12 years old living in Tripoli, Libya on the Mediterranean coast.

During our three-year stay in Tripoli, my family visited the ruins of Leptis Magna, an ancient Roman coastal city in the Libyan Desert. The city is like a mirage rising from the past surrounded by vast stretches of emptiness.

I can remember the day as clearly as if it were yesterday. It was a quiet, sunny afternoon when we strolled through the streets of Leptis Magna. We stepped over the ruts that chariots had worn into the cobblestones. We walked past stone pillars, which had collapsed and were scattered across the sand. Statues of Roman athletes and statesmen, once covered with sand, stared vacantly at us with their hollow eyes, just as they had long ago.

From a hill, I looked past the great field of ruined, silent buildings, to the dark blue Mediterranean in the distance. We walked through the ruins and made our way to the beach.

Scattered on the sandy beach were half-inch square stone tiles and broken pieces of pottery. Bits of pottery jutted from the sand where the waves gently washed over them.

I recognized the stone tile squares from the beach near my house, about half a day's drive from Leptis Magna. The tiles came in black or white stone. I had collected a handful of the tiles that had washed up on the beach in the mornings. Here at Leptis Magna they were scattered about plentifully, a remnant of mosaic flooring from the Roman buildings.

Among the shards of cups and pots, I found a ceramic bowl about 3" in diameter and 2" high, made of reddish-brown clay. It was unglazed and, except for a few small chips on the rim and around the base, in perfect condition. I picked it up. Impressed into the base was a handprint. Inside the bowl were impressions of several fingerprints. The fine lines showed clearly. That the delicate impression of a human hand remained after two thousand years astonished me. I visualized an ancient potter holding the bowl in his palm while the clay was still wet. Cupping the bowl in my hands brought history to life.

Over forty years have passed since that visit to Leptis Magna. Thinking of it reminds me of how special, even magical, ceramics is. The heat of an ancient kiln had given that little bowl the strength to survive the centuries, buried in the desert. And centuries from now, ceramic pieces will be among the few relics of our civilization. Plastic, metal and wood will have disintegrated.

PROJECT IDEAS FOR CERAMICS TEACHERS

Tell your students that by making ceramics, they are continuing a tradition thousands of years old. By teaching ceramics, you have the opportunity to bring history to life for your students.

- 1) Bring photos of ancient pottery to class. Have your students make pots using the styles of ancient Greece, Rome, or Egypt.
- 2) Schedule your ancient pottery class to coincide with the study of ancient Rome, Greece, or Egypt in World History class. The World History teachers could help with your research into ancient pottery styles.
- 3) Have students tell a story by impressing images into the leather-hard clay.
- 4) Research ancient glaze formulas, and have your students replicate those glazes using a small test kiln.
- 5) Have your school's Latin club translate student poetry. Decorate Roman-style pots with Latin.

- 6) Take your art class on a field trip to a museum that displays ancient pottery.
- 7) Make a pottery time capsule. Bury students' work where it might be found far into the future.

As a boy wandering through Roman ruins, I learned to appreciate ceramics. Your students can learn the same appreciation right in your own school. More important than discovering rare pieces is for your students to make ceramics themselves.

Making Gifts with Your Kiln

A few weeks ago I made my wife, Sandi, an Art Clay Silver medallion for her birthday. I squeezed the clay from a syringe into the shape of a heart. When the clay dried it was too hard to carve, so I sprinkled several drops of water onto it. Half an hour later when the clay was softer, I carved a message with a bent paperclip onto the front and back.

I placed the medallion into a Paragon SC-2 kiln, programmed a full rate to 1600 degrees F with a 10-minute hold, pressed Start, and walked away. After the kiln had cooled to 800 degrees F, I turned it off and removed the medallion with a long putty knife. Then I held the knife and medallion under a water faucet. A few seconds later it was cool enough to touch.

The silver was covered with a white coating, which took a couple of minutes to scrub off with a small wire brush. The crude little heart that I squeezed out of a syringe was no longer clay. Now it glistened.

We were sitting around a table at a surprise birthday party when Sandi opened the card that contained the medallion. When she saw it, she was stunned. Sandi's sister Audra, who was sitting next to her, looked over at the medallion. Audra cried when she held it. Sandi came over and hugged and kissed me. Then she passed the medallion around the table. Her uncle Mark leaned over to me and whispered in mock seriousness, "Why did you make that for her? Now they're going to expect it from the rest of us men!"

I was surprised that the hand-made gift of a silver heart had such a profound impact. We underestimate how special are the things we make from a wad of clay or slivers of glass.

With a little creativity, you can make gifts with your kiln that your loved ones will always remember. Suggestions:

- 1) The most personal gifts are jewelry, which you can make with silver clay, copper enameling, glass fusing, ceramics, stoneware, or porcelain.
- 2) Inscribe a personal message into the piece. This is easy to do with clay, whether it is silver or ceramics. You could also paint a message onto porcelain or glass. You could even emboss a message into hot glass if you had the right tools.

3) The gift does not have to be exquisitely designed. Far more important is that you made it yourself.

4) When you test ceramic glazes, do not use throwaway tiles. Instead, make dozens of small medallions that you can give to friends. Some of those test glazes will be stunning. Even the “ugly” ones can look beautiful on a medallion.

READER RESPONSE

Last week I wrote, “Cutting glass: Memorize the sound of a glasscutter in the hands of an expert, and duplicate that sound when you cut glass. Press the cutter in such a way that the sound is steady and even. To master a glasscutter, listen to the sound it makes.”

Linda of the Ohno Organization wrote, “I learned how to shift my motorcycle at the right time by the sound I had memorized in my mind. Sound is spiritual.”

Charlie Spitzer of Cave Creek, Arizona wrote, “The sound of a glass cutter is the same as long as you're using the same type and color of glass. When you switch to a different color or manufacturer, the sound is different because the glass may be harder/softer/more or less brittle, etc. Some glasses actually have NO sound when cut correctly.”

Linda and Charlie, thanks for your special insights. I look forward to hearing from more readers. Just hit “Reply” to send a message.

Paragon’s CEO John Hohenshelt and I returned this week from the National Council for Education on the Ceramic Arts annual convention in Portland, Oregon. It is exhilarating to be with creative people for days on end. However, my favorite moment was arriving home early Saturday morning after flying the “red eye” and dropping into a deep, joyous sleep.

Important Small Pointers

We usually make things too complicated, especially when we’re new at something. I realized this recently while talking to a friend about his job at UPS.

He told me that he parked 18-wheeler trucks. He backed them into tightly spaced loading bays during the night shift.

“That takes a lot of skill,” I said. “Backing up those trailers must hard. It would be embarrassing to ram into another trailer, wouldn’t it?”

“Yeah, but it’s easy,” he said. “All I have to do is line up the trailer with the line on the pavement. Just watch the line, and the trailer goes right in. There’s nothing to it.”

By paying attention to one small detail, he mastered a complex task. This idea applies to mastering almost anything. Find the one small detail that makes the biggest difference, and master that detail. Usually, the detail is simple. Here are examples:

- 1) Kiln wash: Apply three thin coats of kiln wash instead of one thick coat.
- 2) Cutting glass: Memorize the sound of a glasscutter in the hands of an expert, and duplicate that sound when you cut glass. Press the cutter in such a way that the sound is steady and even. To master a glasscutter, listen to the sound it makes.
- 3) Loading ceramics into a kiln: Sort ceramic ware by height before you place anything inside the kiln.

How to Make Firebricks Last

CONTENTS

- 1) How to Make Firebricks Last
- 2) Reader Response: estimating the cost of firing a kiln
- 3) Book Review by Charles Moore on “Clay: A Studio Handbook,” by Vince Pitelka

Let me know if you like book reviews or would like to write them.

1) HOW TO MAKE FIREBRICKS LAST

I have seen 10-year-old kilns with firebricks still in pristine condition and one-year-old kilns that looked like they had been dropped from a roof. You can tell at a glance when a kiln has been cared for. Please follow these guidelines to make your kiln last:

Vacuum the kiln interior regularly using the brush nozzle of a vacuum cleaner. Be gentle when you touch the firebricks with the nozzle.

Apply kiln wash to the kiln’s firebrick bottom. But keep kiln wash away from the walls and elements. (In a glass kiln, you could also use glass separator to coat the bottom.)

If possible, do not fire moist greenware. It should be bone-dry and warm to the touch. If you must fire moist ware, wait until all signs of vapor have disappeared before heating past 200 degrees F. The moisture at higher temperatures is not good for the firebricks and can cause the ware to explode.

Do not lean too heavily against the firebrick walls while loading and unloading. Some people use a small stepladder to reach into a deep kiln. You can also cut a piece of plywood to fit across the wall that helps protect the wall during loading.

Lower the kiln lid (or close the kiln door) gently. Slamming the lid can crack the lid the first time it happens. Fully disengage the lid support before lowering the lid. Forcing the lid downward can break the bricks near the lid hinge. From time to time, check the condition of the lid support and lid handle.

Keep the lid closed when you are not using the kiln. This keeps dust out and prevents the lid from dropping while you are away. Do not store anything inside the kiln.

The kiln stand should be level and rock-steady. An unlevel stand can stress the firebricks. A stand that rocks can cause the kiln to move when jarred, knocking over ware against the sidewalls inside the kiln.

During loading and unloading, do not touch the sidewalls of the kiln with anything. Do not allow a shelf to bump into the firebricks. The extra time and care you spend loading and unloading may add years of life to your kiln.

If glaze, glass, or other materials drip onto a kiln wall or the kiln bottom, repair before the next firing. Otherwise these materials will remelt and embed deeper into the firebricks. Remove the contaminant by scraping gently with a putty knife. If you remove kiln wash from the kiln bottom, apply a fresh coat to the bare spot.

Do not be concerned about small cracks that appear in the firebricks. The cracks are normal and act as expansion joints. During firing, they close tightly.

2) READER RESPONSE

Nuala in Ireland wrote, "Thank you, Arnold, for explaining how much the firing costs! I have been trying to get this information from our national electricity supplier here in Ireland but have never managed to get a satisfactory answer. They would shoot back at me, 'Are you single-phase or 3-phase?'"

"'C'mon guys, you're my supplier. Surely you should have that info on your records.'

"Response: 'Well, no, actually we don't have that info on record. Where do you live again?'"

"At this stage," wrote Nuala, "I'm just about foaming at the mouth with frustration, so I am grateful to you for giving me the where-with-all to work out the electric costs on firing!"

Kathi Martin of Artistry Glass Studios in Chandler, Arizona, USA wrote, "You know, I had my local utility company rep do an energy audit for our business a few years back. I think it cost me about \$120.

"At the time, I gave her information on my Paragon GL-24ADTSD (top-side-door elements with ceramic top). My programs included all the cooling time after the firing was complete, so it registered from when the kiln shut down at 700 degrees to when it reached room temp. That usually was about 15 hours. That's what I gave her--15 hours of firing time. She used firing time, kiln amps, and the kw cost and told me it cost \$13.00 to fire that big bad boy. I was amazed! Only \$13.00!

"Then I realized that the elements are really on for only about half that time since the cooling doesn't pull power. Now we're down to \$6.50 for a full-fuse cycle at commercial electrical rates.

"That single piece of information has sold more big kilns for me than any beautiful piece of glass art in my studio. I recouped my \$120 in the first big kiln sale."

3) BOOK REVIEW

From "Greenware," the publication of the Orchard Valley Ceramic Arts Guild

By Charles Moore
Sacramento, California USA

You can see this book at Paragon's website:

<http://www.paragonweb.com/BookInfo.cfm?BID=12>

(Go to www.paragonweb.com, click on Products, then Books & Videos from the drop menu.)

As soon as Vince Pitelka's book was published, I bought a copy and began to use it--not just read it, but use it. "Clay: A Studio Handbook" became for me a major reference. I am glad that I have waited to review Pitelka's work; I have had a chance to live with it and learn by following his advice.

"Clay: A Studio Handbook" is perhaps the most comprehensive book on clay work that I have encountered. In addition to the scope of the book, I would note clarity in writing and in explanation of principles, ample illustrations, a concern for safety in the clay studio, and a straightforward presentation.

The ten major chapters: Clay and Claybodies; Handbuilding; Throwing; Plaster Working, Mold Making, and Slip Casting; Surface Decoration on Greenware; Glazes and Glazing; Kilns and Firing; Mixed Media in Ceramics; Studio Design, Setup, and Operation (including marketing, photography, and exhibiting).

Within each chapter are numerous sub-sections. Because of the scope and thoroughness of the text, I can only hope to sample bits here and there to give a reader a sense for what Pitelka presents. Chapter 2, Handbuilding, for example contains matter Wedging the

Clay, Handbuilding: General Guidelines and suggestions, Making Pinch forms, Coil Construction, Slab Construction. Other chapters offer a much greater number of sub-sections. The book also contains a most thorough alphabetical index.

Each time I return to the book, I find something that I had missed before. For example, Pitelka presents a paragraph on “Grinding-In” Your Lids. This grinding-in is done when the pot and lid are bone dry: “To accomplish this, hold the pot sideways vertically (with its mouth facing the side) cradled in one hand, and place your other hand flat against the lid with your fingers spread on either side of the handle. Put the lid in place against the pot, and gently rotate it back and forth against its seat several times...rotate it 90 degrees or so, turn it back sideways, rotate the lid back and forth against its seat, turn the pot upright, lift the lid and rotate it 90 degrees. Repeat the procedure until you are satisfied with the fit of the lid” (p. 69). I wish I had known this technique when I recently made a small casserole that had top that would fit only if placed in one position. Note the careful detail of Pitelka’s description of “grinding-in.”

Early in the book, Pitelka uses a series of twelve photographs to show opening clay on the wheel and basic pulling (p. 47). Then he follows with nine photographs showing in cross sections how the clay would look at each step in the pulling and shaping of a vessel (p. 48). Nothing else could be clearer.

In a section on “Vessel Proportions,” Pitelka says, “Vessel proportions vary widely, and unless you are seeking a low spherical shape, these particular forms often look best when the height is at least 1 ½ times the maximum diameter. Also a mix of straight and curved profiles can work very well. For example, the walls might rise straight up six inches from a six-inch diameter base, and then taper inward and flare back outward to a five-inch-diameter rim” (p. 62).

Pitelka continues exploring other pleasing proportional variations. Though he is not dictatorial, he offers some valuable advice on proportion. He follows with a section on “Necking In a Vessel” (pp. 63-64). This section is too lengthy for me to repeat, but it is interesting that he presents careful written description of the necking in process and makes reference to a series of photographs.

In a series of line drawings, Pitelka presents “Types of Lid and Galleries” (p. 70). Again, nothing could be clearer.

Pitelka’s work on “Glazes and Glazing” (pp. 120-159) is thorough without being overwhelming. Though I like to think that I am well acquainted with glaze work, here and there Pitelka teaches me something new. A simple example occurs in the sub-section on “Opacifiers”: “Bone Ash--Calcium phosphate—can give an opalescent satin gloss surface, as microscopic globules of phosphorus remain suspended in the glaze.” p. 146)

In another sub-section, “Firing Clay: Chemical and Physical Changes,” I find useful information about what occurs at different temperatures in the firing. Briefly, I will extract some sample temperatures that Pitelka discusses at length: “Around 400°F all free

water has evaporated from the work, but chemically combined water is still present. Around 451°F organic materials begin to combust (oxidize). Around 900°F sintering begins.” (pp. 73-174) Though Pitelka continues to present the changes that occur as the temperature rises, this sample is, I think, sufficient to illustrate Pitelka’s vast knowledge of heatwork in the kiln.

A few months ago I bought an updraft kiln. I turned to Pitelka’s “Controlling and Correcting Temperature and Atmosphere in an Updraft Kiln” (pp. 180-181). He carefully explains how the damper at the top of the kiln serves to reduce the atmosphere and to even out the temperature from top to bottom. A page later, he presents “Watching the Flame Shape”: “In both updraft and downdraft gas kilns, the shape of the flame entering the burner port can tell you a lot. If the flame tapers rapidly at the burner tip, there is probably too much secondary air, reducing heatwork. If the flame seems to expand and fill the port but there is not reduction, then you have an efficient neutral atmosphere. If the flame spreads out in lazy waves with flickers of yellow, it is getting inadequate secondary air, unless your intention is a reduction atmosphere” (p. 182). I have not found this valuable information elsewhere.

Chapter 9 is entitled “Studio Safety and Sensible Studio Practice” (pp. 246-255). Pitelka begins by presenting a “Studio Safety Checklist.” This chapter is a “must read” for any studio potter.

When I remodeled my studio recently, I picked up many suggestions from Chapter 10—“Studio Design, Setup, and Operation.” Perhaps the most valuable for me was the subsection on “Ware Storage.” Pitelka says, “I suppose there is not such thing as a studio with too much shelving, but one does not want to sacrifice space needed for other purposes. My favorite solution is to equip the studio with plenty of ware carts. Rather than viewing them as a device for efficiently moving wares from one place to another, think of ware carts as movable shelving” (p. 259). Following his advice, I have no fixed shelving, but use a series of ware carts of different sizes. One of them has a plastic cover, which serves as a damp room. I have even mounted my slab roller on large, lockable casters. I owe Vince real thanks for this advice; my studio is almost completely flexible.

In the appendices at the back of the book, Pitelka presents an extensive and useful “Glossary of [Ceramic] Terms” (p. 316-339) and a “Glossary of Ceramic Raw Materials” (pp. 340-347). Again, his definitions are clear; he has a highly developed sense of reading audience.

Finally, I want to finish this review with a philosophical note from Pitelka: “One of the most valuable aphorisms in ceramics is ‘Don’t bond with a piece until it comes out of the glaze firing’” (p. 136).

Clearly, I am pleased to own Pitelka’s "Clay: A Studio Handbook," and I recommend it to anyone who is serious about clay work.

Thanks, Nuala and Kathi, for the letters. It was great to hear from you. I appreciate the book review, Charles.

John Hohenshelt and I will be at the NCECA pottery tradeshow in Portland, Oregon March 8 – 10, 2006. If you are attending, please stop by the Paragon booth #628. I would enjoy meeting you.

When a Downdraft Vent Does Not Remove All Fumes

A downdraft vent comes in several brands. It is used on ceramic and glass kilns to prevent fumes from escaping the kiln into the firing room.

The downdraft vent removes just enough air to create negative pressure inside the kiln. This prevents fumes from leaking out. On most kilns the vent is positioned between the kiln bottom and kiln stand. (The fan on the new Orton Vent Master mounts away from the kiln.)

If you can still detect odors during vent operation, check the following:

- 1) Make sure you can hear the fan spinning. This is basic but easy to overlook in a busy studio.
- 2) The holes that draw air out of the kiln must be free of obstructions. If the exit air holes are in the bottom of your kiln, the bottom shelf should be positioned 1” above the kiln floor. The shelf must not block the holes.
- 3) The intake and exit vent holes must be of the correct number, size, and location in your kiln. See the vent instruction manual to be sure, or call the manufacturer. (Orton downdraft vents: 614-895-2663.) The vent housing must cover the air exit holes. Otherwise hot particles can fall onto the floor from inside the kiln.
- 4) Insert all the peephole plugs and keep the lid/door fully closed throughout the firing.
- 5) Check the vent duct for leaks.
- 6) Make sure the duct is free of obstructions and that the vent flapper on the outside of the building can open freely. Go outside. You should feel warm air coming out of the vent.
- 7) If you fire ware that contains many impurities, you may need to fire smaller loads.

If you still smell fumes after checking the 7 points above, you may need to drill another air exit hole in the kiln.

Reminding Yourself That the Kiln is Firing

As I've mentioned in other kiln pointers, Paragon recommends that you monitor your kiln during firing. In most situations this doesn't mean constantly watching the kiln. You are undoubtedly too busy for that. But you should check the kiln occasionally. Monitor the kiln more frequently as it approaches the shut-off time.

If you are like most people, it is easy to forget that the kiln is firing. Some people use a wind-up electric timer as a reminder to check the kiln. The method that I prefer is the countdown timer on my digital watch.

To check your kiln every hour, for instance, adjust the countdown timer for 60 minutes. After the alarm goes off, press the stop button. To begin the timer again, press the reset button; then press start. The timer will begin counting down 60 minutes again. It is that simple. You can also easily change the number of minutes that count down.

When I buy a digital watch, I make sure it has a countdown timer. Almost all digital watches have an elapsed timer (the type that counts minutes/seconds like a stop watch), but many don't have a countdown timer.

There are also situations where you should constantly monitor the kiln. For example, watch the Paragon QuikFire throughout the firing. It reaches 1000 degrees F in less than 5 minutes and can easily overfire glass. One time I answered the phone while the QuikFire was on. I returned a moment later, and the glass pendant inside the kiln was a melted puddle.

Another example is enameling. Once the kiln reaches 1450 degrees F, insert the piece. Watch it every 15 seconds. When it appears rosy red and the enamel is smooth, turn off the kiln and remove the piece with an enameling fork. Insert the next piece and turn the kiln back on.

A Basic Guide to Firing Ceramics

Even if you have never fired ceramics before, you should get good results by following these 10 guidelines and reading your kiln instruction manual.

1) Dry the greenware thoroughly before firing. Place the ware against the inside of your wrist. The ware should feel warm. Drying the greenware before firing will eliminate explosions caused by moisture in the clay turning to steam.

2) Know the cone number for each clay and glaze, and fire to the correct cone. Correctly label clays in storage.

3) Do not mix clays rated to different cone numbers. Firing ware of different clays in the same load can result in melted clay running on the shelves. (Example: Do not fire stoneware and low fire ware together.)

- 4) Place pyrometric self-supporting witness cones on the shelf. The cones are inexpensive, take only a moment to use, and verify that the clay and glazes received the correct amount of heat work.
- 5) Keep shelves and ware at least 1" away from the thermocouple or Kiln Sitter tube. Ware or shelves placed too close to the thermocouple can cause inaccurate readings. Items placed too close to the Kiln Sitter can cause an overfire by preventing the rod from dropping.
- 6) Vent the firing chamber during the initial stage of firing. Either prop the lid or use a down-draft kiln vent.
- 7) Fire slowly enough to burn out impurities from the clay. Most firing problems are caused by either a poor fit between clay and glaze or firing too fast.
- 8) Monitor the kiln during firing. Occasionally check the kiln, especially near the end of the firing.
- 9) Become familiar with the color around the lid and with the noises that a kiln makes during firing. You can tell approximately what temperature the kiln has reached by the color of light around the lid. A kiln's noises, like engine noises, can warn when something is wrong.
- 10) Keep firing records. Write down what you learn from each firing.

The Bending of a Pyrometric Witness Cone

Pyrometric cones measure heat work in ceramic kilns. The cones are small pyramids of clay and mineral oxide that soften and bend when exposed to heat. Twenty years ago glass artists used cones too. Now most of them use digital controllers.

Standard large cones must be mounted in a clay or wire plaque with 2" of the cone exposed above the cone holder. Self-supporting cones stand upright without holders. We recommend self-supporting cones. They are easier to use than standard large cones.

The standard large cone, when fired to maturity, bends straight down toward the kiln shelf. This is called the 6 o'clock position. It is okay if the tip of the cone touches the kiln shelf.

On the other hand, the self-supporting cone, when fired to maturity, bends downward until the tip is even with the top of the base. If the self-supporting cone tip touches the kiln shelf, the cone is over-fired by a few degrees.

Preventing New Sidewall Elements from Bulging Out of the Brick Grooves

This pointer is for firebrick kilns with sidewall elements. It does not apply to ceramic fiber kilns. (You will see heating element grooves and brick seams inside a firebrick kiln. Most ceramic fiber kilns have embedded elements that do not use grooves.)

If your kiln is new or you have just installed a new element, perform the “Kitchen Knife Test.” Do not perform this test if the element has been fired. Always unplug the kiln before touching an element with anything.

THE KITCHEN KNIFE TEST: FIREBRICK KILNS WITH SIDEWALL ELEMENTS

Press the elements into their grooves by running a blunt kitchen knife, plastic comb, or similar blunt object completely around each groove. Do this before the first firing, because it may not be evident to the eye whether the coil is in its groove. If the element doesn't lie flat in the bottom of its groove, you needn't be concerned as long as the element fits all the way back into each corner and doesn't bulge outside the groove.

FIRING THE KILN TO CONE 05

When the kiln is fired to cone 05 or hotter (1888 degrees F or hotter), the elements soften to the point where they no longer support their own weight. If they are inside the grooves, they will conform to the shape of the grooves. Occasionally firing to cone 05 or hotter will help prevent the elements from bulging out of the grooves.

A Simple Heating Element Repair

Ordinarily the only way to repair a burned-out element is to replace it. The exception: When an element burns out at the connector, you may be able to install a new connector and salvage the element.

Elements rarely burn out at the connector. This type of failure is due to a loose connection, which builds up enough heat in the connector to break the element wire. This is why it is important to securely tighten element connectors when replacing an element.

The following instructions are for Paragon kilns, which use barrel connectors. If your kiln uses a different type of connector, the basic principle still applies.

You have a burned-out element. To replace the element or connector, disconnect the kiln and remove the switch box (control panel) from the kiln. You will see two element connectors for each element in your kiln.

If the element has burned at the connector, you will usually see a bare, twisted section of element with a missing connector. This is because the element connector falls off the broken element end.

Does the burned element end have enough length so that you can install another element connector? (With Paragon's barrel connector, you will need about 1/2" of element length

to install another connector.) If not, gently pull the element end with needle-nose pliers. There is sometimes play in the element. If so, you will feel the play as you pull the element end toward you.

If you have 1/2" of exposed length at the element end, you can install a new element connector and salvage the element. Please do not remove the porcelain insulator located under the element. (Not all kilns have porcelain insulators, by the way.) Removing the insulator will give you extra element length, but the insulator is there to prevent the element from shorting out against the kiln case.

Check the element lead wire for heat damage by bending the wire. If the insulation is brittle, replace the wire.

Wishing you a great summer

The Downdraft Vent

A few weeks ago I sent a kiln pointer on the downdraft kiln vent. (I have copied some of my message below.)

Tony Rodriguez, a kiln technician in San Antonio, Texas, kindly sent the following pointers:

"The lid air intake holes in top-loading kilns should be drilled close to the walls of the kiln to prevent thermo-shocking the ware. Position the holes in the lid so that they are 1/2" to 1" at most from the edge of the firebrick walls. This will allow the elements in the walls to heat the colder air that comes in through the vent holes.

"You say that you can mix glazed ware and greenware on the same shelf in the kiln. This is misleading as not all glazes are fired to cone 04--only specialty glazes such as metallics. There must be a two-cone difference between bisque and glaze firing for good body fit. Otherwise the glaze can separate from the bisque and peel off."

ORIGINAL MESSAGE

Most top-loading kilns with the down-draft vent have 1/4" air intake holes drilled in the lid. Try not to place ware directly under these vent intake holes. The room temperature air coming in through the holes can cause small areas of glaze imperfection such as crazing. The vent intake holes should be drilled toward the outer edges of the lid so that they won't interfere with ware placed toward the central area of the top shelf.

You can place ware near the vent exit holes, however. In most top-loading kilns, the exit holes are drilled in the kiln bottom. The movement of air will not interfere with ware because the exit air is hot.

With the vent, you can mix glazed ware and greenware on the same shelf in the kiln. Because the atmosphere is oxygenated and replenished, glazes are not as affected by surrounding ware.

PARAGON KILN SEMINAR

On October 7 - 8, 2005, we are holding a 1-1/2 day Basic Kiln Maintenance Seminar at the Paragon factory in Mesquite, the rodeo capital of Texas. This is about 30 minutes east of Dallas.

The seminar fee is \$95. To register, please call 800-876-4328 or email paragonind@att.net. If you are flying and don't want to rent a car while you are here, ask the receptionist about Paragon's airport pickup schedule.

Loading a Kiln That Has a Down-Draft Vent

The down-draft vent system pulls a small amount of air from the kiln, dilutes it with room air, and vents the air to the outside. There are several brands available.

The down-draft vent is used mostly on ceramic studio kilns. But it is also useful in glass kilns if you use fiber shelf paper or any materials that produce strong fumes.

Some vent systems do not use air intake vent holes. For instance, the Paragon Dragon does not need vent holes. But most top-loading kilns with the down-draft vent have 1/4" air intake holes drilled in the lid. Try not to place ware directly under these vent intake holes. The room temperature air coming in through the holes can cause small areas of glaze imperfection such as crazing. The vent intake holes should be drilled toward the outer edges of the lid so that they won't interfere with ware placed toward the central area of the top shelf.

You can place ware near the vent exit holes, however. In most top-loading kilns, the exit holes are drilled in the kiln bottom. The movement of air will not interfere with ware because the exit air is hot.

With the vent, you can mix glazed ware and greenware on the same shelf in the kiln. Because the atmosphere is oxygenated and replenished, glazes are not as affected by surrounding ware.

Leave the vent on throughout the kiln firing and cooling cycle. Turn the vent off when the kiln is cool enough to unload barehanded. The vent will help remove moisture during "candling" at the beginning of the firing. The moisture inside the duct and motor will dry out as the kiln heats.

More on Glass Separator

Several weeks ago I sent a kiln pointer on glass separator. (I have included the original message at the end of this email.) Several readers sent in additional pointers that I wanted to share with you:

Paul Bush of Portland, Oregon: “From my experience firing glass for over 5 years in a Paragon GL-24AD, you really need to rewash the shelves every time you fire to a full fuse. It's not worth taking the risk of having the glass stick to the shelf or having the separator stick to the glass.

“I've also found it easy to remove the fired separator with a glass scraper used by painters and found at Home Depot, Lowe's, or any paint store. The blades are replaceable and really make fast work of this messy job. Some people wet the shelf before scraping to avoid flying particles. Naturally a respirator or at least a HEPA dust mask should always be worn when cleaning shelves.”

Christie A. Wood, Art Glass Ensembles, Denton, Texas: “I've been using kiln wash applied with haik brush on shelves, floor and posts for years. I usually run my kilns up to 500 degrees per hour (melting wine bottles). The kiln wash/separator usually lasts 4-5 firings before needing to be scraped off/sanded down and reapplied. However, some bottles with glass paint embedded in their surface will adhere to the kiln wash immediately, and you have to reapply kiln wash after that firing. But that's what the kiln wash is supposed to do. It's doing its job.”

Charlie Spitzer of Cave Creek, Arizona: “Another, better way to get a smooth surface is to do the multiple coats of wash, then rinse out the brush and use just plain water with the brush for one last coat. Pantyhose work really well, too--lots better than sanding screen.”

Thanks, Paul, Christie, and Charlie for the excellent pointers.

When firing to a “tack fuse” or slightly hotter, I reuse the glass separator several times. (This is the stage of fusing where stringers on the glass surface are still distinct and have not melted flat into the glass.)

Shine a sidelight across the shelf surface or hold the shelf vertically under a light source. With light shining directly across the shelf, it is easier to see cracks and flakes in the glass separator. If you see imperfections, reapply the glass separator. If you have difficulty seeing the surface of the glass separator, play it safe by applying a fresh coat with each firing.

I use a putty knife to scrape off the glass separator. Hold the knife at a 45-degree angle. Removing glass separator creates dust and sometimes flying debris, so you should do this outside. A putty knife will also remove ceramic glaze or glass that has stuck to the shelf. In addition to wearing a dust mask, it is a good idea to wear safety glasses.

Several of you asked about the difference between glass separator and kiln wash. They are finely ground minerals that do not fuse at high temperatures. They serve the same function: to prevent glaze and glass from sticking to the shelf.

The difference between Paragon's glass separator and kiln wash is that glass separator is ground more finely than kiln wash. Glass separator can also be used as a bead release on bead mandrels.

ORIGINAL KILN POINTER

A coat of glass separator will usually last several firings. The lower the fusing temperature, the more firings you can get from one application of separator.

If the glass separator is sticking to the glass, fire to a lower temperature. Are you sure you need a "full fuse"? (This is where the surface of the fused piece is completely flat and the separate pieces of glass have merged together.) At lower fusing temperatures, very little glass separator sticks to the glass.

Whenever you notice the separator cracking or chipping on the shelf, apply a fresh coat. Remove most of the old separator from the shelf with grit cloth (available from Paragon). This is an abrasive-coated mesh that allows residue to pass through. Removing the old separator gives you a smooth surface to start with. Then recoat the shelf.

Installing APM Elements

APM heating elements are made from powdered metal. They last longer than standard element wire and are recommended for cone 6 and hotter firings.

APM elements install the same way as standard element wire, except for the element connectors. To install the connectors properly, insert the twisted wire end through the hole in the connector. Then rotate the connector until the screw presses against two twisted strands of wire. If the screw presses against only one strand of wire, the connector can become loose. Because APM wire is harder than standard element wire, the element screws need more metal to bite into.

READER RESPONSE

Several weeks ago I sent out a kiln pointer on repairing an element that fails at the connector. Tony Rodriguez, a kiln technician in San Antonio, Texas, sent me a pointer on that topic that I want to share with you.

Here is the original kiln pointer:

Ordinarily the only way to repair a burned-out element is to replace it. The exception: When an element burns out at the connector, you may be able to install a new connector and salvage the element.

Elements rarely burn out at the connector. This type of failure is due to a loose connection, which builds up enough heat in the connector to break the element wire. This is why it is important to securely tighten element connectors when replacing an element.

The following instructions are for Paragon kilns, which use barrel connectors. If your kiln uses a different type of connector, the basic principle still applies.

You have a burned-out element. To replace the element or connector, disconnect the kiln and remove the switch box (control panel) from the kiln. You will see two element connectors for each element in your kiln.

If the element has burned at the connector, you will usually see a bare, twisted section of element with a missing connector. This is because the element connector falls off the broken element end.

Does the burned element end have enough length so that you can install another element connector? (With Paragon's barrel connector, you will need about 1/2" of element length to install another connector.) If not, gently pull the element end with needle-nose pliers. There is sometimes play in the element. If so, you will feel the play as you pull the element end toward you.

If you have 1/2" of exposed length at the element end, you can install a new element connector and salvage the element. Please do not remove the porcelain insulator located under the element. (Not all kilns have porcelain insulators, by the way.) Removing the insulator will give you extra element length, but the insulator is there to prevent the element from shorting out against the kiln case.

Check the element lead wire for heat damage by bending the wire. If the insulation is brittle, replace the wire.

Here is Tony's suggestion:

"To gain extra element length to install another connector, use a propane torch. Disconnect the power. Then heat to red the element inside the kiln where the element goes out through the firebrick hole.

"GENTLY and SLOWLY pull the pigtail to get the extra 1/2" needed to install another connector. You will usually need even less than an additional 1/2", because some of the wire inside the connector will still be good.

"You must use sandpaper or grit cloth and clean the end of the pigtail before installing the new connector. If the old connector has to be reused, then use a round file to thoroughly clean the inside of the connector hole where the pigtail is to be tightened by the steel screw."

Tony Rodriguez
gsm_ent@msn.com

Thank you, Tony, for another excellent idea.

Firing to a Pyrometric Cone in a Jewelry or Glass Kiln

I recently received this email from Delores Highsmith: “I bought a digital kiln that uses degrees, ramp speed and time. I use it for jewelry making and bead annealing but would also like to fire small ceramic pieces.

“Since I don't come from a ceramics background, the pyrometric cones are a mystery to me, and when I talk to someone from a ceramics background about converting cone firing to degrees and times, they give me a blank look. Are there charts that convert cones to degrees and times for digital kilns?”

If, like Delores Highsmith, you specialize in jewelry or glass beads, you may enjoy making ceramic jewelry for a change. Clay and ceramic glazes are very inexpensive compared to silver and glass, and the results can be stunning. I have included cone-programming instructions at the end of this kiln pointer.

Cone-Fire mode is included with ceramic kiln digital controllers but usually not with glass and jewelry kiln controllers. But you can still fire to a pyrometric cone with a glass or jewelry kiln by programming the segments I've listed below. You will find the recommended cone number on the glaze or clay package, or you can get this information from your ceramic supplier.

The cones listed below go from the coolest to the hottest. As you can see, the cone numbering system is confusing. 022 is cooler than 10, yet 022 is a higher number. It helps to mentally replace the “0” with “-”. Most people find it easier to figure -22 rather than 022 as cooler than cone 10. (The coolest original cone was cone 1. Later, “0” was placed in front of cone numbers to designate cones cooler than cone 1.)

To fire faster or slower than the segments I've included here, change the rates by 10 – 20 percent. However, the rate for the last segment should always be 108 degrees F.

Do not attempt to fire a cone that is hotter than the maximum temperature listed on your kiln's electrical data plate. (You will find the plate on the side of the switch box or on the back of the kiln.)

PROGRAMMING PYROMETRIC CONES

TEMPERATURES: Degrees F

Cone 022

Segment 1: Rate 396 Temperature: 979

Segment 2: Rate 108 Temperature: 1087

Cone 021

Segment 1: Rate 396 Temperature: 1004

Segment 2: Rate 108 Temperature: 1112

Cone 020

Segment 1: Rate 396 Temperature: 1051

Segment 2: Rate 108 Temperature: 1159

Cone 019

Segment 1: Rate 396 Temperature: 1144

Segment 2: Rate 108 Temperature: 1252

Cone 018

Segment 1: Rate 396 Temperature: 1211

Segment 2: Rate 108 Temperature: 1319

Cone 017

Segment 1: Rate 396 Temperature: 1252

Segment 2: Rate 108 Temperature: 1360

Cone 016

Segment 1: Rate 396 Temperature: 1314

Segment 2: Rate 108 Temperature: 1422

Cone 015

Segment 1: Rate 396 Temperature: 1348

Segment 2: Rate 108 Temperature: 1456

Cone 014

Segment 1: Rate 396 Temperature: 1377

Segment 2: Rate 108 Temperature: 1485

Cone 013

Segment 1: Rate 396 Temperature: 1431

Segment 2: Rate 108 Temperature: 1539

Cone 012

Segment 1: Rate 396 Temperature: 1474

Segment 2: Rate 108 Temperature: 1582

Cone 011

Segment 1: Rate 396 Temperature: 1499

Segment 2: Rate 108 Temperature: 1607

Cone 010

Segment 1: Rate 324 Temperature: 1022

Segment 2: Rate 153 Temperature: 1112

Segment 3: Rate 180 Temperature: 1549

Segment 4: Rate 108 Temperature: 1657

Cone 09

Segment 1: Rate 324 Temperature: 1022

Segment 2: Rate 153 Temperature: 1112

Segment 3: Rate 180 Temperature: 1580

Segment 4: Rate 108 Temperature: 1688

Cone 08

Segment 1: Rate 324 Temperature: 1022

Segment 2: Rate 153 Temperature: 1112

Segment 3: Rate 180 Temperature: 1620

Segment 4: Rate 108 Temperature: 1728

Cone 07

Segment 1: Rate 324 Temperature: 1022

Segment 2: Rate 153 Temperature: 1112

Segment 3: Rate 180 Temperature: 1681

Segment 4: Rate 108 Temperature: 1789

Cone 06

Segment 1: Rate 324 Temperature: 1022

Segment 2: Rate 153 Temperature: 1112

Segment 3: Rate 180 Temperature: 1720

Segment 4: Rate 108 Temperature: 1828

Cone 05

Segment 1: Rate 324 Temperature: 1022

Segment 2: Rate 153 Temperature: 1112

Segment 3: Rate 180 Temperature: 1780

Segment 4: Rate 108 Temperature: 1888

Cone 04

Segment 1: Rate 324 Temperature: 1022

Segment 2: Rate 153 Temperature: 1112

Segment 3: Rate 180 Temperature: 1837

Segment 4: Rate 108 Temperature: 1945

Cone 03

Segment 1: Rate 324 Temperature: 1022

Segment 2: Rate 153 Temperature: 1112

Segment 3: Rate 180 Temperature: 1879

Segment 4: Rate 108 Temperature: 1987

Cone 02

Segment 1: Rate 324 Temperature: 1022

Segment 2: Rate 153 Temperature: 1112

Segment 3: Rate 180 Temperature: 1908

Segment 4: Rate 108 Temperature: 2016

Cone 01

Segment 1: Rate 324 Temperature: 1022

Segment 2: Rate 153 Temperature: 1112

Segment 3: Rate 180 Temperature: 1938

Segment 4: Rate 108 Temperature: 2046

Cone 1

Segment 1: Rate 324 Temperature: 1022

Segment 2: Rate 153 Temperature: 1112

Segment 3: Rate 162 Temperature: 1863

Segment 4: Rate 108 Temperature: 2079

Cone 2

Segment 1: Rate 324 Temperature: 1022

Segment 2: Rate 153 Temperature: 1112

Segment 3: Rate 162 Temperature: 1872

Segment 4: Rate 108 Temperature: 2088

Cone 3

Segment 1: Rate 324 Temperature: 1022

Segment 2: Rate 153 Temperature: 1112

Segment 3: Rate 162 Temperature: 1890

Segment 4: Rate 108 Temperature: 2106

Cone 4

Segment 1: Rate 324 Temperature: 1022

Segment 2: Rate 153 Temperature: 1112

Segment 3: Rate 162 Temperature: 1908

Segment 4: Rate 108 Temperature: 2124

Cone 5

Segment 1: Rate 324 Temperature: 1022

Segment 2: Rate 153 Temperature: 1112

Segment 3: Rate 162 Temperature: 1951

Segment 4: Rate 108 Temperature: 2167

Cone 6

Segment 1: Rate 324 Temperature: 1022

Segment 2: Rate 153 Temperature: 1112

Segment 3: Rate 162 Temperature: 2016

Segment 4: Rate 108 Temperature: 2232

Cone 7

Segment 1: Rate 324 Temperature: 1022

Segment 2: Rate 153 Temperature: 1112
Segment 3: Rate 162 Temperature: 2046
Segment 4: Rate 108 Temperature: 2262

Cone 8

Segment 1: Rate 324 Temperature: 1022
Segment 2: Rate 153 Temperature: 1112
Segment 3: Rate 162 Temperature: 2064
Segment 4: Rate 108 Temperature: 2280

Cone 9

Segment 1: Rate 324 Temperature: 1022
Segment 2: Rate 153 Temperature: 1112
Segment 3: Rate 162 Temperature: 2084
Segment 4: Rate 108 Temperature: 2300

Cone 10

Segment 1: Rate 324 Temperature: 1022
Segment 2: Rate 153 Temperature: 1112
Segment 3: Rate 162 Temperature: 2129
Segment 4: Rate 108 Temperature: 2345

Firing Kilns in Schools and Institutions

Since teachers are getting ready to go back to school, I thought I would write a kiln pointer for them. (You may find this information useful even if you're not a teacher.)

These pointers are compliments of the art teachers at RISD in Richardson, Texas. I visited with them yesterday at an in-service on kilns.

A teacher told me about a footprint that she found on the lid of her kiln. A maintenance man had stood on the kiln to reach something and cracked the lid. Not surprisingly she had to replace it.

She now has a sign on top of her kiln in English and Spanish:

Do not stand on the kiln.
Do not move the kiln.
Do not place anything on top of it.

(Reminder: Remove any signs from your kiln before you fire it.)

Not only that, but she also sent emails to the school principal and the maintenance department explaining that the kiln is fragile.

At another school, the maintenance man turned off the kiln because he heard a clicking noise. So the teacher now explains kiln operation to the maintenance staff each year. She also places a sign on the door: Kiln is Firing.

The beeping temperature alarm of a digital kiln frightens students and maintenance people because they assume that something is wrong. If you use an alarm, tell others what it means.

If the kiln room is too hot and you smell fumes even though you have an overhead Vent-a-Kiln vent hood, have the maintenance people check the duct work for obstructions. It is not uncommon for something on the roof to cover the duct outlet.

Do not install a fire safety sprinkler head above the kiln. A school in Frisco, Texas was flooded because a kiln turned on the sprinkler system. This is another reason to monitor the kiln during firing.

A Reminder: A kiln will discolor linoleum tile. Place a heat-resistant material between the kiln stand and linoleum.

The Basics of Silver Clay

My wife frequently wears a pendant that I made for her. It is a silver heart with dichroic glass fused in the center. I had no silversmith training and shaped the heart from silver clay, which is like modeling clay.

Silver clay is made of fine silver particles suspended in a binder that burns away during firing. After the binder disappears, the silver particles fuse together to form solid silver. The silver can be fired in any kiln that will reach 1650 degrees F. (However, a small digital kiln is most suitable.)

Sallie Bly, a certified Silver Art Clay teacher and distributor, kindly agreed to answer the 20 most frequently asked questions on silver clay.

THE TOP 20 QUESTIONS ON SILVER CLAY

Sallie Bly
Grand Prairie, Texas
972-264-6573 / www.salliebly.com

1) What is the difference between PMC and Art Clay Silver?

Both companies manufacture metal clay. They are like Pepsi and Coke--similar but slightly different. Both companies have clay, syringes, paste and paper; both have high-fire and low-fire products. However, they each have unique products that the other does not have. If you learn to use one company's clay, you will be able to work with other company's clay. However, when you fire, refer to the Art Clay Silver firing guide for Art Clay Silver and the PMC firing guide for PMC.

2) Can I fire the metal clays without a kiln?

Yes. You can use a butane torch or PMC's hot pot. In my classes I teach how to use the torch. However, I do not recommend it. I have had too many students who rely on the torch and have had irreparable failures. If you under-fire, the piece will not be strong and will eventually break. If you get the torch too close, you will melt the silver and lose detail. Recently a student who uses the torch brought me a piece that had broken into several pieces when torched. I knew by the look of the interior that the piece had not been dried thoroughly before firing. Had this piece been fired in a Paragon SC-2 kiln at Ramp 3, it would not have broken.

I believe that most bead stores and ceramic shops would agree to be a firing station if they understood what was in it for them. Firing stations charge between \$5.00 per kiln load up to \$10.00 per piece to be fired, and most people want to wait for their pieces to be fired. That means between 20 minutes and an hour of shopping. Most of my students say that they would prefer having someone fire their pieces in a kiln as opposed to learning how to use a torch. Locally we have an excellent firing station in a bead store.

3) How many coats does it take to coat a leaf, and why does the leaf curl when I am painting it?

This is one of the hardest questions to answer without being in a classroom. It depends on the size of the leaf, the structure of the leaf's vein, the end use of the fired leaf, and how thick your paste is.

Your first few coats are vital to your project. The paste should be air-dried for the first coats, because if the leaf dries out before you get enough paste on it to weigh it down, the leaf will curl. Even when air drying, don't let too much time go by before adding the next coat, or again your leaf will curl.

4) What happens to the leaf and other combustible objects in the kiln?

Straws, leaves, cork clay and other natural products we use to support the clay burn away. Sometimes they leave residue in the kiln. Occasionally use a small computer vacuum cleaner or canned air to clean out the kiln interior.

5) Does the clay come in gold?

Yes, gold comes in clay and paste. However, a good alternative to gold is Kuem Bu. This is a special gold leaf that adheres to the silver by a hot embossing method. It is 22K gold.

6) If I don't like what I make, can I melt it down and sell it for scrap?

Yes. However, I always advise my students that no matter how much they dislike something they have made in metal clay, there is someone out there who will love it and

pay them more for it than they would get as reconstituted silver. One of the designs I had to make in my Level II class was really ugly, in my opinion, and I thought I made it even uglier than it was intended. I put it up for sale at a high price, because we all know that the biggest mistake an artist can make is to sell something too cheap. The woman who bought it was so excited about having a one-of-a-kind handmade silver necklace. I made a lot more than I paid for the silver.

7) Can I refill the syringe with paste?

Yes, but there will be air bubbles that might ruin your design. I keep one syringe that I have refilled with thick paste that I use as a filler. It is just as good as my sludge pot.

8) What is Art Clay Silver?

Art Clay Silver is a pure metal powder mixed with non-toxic binders and water. When fired, the binders burn away and leave pure 99.9% silver.

More practically it is a product that feels like clay and behaves like clay. However, when it is fired in a kiln, it becomes pure fine silver.

9) Is Art Clay Silver sterling?

No. Sterling has alloys added to the fine silver. Art Clay Silver is 99.9% pure fine silver. As a note, most people who are allergic to silver are actually allergic to one of the alloys. Therefore, they are able to wear fine silver.

10) Can I make what I see at the store?

Depending on your artistic ability, yes. If the piece were cast by the thousands, you could probably buy it cheaper than you could make it. However, if the piece you want to duplicate is an expensive one-of-a-kind art piece, you could get into trouble because of copyright laws.

The real advantage of the metal clays is that you can learn to make one-of-a-kind pieces that reflect your style for a small percentage of the price and minimal training compared to years of training in traditional metalsmithing.

11) The silver clay shown in magazines sometimes is shiny, sometimes has a matte look, and sometimes it is colored. Do all of these come from the same clay, and how do they get the colors?

The silver finish is determined by how you work with the clay both before and after firing. A high shine is achieved with sandpaper, rotary drill using 3M radial bristle discs, magnetic burnishers, or just good old-fashioned elbow grease.

Most people think that Liver of Sulphur gives silver an old, black effect. Wrong. When used correctly, you can get the color and effect you want: gold, amber, magenta, blue, and then black. Most colored pieces are made with Liver of Sulphur or enameling.

12) Can I fire the clay with sterling silver findings?

The new low-fire clays (650 for Art Clay Silver and PMC3 for PMC) mix well with sterling silver. I have had only one case where they were incompatible. I now always test the sterling silver finding or sterling silver wire I want to use with a little metal clay on it in the kiln first. If there is no reaction, I continue with the project.

13) If a piece breaks after firing, can it be soldered?

Yes. However, Art Clay Silver has a product called Oil Paste that works with pieces that have been fired and burnished. It is like soldering in the kiln - easy and successful.

14) I have read that gemstones can be fired directly into the clay. Can I fire my diamond in it?

Most CZs can be fired into your projects. I have seen several failures with stones that were supposedly tested for the heat required for the metal clays. One beautiful diamond-like CZ became cloudy and had an opal appearance--very attractive and fortunately it worked with the design, but a failure nevertheless.

One CZ lost all of its facets and became a rounded piece of glass. This was a real failure, and I had no solution for fixing it.

In my studio, I test all stones personally before they are worked into projects. If a stone fires correctly the first time, it will fire the same way (at the same temperature) in each subsequent firing.

As for you diamond, the answer is no. However, you can place a setting into your piece and set your diamond in after the firing.

15) Can I enamel on the metal clays?

Yes. You might have read that it is not recommended to enamel on sterling. There again, it is the alloys that cause the problems.

Fine silver is an excellent source for enameling. PMC artist Mary Ellin D'Agostino has even developed a new technique for adding the enameling into the clay before it is worked into a design.

16) How long is the clay good for? What do I do if I open the package and it is dried out?

The clay is good indefinitely. Until it is fired, it can be reconstituted and reworked into something else.

I had a 20-gram piece that I wasn't happy with. I kept thinking that if I just added one more thing here and there, it would be great. Eighty grams and one year later, it was time to give it up. Because it sat on a bureau in a hot dry room for a full year and because it was so big, it took a week to reconstitute. The piece I made with that reconstituted 80 grams is one of my favorites.

17) After a student works hard on their first piece, they often say, "I don't like this. Do I have to fire it?"

Yes. There is a big difference between what your piece looks like when it is still in the clay stage and what it looks like after it is fired. I always tell my students that it is imperative that they fire their first pieces. I guarantee that if they do not like it, I will exchange it for the same amount of silver clay. I have never had a student take me up on it. However, once students can tell from experience what the finished piece will look like, I back up their decision to reconstitute the clay and start over.

18) How much does the clay shrink?

The clay will shrink approximately 10 percent. PMC makes a ruler that allows you to create your piece taking that shrinkage into account.

19) Can I really make metal clay jewelry if I am not an artist?

I strongly believe that inside everyone is an artist just waiting to be discovered. I have had students that had never done anything "crafty" before taking my class. A lot of them go on to sell their work starting with friends and co-workers, and some have become affiliated with a gallery. You do not have to believe in your talent to learn, but learning and doing will help you to believe in yourself and your talent.

20) I don't want to teach, so why would I want to be certified?

There is a greater demand for classes than there are teachers and places to learn. When you take a certification class to teach, not only do you get the recognition of being a certified teacher and a 35% discount off the clay, but you learn many techniques for working with the clay. By the end of certification you learn how to work with the paste, syringe and clay. You learn how to roll the clay out to a uniform thickness, add texture, and make bails. You learn how to get the shiny mirror finish, add CZs prior to firing, and set gemstones into the settings that you have placed in your piece. You learn how to work with Overlay Paste on glossy and non-porous surfaces like porcelain, glazes and glass. You learn how to work with cork clay and how to mix dichroic glass cabs with silver clay. You learn how to embed wire and place pins into your piece prior to firing. You even learn how to make two types of rings--flat band and round band. By the time you

finish with certification classes, you really know how to work with the clay, fire it (kiln and torch), and color it with Liver of Sulphur.

I hope you are enjoying your summer and getting ready for a busy fall.

Making the Glass Separator Smooth

Give the shelf two or three thin coats of glass separator, changing the direction of the brush stroke each time. Apply the separator with a haik brush. After the separator has dried and the shelf is cool, you can smoothen the separator by rubbing your palm lightly over the shelf.

A more advanced technique is to fire the freshly applied glass separator to around 1000 degrees F. After the shelf cools, rub grit cloth over the glass separator. (Grit cloth is similar to sand paper except that it is an abrasive-coated mesh that allows residue to pass through. It can be rinsed with water and reused many times.)

As you rub the glass separator, watch the brush-stroked surface. Remove just enough glass separator to remove the brush strokes. It takes just a moment to smoothen the surface.

Please let me know how this works for you.

How to Apply Glass Separator

Glass is fired on a kiln shelf and not directly on the kiln bottom. You can also slump glass over a mold. The kiln shelf and sagging mold must be coated with glass separator to keep the glass from sticking to them. Glass separator is similar to kiln wash.

Pour the separator carefully from the bag to avoid creating airborne dust. Do not breathe glass separator dust.

1. Mix the separator with water following the directions on the bag. Stir.
2. Use a haik brush (which is a Chinese soft-bristle brush) or a soft paintbrush to apply the separator to the shelf. The haik brush lays down a more even coating than a paintbrush. Each time you dip the brush into the glass separator mixture, swirl the brush around the bottom of the container. This is necessary because the separator settles to the bottom.
3. Give the shelf two or three thin coats, changing the direction of the brush stroke each time.
4. Moisture in the kiln shelf can crack glass or cause bubbles during fusing. So dry the shelf thoroughly before use. Let the separator dry overnight. You can speed drying by

placing the shelf in the kiln on 1/2" posts, venting the lid, and heating to 300 degrees F for 30 minutes. Let the shelf cool before placing glass on it.

5. After the separator has dried and your shelf is cool, you can smoothen the separator by rubbing your palm lightly over the shelf.

I hope you found this kiln pointer useful. The topic of the next one is "How to Prevent Glass Separator from Sticking to the Glass."

How to Prevent Glass Separator from Sticking to the Glass

A coat of glass separator will usually last several firings. The lower the fusing temperature, the more firings you can get from one application of separator.

If the glass separator is sticking to the glass, fire to a lower temperature. Are you sure you need a "full fuse"? (This is where the surface of the fused piece is completely flat and the separate pieces of glass have merged together.) At lower fusing temperatures, very little glass separator sticks to the glass.

Whenever you notice the separator cracking or chipping on the shelf, apply a fresh coat. Remove most of the old separator from the shelf with grit cloth (available from Paragon). This is an abrasive-coated mesh that allows residue to pass through. Removing the old separator gives you a smooth surface to start with. Then recoat the shelf.

Erratic Digital Temperature Display

A digital kiln measures the firing chamber temperature with a thermocouple, which is a metal or ceramic-sheathed rod that extends into the firing chamber.

When the thermocouple is about to fail, the temperature display often becomes erratic or inaccurate. I know of a recent case where the temperature was 300 degrees F. too low due to a bad thermocouple. If the temperature is off by 45 degrees F. or more, replace the thermocouple.

Some brands of controllers give a temperature reading of the controller's circuit board itself. (This feature is not available on earlier controllers or on Paragon's Sentry Xpress 3-key series.)

With the kiln at room temperature, check the electronic circuit board temperature. (Paragon's Sentry 2.0: Select ELEC under Options.) If ELEC shows room temperature, then the board is okay. If the ELEC temperature is way off from room temperature, the problem is a board instead of a thermocouple.

An erratic or inaccurate temperature display can also be caused by a loose thermocouple connection, a bare spot on the thermocouple wire touching the kiln case, or the thermocouple touching the kiln case.

Repairing a Bulging Sidewall Element

Elements that bulge out of a sidewall brick groove should be pushed back into the groove. It is not difficult as long as you first heat the element. If you push it back in place while it is cold, the element will break.

You will need a propane torch, which is available at home improvement centers. Be sure the kiln area is free of flammable materials, such as paint, gasoline, lawn mowers, etc. When the propane torch is on, do not reach for tools or do anything that would take your attention away from the torch.

First, unplug the kiln or disconnect the power to the kiln. Heat the element with the propane torch. When the bulging element section turns dull red, squeeze the individual turns in the coils together slightly with needle-nose pliers. Take a little from each turn so that no two turns will be pressed tightly enough to touch.

As the element shrinks, work it back toward the groove and into place. Work rapidly. At the first sign of stiffness in the coils, stop bending and reheat the element with the propane torch. The elements do not have to be red to be bent safely, as the stiffening can be felt through the pliers.

If the element has popped out from a corner, you will need to expand the distance between the coils to make the element go back into the corner. Use snap-ring pliers, which are available from an auto parts store.

When you have the coils positioned above the brick groove, heat the element again and press it down into the groove with a blunt kitchen knife.

The next time you replace elements, push them all the way to the back of the brick groove corners. This will help prevent the elements from bulging out of the grooves.

Installing a Motorized Kiln Vent

Firing ceramics produces fumes that contain small amounts of carbon monoxide, formaldehyde, and sulfur dioxide. For health reasons, we recommend—and building codes in some areas require—that kilns are vented with a motorized vent. The two vent systems available for electric kilns are the overhead system made by Vent-A-Kiln Corporation, and the down-draft system made by Orton Ceramic Foundation.

To help you plan your kiln location, we are including basic information on these systems. For additional information, contact the vent manufacturers or your ceramic supplier:

Orton Ceramic Foundation

614-895-2663 / Fax 614-895-5610

www.ortonceramic.com

Vent-A-Kiln Corporation

716-876-2023 / Fax 716-876-4383

www.ventakiln.com

General Guidelines

Vent System Operation Theory

The overhead vent is positioned over the kiln with the aid of a counter-weight. As heated air rises from the kiln, the vent pulls it outside through an aluminum duct. This system also helps lower room temperature around the kiln.

The down-draft vent connects directly to the kiln. For top-loading kilns, the vent fits between the kiln and the kiln stand. A small amount of air is pulled from the kiln and mixed with room air. This lowers the temperature of the vented air to a safe level. Small holes drilled in the kiln lid and bottom regulate the amount of air that the vent pulls from the kiln.

Vented Air Volume & Temperature

Both vent systems remove air from the kiln room. Open a window or door to replace the air that is vented outside.

Many studios keep the door to the kiln room closed. In this case, you must open a window or install an intake vent so that make-up air can enter the kiln room.

	Volume of Vented Air	Approx. Duct Temperature
Orton KilnVent	60 - 80 CFM	100°F - 155°F
Vent-A-Kiln	265 - 500 CFM	90°F - 125°F

Installing the Vent

The Vent Exit Point

Plan your kiln room to include an exterior wall. The fumes are vented to the outside through a clothes dryer duct. If the kiln room does not have an exterior wall, you will need to run the duct through the ceiling or floor to the outside.

Avoid placing the vent exit near windows. Otherwise the fumes may reenter the room. If you are in a multi-story building, avoid placing the vent exit under upper story windows.

If you cannot avoid placing the vent exit near a window, you can raise the vent above the level of the window. As the warm air is vented outside, it will rise past the window.

The Vent Duct

The duct size will depend on the type of vent you are installing. Several kilns can be vented to a single exit duct. The size of the exit duct depends upon the number of kilns vented and the brand of vent.

Duct Length and Width

	Maximum Length	Width
Orton KilnVent	60' with 4 - 90° turns	4"
Orton KilnVent	60' with 8 - 45° turns	4"
Vent-A-Kiln	10' with 2 - 45° turns*	5" & 6"

*20' if you extend the duct with rigid duct.

It is okay to include vertical lengths of duct, because the warm air rises. Use aluminum flexible duct. Do not use the plastic flexible duct sometimes used on clothes dryers.

Orton KilnVent

You can use 4" PVC pipe, provided your building code approves. PVC lasts longer than aluminum duct, especially if you fire clay with a high sulfur content.

Do not connect the PVC directly to the KilnVent. Instead, use several feet of flexible aluminum duct between the vent and the PVC. This prevents vibration of the motor from transferring to the PVC.

Seal all joints with duct tape. When aluminum duct begins to deteriorate, small holes will appear, and you will begin to smell kiln fumes. At that point, replace the duct rather than attempt to repair with duct tape.

If you fire the kiln with the Orton KilnVent turned off or removed for repair, cover the air exit holes in the kiln bottom. Place a kiln shelf over the holes.

Leave the vent on throughout the kiln firing and cooling cycle. Turn the vent off when the kiln is cool enough to unload bare-handed. The vent will help remove moisture during “candling” at the beginning of the firing. The moisture in the duct and motor will dry out as the kiln heats.

When using the Orton KilnVent, leave the kiln’s peephole plugs in place and lid down all the way throughout the firing. The vent operates under negative pressure, which requires that the lid and peepholes are closed.

Selecting a Location for Your Kiln

NOTE: Your local building codes supersede our recommendations.

Selecting a Location

In most home studios, the kiln goes in the garage or basement. An alternate location is a separate storage building. It is okay to place the kiln in an unheated building in cold weather.

Room Size & Ventilation

Avoid small, enclosed spaces such as a closet or small utility room. The kiln room must be large enough to avoid heat buildup around the kiln.

The minimum spacing between the kiln and nearby walls is 12”. But in addition to the 12”, plan for generous space around the kiln to promote good ventilation. Include room for steel shelves to hold ceramic ware. Maintain a minimum of 3 feet of space between kilns to prevent heat buildup around the kilns. Keep flammable material, such as shipping materials, out of the kiln room.

Consult building codes for recommended non-combustible wall material for walls that are near the kiln. Cement board or masonry tile are good choices.

An Exterior Wall

Select a room with an exterior wall. You should vent the kiln, similar to the way a clothes dryer is vented, using a motorized vent. Fumes are vented outside through an exterior wall. If your kiln room has only interior walls, you will need to vent through the ceiling or floor to the outside.

Concrete Floor

Place the kiln on a concrete floor. Avoid wood floors and, of course, carpet. If you place a kiln on a concrete floor finished with linoleum tile, place a fireproof material over the tile to protect it from discoloration.

Be sure the bottom of your kiln is covered with an outside layer of sheet metal. Overfired glazes can eat through the firing chamber insulation and drip onto the floor under the kiln. The sheet metal bottom prevents this.

Warning About Fire Safety Sprinkler Heads

In the kiln room, position sprinkler heads in the ceiling away from the kiln(s). We know of schools that were flooded because the sprinkler head, positioned above the kiln, turned on the fire alarm. Consider using a higher temperature sprinkler head in the kiln room or the type that senses smoke rather than heat. You could also install a Vent-A-Kiln vent hood, which will lower the temperature around the kiln.

Electrical Capacity

Before you order a studio kiln, measure the voltage in your building. (In the U.S. and Canada, it is usually 240 or 208. Both voltage systems use the same wall outlets, so you can't tell voltage by the type of outlet.) If you are not sure how to use a voltmeter, ask your power company to confirm voltage, or hire an electrician to check it. If you are in a commercial location, find out if you have single or 3 phase power. (Single phase: 2 hot wires and a grounding wire; 3 phase: 3 hot wires and a grounding wire.)

Besides knowing voltage and phase, be sure your building can handle the kiln's amperage. Some older sites cannot power a studio kiln without an expensive upgrade of the electrical system. See the specifications in the kiln catalog.

In some areas, the power company gives a discount for electricity consumed during the night. This is to encourage you to take advantage of excess generating capacity during off-peak hours. You might want to ask your power company if they offer this discount. If so, you will need a time-of-use meter installed.

Plan enough space and electrical capacity for additional kilns if you believe your kiln program will expand later.

Doorway Clearance

Make sure the kiln will fit through the necessary doorways to reach the kiln room. Ask your dealer for the kiln's exterior width. Some catalogs include doorway clearance for each kiln.

HVAC: Heating, Ventilating & Air Conditioning

If you are installing a kiln in a school, mall, or other location with a central heating, ventilating, and air conditioning system, the building manager may ask how much heat your kiln will generate. A good estimate for studio kilns is 23,000 BTUs.

Kiln Safety

During firing, check the kiln from time to time. Observe the normal sounds that it makes and the length of firing time. Once you are familiar with the normal operation of your kiln, you will be more likely to notice when something goes wrong.

Following these 28 pointers adds very little extra time to your daily routine:

1) Place the kiln on the stand recommended by the manufacturer. When a kiln is safety-tested by UL, the lab fires the kiln on the stand designed for the kiln. Cinder blocks or bricks can inhibit the flow of air under the kiln. They can also change the kiln's heating characteristics.

2) Place the kiln on a non-combustible surface.

3) Do not install closer than 12" from any wall or combustible surface.

4) Fire only in a well-ventilated, covered and protected area.

5) Do not open the lid until kiln has cooled to room temperature and all switches are off.

6) Dangerous voltage: do not touch the heating elements with anything.

7) Disconnect kiln before servicing.

8) Do not leave kiln unattended while firing. Do not leave a kiln turned on at your studio while you are at home sleeping.

9) Wear firing safety glasses when looking into a hot kiln.

10) Keep the kiln lid or door closed when the kiln is not in use. This keeps dust out of the kiln. Also, should someone turn on the kiln while you are away, the closed lid will keep the heat safely inside the firing chamber.

11) Never place anything on the kiln lid, even when the kiln is idle. If people become accustomed to placing papers and other objects on the kiln, they may forget and do that while the kiln is firing.

12) Remove all tripping hazards from around the kiln. Keep the kiln's supply cord out of traffic areas.

13) Do not let the cord touch the side of the kiln, which may damage the cord.

14) Avoid using extension cords.

- 15) Do not remove the ware from the kiln until the kiln has cooled to room temperature. It is possible for thermal shock to break hot ceramic pieces. The sharp edges of broken ware can injure hands.
- 16) After firing glazed ware in your kiln, examine the shelves for glaze particles. Sharp slivers of glaze stuck to the shelf can cut hands. Before rubbing a hand over a shelf, be sure the shelf is free of glaze shards.
- 17) Fire only approved materials purchased from a knowledgeable supplier. Do not fire marbles, pieces of concrete, rocks, and other miscellaneous objects. Rapid heating to high temperature can cause violent reactions in many materials.
- 18) Avoid firing toxic materials inside the kiln, such as moth balls. Burning moth balls create toxic fumes.
- 19) Never fire tempered glass inside a kiln. It could explode.
- 20) Greenware, which is unfired clay, must be bone dry before firing. Moist greenware can explode inside the kiln, damaging the ware and the kiln. Place a piece of greenware against the inside of your wrist. If it feels cool, it is too wet to fire.
- 21) Do not fire cracked shelves. They can break during firing, damaging the ware inside the kiln.
- 22) Store kiln shelves in a dry area. Moist shelves can explode inside a kiln.
- 23) If you smell burning plastic, turn the kiln off. Examine the wall outlet and supply cord for signs of burning.
- 24) Never place extra insulation around the kiln in an attempt to conserve energy. The extra insulation can cause the wiring and the steel case to over-heat.
- 25) Do not wear loose-fitting clothing around a hot kiln.
- 26) Unplug the kiln, or turn off the electrical shut-off box or circuit breaker when the kiln is not in use, especially if you are concerned that someone could turn it on while you are away.
- 27) Remove flammable materials from the kiln room. If you fire a kiln in the garage, park your car outside. Remove the lawn mower, gasoline, and other flammable materials. Keep packing materials such as shredded newspapers out of the kiln room.
- 28) Keep unsupervised children away.

Element Coils Collapsing in the Grooves

One of the signs that a heating element has been over-fired is that the element coils begin to collapse, or lie flat, in the element grooves. If you are buying a used kiln, use a small mirror to look at the elements. If you notice collapsed coils, assume that you will need to replace the elements before firing the kiln.

After removing such an element, examine the element groove. You may see discolored areas where the coils shorted out and melted the element wire. These discolored spots must be removed from the groove before installing a new element. You can dig out the melted element wire using a screwdriver.

Preventing Glass Bubbles

Bubbles in hot glass are usually caused by trapped air between the glass and the kiln shelf or between layers of glass. Here are several ways that air can become trapped:

- 1) The kiln shelf absorbs moisture from glass separator (the coating applied to the shelf to prevent glass from sticking). Moisture in the shelf turns to steam at higher temperatures causing an air pocket between the shelf and the glass.
- 2) As the glass softens, it collapses and forms air pockets between layers. The air pockets form around glass pieces placed between larger layers of glass.
- 3) The weight of glass pieces over the top layer of glass can cause the top layer to press down and trap air underneath.
- 4) A low spot in the shelf can form an air pocket between the shelf and the glass. Debris such as flakes of glass separator under the glass can also cause air pockets.

Suggestions for preventing air bubbles:

- 1) Dry the kiln shelf after applying glass separator. Fire the empty shelf to around 350 degrees F for 30 minutes, or dry the shelf overnight.
- 2) Design your fused piece so that air between layers of glass has an escape route. One way to do this is to place glass pieces near the outer edge between the layers. Or keep surface elements such as stringers away from the edges, where their weight can trap air between the layers underneath.
- 3) Make sure the shelf is smooth and clean before placing glass on top. If the bubble appears over the same area of the shelf every time, it may be due to a low spot or gouge in the shelf.
- 4) Soak the glass at 1250 degrees F for 30 minutes. You can extend the soak for as long as 1 1/2 hours if necessary. Some artists begin the soak at 100 degrees below the fusing temperature.

If you've had air bubbles, try the above suggestions. Then the next time you fire the kiln, occasionally look at the glass through the peephole. (Wear firing safety glasses.) At the first sign that a bubble is forming, make a note of the temperature, press STOP (if you are using a digital controller), and reprogram the kiln so that at that temperature, you have a 20 minute hold. Then turn the kiln back on.

As the kiln fires on hold, look at the glass occasionally to see what the bubble is doing. Is it going back down and flattening out? If not, leave on hold longer. Once the hold is done, resume firing to the fusing temperature.

I welcome other ideas for preventing bubbles.

How to Improve Heat Distribution in a Ceramic Kiln

1) Load more ware in hot sections of the firing chamber and less ware in cool sections. The greater the density of ware, the more heat required in that section of the firing chamber. By changing the load balance inside the kiln, you can alter the heat distribution by about half a pyrometric cone.

For instance, to reduce the heat in a hot section of the kiln, load short pieces of ware that require extra shelves. Load fewer shelves in the cooler sections of the kiln. The shelves are heavy and require extra heat energy.

2) On digital kilns, program a hold of around 15 minutes at the end of the firing. This will help even out the temperature. Firing slower also helps.

3) A down-draft kiln vent that is operating properly helps even out the heat distribution by as much as 1/4 - 1/2 cone. While the kiln is empty and unplugged, turn on the down-draft vent. Hold a lighted match inside the kiln just above a vent hole in the bottom. The flame of the match should be pulled toward the hole.

Turn off the vent and load the kiln. Insert the peephole plugs and close the lid. Then turn on the vent and hold a lighted match above and level with a lid vent hole. The flame should be sucked toward the hole.

If the lid rises during firing, the down-draft vent will lose efficiency, because it must create negative pressure inside the kiln. Opening the lid or removing peephole plugs reduces the negative pressure.

Odors Detected with the Orton KilnVent

The Orton KilnVent very efficiently removes fumes from the kiln room by pulling just enough air from the kiln to create negative pressure. This prevents fumes from leaking out of the kiln. On most kilns the vent is positioned between the bottom of the kiln and the kiln stand. The fan on the new Orton Vent Master mounts away from the kiln.

The Orton KilnVent is very effective at removing firing odors. But if you can still detect an odor during KilnVent operation, check the following:

- 1) Make sure you can hear the fan spinning. This is basic but easy to overlook in a busy studio.
- 2) The holes that draw air out of the kiln must be free of obstructions. If the exit air holes are in the bottom of your kiln, the bottom shelf should be positioned 1" above the kiln floor. The shelf must not close the holes.
- 3) The intake and exit vent holes must be of the correct number, size, and location in your kiln. See the Orton KilnVent instruction manual to be sure, or call Orton: 614-895-2663.
- 4) Insert all the peephole plugs. Leave the lid fully closed.
- 5) Check the vent duct for leaks.
- 6) Make sure the duct is free of obstructions and that the vent flapper on the outside of the building can open freely.
- 7) If you fire ware that contains many impurities, you may need to fire smaller loads.

Replacing Elements

Replacing heating elements is easy with a little practice. Here are a few pointers that will simplify element replacement:

EXPANDING THE ELEMENT

Sidewall brick grooves: The new replacement element for most kiln models is bent where it fits into the corners of the firing chamber. The element bends must fit into the back of the firebrick corners. If the element barely fits into the corners, gently expand the distance between element coils with snap-ring pliers. (You can buy the pliers at an auto parts store.) This will prevent the element from bulging out of the grooves later.

THE ELEMENT CONNECTOR

If you strip the threads in an element connector, discard the connector and install a new one. Otherwise the element will burn out at the connector.

THE ELEMENT ENDS

Cut off the element ends where they stick out past the element connectors. You will have two element ends for each element that you replace. After you install the elements, count the number of element ends to be sure that none have been left inside the kiln. I know of a case where a discarded element end fell into the Kiln Sitter contact block and prevented the Kiln Sitter from operating. A discarded element end could also fall against wire terminals and cause a short.

Good luck with your next element change,

Quick Repair of a Rusted Steel Base on a Top-Loading Kiln

Recently someone asked, “I live beside the sea and the metal bottom of my kiln has rusted and fallen apart. How do I fix this?”

Paragon 6, 7, 8, 10, and 12-sided kilns have a galvanized steel base plate under the firebrick bottom. The base plate covers the entire bottom and folds up inside the stainless steel case on all sides.

Though the base plate is galvanized steel, it may eventually rust especially if you fire moist greenware or live near the ocean.

The easiest way to repair a rusted base is to lay a piece of galvanized sheet metal between the kiln and kiln stand. You don't even need to remove the old base from the kiln.

You can buy the galvanized sheet metal from a hardware store. It should be large enough to protect the entire kiln bottom.

Using the Hold Feature of a Digital Kiln

I decided to write a kiln pointer on the hold feature of digital kilns, because holding the temperature during a firing has many uses. Here are several:

- 1) Firing a few degrees cooler than normal and holding the temperature there for 10 – 20 minutes can heal pinholes in ceramic glazes, heal bubbles in fused glass, and bring out more intense colors in china paints.
- 2) Holding the temperature forms crystals in crystalline glazes. Some firing formulas include several heating and cooling segments with holds.
- 3) Temperature hold helps to improve the heat distribution inside the kiln. This may be especially useful when fusing glass in a ceramic kiln.
- 4) If the witness cone (the one placed on the ceramic shelf inside the kiln) is under-fired in Cone-Fire mode, add hold to the next firing. This is a simple way to correct under-firing. (Glass artists: Cone-Fire mode is used in ceramic firing. You will probably never use this mode.)
- 5) Hold allows the gases in ceramic greenware to burn out. This prevents firing problems such as pinholes, bloating, carbon coring, etc.
- 6) Firing to a lower temperature than normal and adding a few minutes of hold sometimes gives greater control of the firing. For instance, it may be easier in some kilns to control the stages of glass fusing by using hold.

Be careful how you use hold. It can easily over-fire the ware if you inadvertently enter 2 hours (02.00) instead of 20 minutes (00.20) of hold time. Experiment with small amounts of hold.

Temperature hold improves many ceramic glazes, but certainly not all of them. This is a matter of experimentation. Too much hold time could even alter the fit between the clay body and glaze.

According to the Orton Ceramic Foundation, one to two hours of hold is equivalent to firing to the next hotter pyrometric cone. This, too, is a matter of experimentation.

Wishing you a Happy New Year,

Holding Temperature on a Switch-Operated Kiln

Q. I have a recipe for a reduction glaze that requires a hold at the end of the firing cycle. How do I add a hold to a manual kiln when the Kiln Sitter automatically shuts it off?

A. You can add a hold at the end of the firing, even on a manual kiln. With a pyrometer (a device that reads temperature inside the kiln), it is easy to add a hold. You can add a hold even without a pyrometer, but it will require guesswork.

At the end of the firing, you will hear the Kiln Sitter weight drop, shutting off the kiln. Raise the weight and press the Kiln Sitter plunger (the button that turns on the Kiln Sitter). Then gently lower the weight. The kiln is now firing again. Please be aware that the Kiln Sitter is operating on manual and will not shut off the kiln.

With a pyrometer, you can adjust the switches to maintain the temperature of the correct pyrometric cone. When the needle on the pyrometer goes too high, lower the switch setting. If the needle goes too low, raise the switch setting.

If you don't have a pyrometer, you can still add a temperature hold to your firing. When the kiln shuts off at maturity, observe the color of the firing chamber. (You can see the color through the peephole and around the edges of the lid.) Turn the kiln switches to a setting that maintains that same color. This method will give an approximate rather than an exact hold, but the results should be close.

You might want to experiment with a test sample before using temperature hold on a full load of ware.

How to Replace the Steel Base in a Top Loading Kiln

Paragon 6, 7, 8, 10, and 12-sided kilns have a galvanized steel base plate under the firebrick bottom. The base plate covers the entire bottom and folds up inside the stainless steel case on all sides.

Though the base plate is made of galvanized steel, it will eventually rust if you fire moist greenware or live near the ocean. A sign of rust is dark flecks of steel under the kiln. (Do not replace the base plate if it has only minor rust.) To replace the base plate, you will need several helpers.

First, remove the screws that hold the base plate to the kiln. You will find a screw near the bottom of the kiln on each flat side. Do not disturb the other screws in the stainless steel case.

Have several people lift the kiln. The bottom and old base plate will remain on the kiln stand while your helpers lift the kiln.

Place a new base plate on top of the brick bottom. The bottom is now sandwiched between the new base plate and the old one. Carefully turn the bottom over so that the new base plate is underneath and against the kiln stand. You must use care in turning the bottom over. If it is cracked, the bottom could separate if handled carelessly.

The old base plate is now on top of the brick bottom. Remove the old base plate.

Place the kiln on top of the brick bottom. Slide the base plate edges up inside the stainless steel kiln case. Drill new holes and install the screws that you removed earlier.

This method of replacing the base plate also turns the brick bottom over, giving you a fresh side. Apply kiln wash to the brick bottom before firing the kiln.

This kiln pointer is courtesy of Tony Rodriguez, kiln technician with GSM Enterprises in San Antonio, Texas.

How to Move a Kiln

When moving a top-loading kiln out of the way when not in use, avoid pushing the kiln on the stand. This can damage the stand. Instead, lift the kiln. If you move the kiln frequently, get a deluxe stand with casters. The wheels are heavy-duty and designed to last a lifetime.

It is easier to move a kiln with a large dolly than with a two-wheeler. If you use a two-wheeler, place a flat side of the kiln against the two-wheeler. Do not place the switch box against it. Be careful not to jar the kiln when lowering it to the floor.

Never lift a kiln by the peephole. Use the hand-lifts, or lift from the bottom.

The main concern in moving a kiln is brick damage, especially to the lid. The wiring is usually not affected by a move. Sandwich a 1/16"-thick sheet of foam packing between the kiln body and the lid. The foam sheet must extend under the lid completely so that no section of the lid touches the kiln walls. This is very important. I have seen kilns sent to the factory without the protective sheet under the lid. The kilns were always damaged. If

you are moving a front-loading kiln, place the foam sheet between the door and firing chamber.

Lay a 1"-thick piece of Styrofoam board over a wooden pallet. Then place the kiln on the Styrofoam. (The Styrofoam and pallet must be large enough for the entire kiln.) On top of the kiln lid, place one or two sheets of 1"-thick Styrofoam, and on top of that, a light-weight pallet. Then band the two pallets tightly. If you are moving the kiln a long distance, you could nail vertical 1x4 boards at the corners to form a crate. Then add diagonal boards on the sides for stability.

Do not place anything inside the kiln during a move, especially shelves and posts. Unless your kiln is securely crated, do not place anything on top of it. Place the kiln near the front of a truck or trailer where the ride is smoother.

How to Get a Perfect Mirror Finish on Silver

I am sending you an article by a friend, Janae Cook. I am sure you will enjoy this article if you fire Art Clay Silver or Precious Metals Clay.

How to Get a Perfect Mirror Finish on Silver

One of the most desirable finishes for the Art Clay Silver is a perfect mirror finish. But getting that mirror finish is not exactly easy, especially by hand! And what exactly is a mirror finish anyway?

A mirror finish is a shiny surface that has been polished, or scratched, to a high shine such that you can almost literally see your reflection – like a mirror. The surface you are polishing doesn't have to be completely flush (all at the same level) but it is easier to work on a fairly smooth texture. However, a textured or patterned surface can have a mirror finish on the high spots too.

In order to get a mirror finish, you use higher and higher grit sandpapers that each take away the rougher scratches and make smaller scratches until finally the scratches are so small you can barely see them. Think of a brand-new shiny chrome bumper.

First, start with a fired silver piece and a piece of low grit wet/dry sandpaper like 400. Work in one direction only, going from side to side or top to bottom. Keep going until the entire surface to be polished is uniformly scratched. You should not see any unscratched low areas. If your surface is not all level, then you'll need to use a corner and your finger and work the sandpaper into the low spot so it gets scratched too.

Next, move up to a higher grit sandpaper like 600. This time, work in the opposite direction and in that direction only. (HINT: By working in opposite directions every time, it is easier to see if you've removed all of the previous grit's marks.) Keep going until you can no longer see any of the previous scratches going the other way.

Don't forget to clean your piece and surrounding area each time you change to a new grit of paper. If you are working wet (in a bowl of water or in the sink) you should change the water each time. This will prevent the frustration of contamination and having a piece of larger grit making a huge scratch in a nicely polished surface! If that happens, you have to start back at the beginning. Also, if you are working without water, it is not a bad idea to wear a dust mask to prevent inhaling silver and dust particles. Safety first!

Keep polishing like before in opposite directions with 1200 grit, then 2000 grit. Be patient, you're almost there. There are special polishing papers that go up to 8000 grit and they work really well. You can also use metal polish to get a great mirror shine. We recommend Wenol polish. All you do is apply a small amount to a dry cloth, rub it on and then buff it off with a clean cloth.

Remember, with a mirror finish you should not be able to see any scratches. There's no substitute for a good mirror finish and if you do it right, you will be thrilled with the results.

Written by Janae Cook

April 2004

info@watercolorsglass.com

www.watercolorsglass.com

Cracks in the Kiln's Firebrick Bottom

Someone recently sent me a photo of a cracked firebrick kiln bottom and wondered how to repair it. The photo shows two perpendicular cracks running across the entire bottom and several smaller cracks.

Cracking in the firebrick bottom is usually nothing to be concerned about. No repairs are needed in most cases. As the bricks expand with heat, the cracks come together tightly.

Examine the galvanized sheet metal base plate under the brick bottom. You can check it with a mirror and a flashlight. As long as the base plate is sound, the brick bottom cracks are nothing to worry about. If the steel base plate is falling apart with rust, you can replace it. Or, slide a piece of galvanized sheet metal under the kiln. It would fit between the kiln bottom and the kiln stand.

Though this isn't essential, you could also place a kiln shelf in the bottom of the kiln. Some people place the shelf directly against the brick bottom. Others raise the shelf with 1 1/2" long, 1 1/2" wide posts.

If you use silica sand on the kiln shelves, be careful not to allow the sand to seep onto the firebrick bottom. The sand will get into the cracks and widen them. This is why we do not recommend that you use sand on the firebrick bottom.

Using Kiln Wash with the Kiln Sitter

Note: Most digital kiln owners can skip this pointer. This is for kilns equipped with the Dawson Kiln Sitter.

The metal parts of the Kiln Sitter that touch the small pyrometric cone should be coated with kiln wash. These parts are the two cone supports and the underside of the actuating rod.

Please do not apply kiln wash directly to the pyrometric cone. This could cause a shell to form on the cone, resulting in an over-fire. Apply only a light coat of kiln wash to the cone supports and actuating rod. If the coating builds up, remove with emery cloth and then apply a fresh coat. Do not allow the kiln wash to get inside the porcelain tube.

Wait until the kiln wash dries before placing the small cone on the cone supports. Drying time is usually a few minutes.

Keep a small bottle of kiln wash near the kiln. Some people use a nail polish bottle with the built-in brush as a convenient applicator.

The tops of shelves and the kiln's brick bottom should also be coated with kiln wash. Please be careful when using kiln wash. If it splashes inside an element groove, it will burn out the element.

The Kiln Sitter Firing Gauge

The Dawson Kiln Sitter firing gauge is a small metal disk used to adjust the Kiln Sitter actuating rod. (Note: If your kiln is digital, you can probably skip this kiln pointer. Digital kilns rarely include a Dawson Kiln Sitter.)

Many people have never seen a firing gauge, because it is often thrown away. But the gauge is important. If you don't have one and your kiln has a Dawson Kiln Sitter, you should order the firing gauge. The cost is only \$4.75 plus shipping. Your ceramic supplier may have them in stock.

A firing gauge comes with every new kiln equipped with a Kiln Sitter. Do not fire the kiln with the gauge on the cone supports. The gauge would prevent the Kiln Sitter from shutting off.

Use the gauge to adjust the actuating rod after every dozen or so firings. Place the gauge on the cone supports, sliding the actuating rod through the hole in the gauge. If the actuating rod is not centered in the porcelain tube, loosen the two screws on the guide plate and move the guide plate from side to side.

Lift the Kiln Sitter weight to the raised position. With the firing gauge in place, the trigger should just barely clear the release claw, coming as close as possible without touching. If the gap is wrong, loosen the set screw in the center of the weight, move the trigger and retighten the set screw.

This adjustment is easier to understand when you see pictures. You can download the Kiln Sitter instruction manuals at Paragon's website:

<http://paragonweb.com/catalog.cfm?type=manuals>

The Importance of Vacuuming the Kiln

One of the easiest kiln maintenance tasks you can perform is regular vacuuming. This is especially important if you fire glazes. Vacuum the kiln before every glaze firing.

Use the soft brush nozzle on a vacuum cleaner. Be sure to vacuum the element grooves, the inner surface of the kiln lid or roof, and the underside of kiln shelves.

Vacuuming the grooves is essential if you have had anything explode inside the kiln. Pieces of greenware that lodge inside the grooves can burn out an element.

Vacuum the kiln often if you use silica sand on the shelves. The sand, which is used to support ware during firing, can ruin the elements if it filters down into an element groove.

As you vacuum the kiln, examine the walls for glass or glaze particles that have embedded into the firebricks. Dig these out carefully with a screwdriver. Otherwise the particles will embed deeper into the firebrick during the next firing.

Slumping Glass Bottles in a Ceramic Kiln

Most kilns can slump glass bottles. Wine bottles are a fairly easy project. You don't have to worry about glass compatibility, since you are not fusing different glasses together. (If different types of glasses are fused together, they must be compatible, meaning they must expand at the same rate. Otherwise the piece will crack.)

I saw a slumped glass bottle for the first time in 1984. Frances Darby, who founded Paragon, was experimenting with glass, because we were introducing our first glass kiln. After the kiln cooled, she took out a kiln-washed, ceramic bisque bowl with a bottle slumped inside. She was experimenting to find out if kiln wash could be used as glass separator. "It works!" she said.

Though we knew little about firing glass back then, that first bottle experiment was a success. That's how easy slumping bottles can be.

Use glass separator to protect the shelves from the glass. (Kiln wash also works.) Place the glass onto the shelves, or on molds designed for bottle slumping. The molds will require small holes so that air can escape as the glass bends. At the slightest cracking or peeling of separator or kiln wash, apply a fresh coat.

You must be able to see the glass as it bends. You should position the bottles so you can see them through peepholes. Shut off the kiln when

the glass has bent to the degree that you want. As a starting point, you could fire a bottle to cone 016.

Cooling usually must be slow from 1100 degrees F. to 700 degrees F, which is the annealing range. The smaller the project, the faster the glass can cool through that temperature range. Small earrings, for example, can be taken out of the kiln and left on the shelf within 15 minutes after fusing. Cast glass, on the other hand, takes days to cool.

If the glass cracks, slow down the firing and cooling.

If you slump bottles together into a single piece, they must be of the same brand. Otherwise they will probably break due to a difference in coefficient of expansion.

Kiln Sitter Rod Corrosion

The actuating rod in the Kiln Sitter rests on top of the cone. As the cone bends, the rod moves downward and releases a trigger that shuts off the kiln.

As the rod corrodes, it no longer moves freely inside the porcelain tube. The rod's pivot point causes sluggish movement of the rod. If your Kiln Sitter is giving inconsistent results, this is one of the possible causes. When you raise the rod from inside the kiln and let go, the rod should drop freely.

The tip of the rod corrodes as it ages. That is natural. However, if the corrosion extends all the way up to the pivot point inside the porcelain tube, your kiln is most likely subjected to too much moisture.

The solution to excessive moisture inside the kiln is to dry the ware longer before firing. You could also leave the kiln on low for a longer period at the beginning of the firing. It is better, though, to dry the ware thoroughly before placing it inside the kiln.

Leave the top peephole plug out. This allows moisture to exit the kiln through the peephole instead of through the Kiln Sitter tube. But if you use the Orton down-draft KilnVent, keep all peephole plugs inserted throughout the firing. Leave the KilnVent on during both firing and cooling. If you turn the KilnVent off when the kiln fires to maturity, moisture can build up inside the Kiln Sitter tube as the kiln cools.

If the Kiln Sitter tube corrodes even though you use a KilnVent, make sure that you have enough negative pressure inside the kiln. Orton recommends holding a match above one of the air intake holes in the lid. The air flowing into the hole should pull the flame toward the hole.

A Simple Way to Test Elements

Carl Bosard of North Augusta, South Carolina sent me the following pointer on testing heating elements:

“I have found a simple method of testing elements that anyone can perform. I use thermal fax paper cut into strips 1" wide and 8 1/2" long for this test. I give these strips to customers as a gift with the instructions. A roll of fax paper is cheap and will last for hundreds of tests. When the fax paper is exposed to heat it will turn dark. The paper can be held by a clothespin or over the end of a pencil.”

Instructions

- 1) Turn the kiln on to the high heat setting for not more than one minute. (You will hear the elements hum as they turn on. Digital kilns will make a clicking noise.)
- 2) UNPLUG the kiln. (Very important.)
- 3) Open the kiln.
- 4) Place an end of the fax paper strip on the element for three to five seconds.
- 5) Check the strip to see if it has turned dark. Dark is good; no change means the element didn't turn on. (This could be due to a burned out element, switch, relay, or fuse.)
- 6) Repeat for each element.

Carl Bosard is a kiln technician. You can reach him at Ceramics Unlimited SC, 224 West Avenue, North Augusta, SC 29841 / 803-819-3311.

Thanks, Carl, for kindly sharing your idea.

The Sentry Controller FTL Error Message

FTL is a 12-key Sentry controller error message that means “Firing Too Long.” FTL can appear during either heating or cooling segments. FTL means the temperature has stalled.

FTL will appear when the temperature change is slower than 27°F/60°C per hour and the firing time is four hours longer than the current segment was programmed to fire. If FTL appears during a heating segment, it is usually due to a worn or burned out element, defective relay, low voltage, or a defective thermocouple.

If FTL appears during a cooling segment, it is usually because the segment was programmed to cool faster than the kiln's natural cooling ability. To solve the problem, slow down the cooling rate.

Example: FTL appears during a segment that is programmed to cool from 725°F down to 75°F. The rate is 570°F per hour.

To eliminate the FTL message, try a cooling rate of 100 instead of 570. Or you could remove the segment altogether. The kiln will cool only as fast as its natural cooling

ability anyway. So the cooling segment mentioned above serves no purpose.

When a Kiln Relay Makes a Chattering Noise

Digital kilns and some switch-operated kilns use electric relays to power the heating elements. To turn on the elements, the digital controller sends power to the relays. Inside each relay, the power from the controller charges an electromagnet, which closes electrical contacts that turn on the elements. (You may have experimented with electromagnets in high school science class.)

During normal operation, a relay makes a clicking noise every time its electromagnet brings the contacts together. (Mercury relays are silent, however, because they don't use mechanical contacts.) To better understand how a relay works, take apart an old one you are replacing. You will find the electromagnet and the contacts.

Sometimes a relay makes a chattering instead of a clicking noise. This is usually because the wires inside the electromagnet have over-heated, burning the insulation on the wires and weakening the electromagnet. Since the magnet is no longer strong enough to pull the contacts tightly together, the contacts chatter instead of click.

Before you replace a chattering relay, check the wires connected to it. A loose connection can cause even a new relay to chatter. You can usually tighten loose connections to solve the problem.

Tony Rodriguez, a kiln technician with GSM Enterprises in San Antonio, told me recently that he was repairing a 120 volt kiln that used an infinite control switch and a relay. Shortly after he replaced a chattering relay, the new relay also began to chatter. After examining the wires between the switch and the relay, he discovered that one of the connections was loose. When he repaired the connection, the relay stopped chattering. Tony called to tell me about the repair so that I could share it with you.

Feel free to send questions or comments for future kiln pointers.

Wishing you a prosperous season

How to Estimate Firing Time in the Sentry's Cone-Fire Mode

The Cone-Fire mode in the Sentry digital controller is used for firing ceramics to a pyrometric cone. Cone-Fire is available in the Sentry controller used on Paragon ceramic kilns. Cone-Fire is not available on glass kilns.

To estimate the length of a firing in Cone-Fire mode, you will first need the Sentry instruction manual. If you do not have a copy, you can download it at no charge from Paragon's website:

<http://www.paragonweb.com/catalog.cfm?type=manuals>

The firing schedules programmed into Cone-Fire are shown on pages 26-27 of the manual. These schedules are used in Medium Speed.

You will find a rate and temperature for each segment of a firing schedule. To estimate total firing time, first subtract room temperature from segment 1 temperature. Then divide by its rate. That will give you the firing time for segment 1.

To figure firing time for the other segments, subtract the temperature of the preceding segment from the segment you are figuring. Then divide by rate.

Example

Firing schedule for cone 06, degrees F.:

Segment 1: 324 rate, fired to 1022

Segment 2: 153 rate, fired to 1112

Segment 3: 180 rate, fired to 1720

Segment 4: 108 rate, fired to 1828

Figuring firing time:

Segment 1: $1022 \text{ minus room temperature } (80) = 942 \text{ divided by } 324 = 2.9 \text{ hours}$

Segment 2: $1112 \text{ minus } 1022 = 90 \text{ divided by } 153 = .58 \text{ hour}$

Segment 3: $1720 \text{ minus } 1112 = 608 \text{ divided by } 180 = 3.37 \text{ hours}$

Segment 4: $1828 \text{ minus } 1720 = 108 \text{ divided by } 108 = 1 \text{ hour}$

$2.9 + .58 + 3.37 + 1 = 7.85 \text{ hours total firing time, Medium Speed}$

Subtract 20% for Fast Speed. Add 20% for Slow Speed.

Fast Speed: $7.85 - 20\% = 6.28$

Slow speed: $7.85 + 20\% = 9.42$

Figuring the firing time of a Cone-Fire schedule will give you a good understanding of Ramp-Hold mode. Each Ramp-Hold segment has a rate, temperature, and sometimes hold. Once you understand this, you can change a Cone-Fire schedule to suit your needs and enter it into Ramp-Hold.

At Paragon, we wish you a successful 2004.

Lost Wax Burnout in an Electric Kiln

Lost wax casting is the process of carving a shape in wax, making a mold of the wax shape, and then casting that shape into metal from the mold.

The mold is a negative image of the wax. The wax is melted out of the mold through hollow channels called sprues.

Lost wax burnout is the process of preparing a casting mold for the melted metal that will be poured into it. The steps in lost wax burnout:

- 1) Melt the wax from the mold.
- 2) Remove wax from the kiln before raising the temperature higher than 300°F/148°C.
- 3) Harden the mold at high temperature.
- 4) Maintain the mold at the casting temperature recommended for the type of metal that will be poured into the mold.

Prevent wax or carbon from contacting the kiln's walls and elements. Carbon build-up inside a kiln ruins the interior. Carbon conducts electricity and causes elements to short circuit. Damage to elements from contact with foreign materials is not covered by warranty.

Lost wax casting is the process of preparing a casting mold for the melted metal that will be poured into it.

1) Place a metal tray inside the kiln on three ½" posts. Place the mold on a wire mesh screen on top of the tray. The mold's sprue holes should be down. The tray will catch melting wax as it drips from the sprue holes.

2 Keep the kiln's vent hole(s), if any, open during wax elimination. If the kiln has no vent hole, leave the door open ½". This allows fumes to escape from the kiln. Heat the kiln to 300°F/148°C and hold it at that temperature for at least one hour.

Do NOT heat the wax above 300°F/148°C. Hold at 300°F/148°C for at least one hour. During this hour, the wax will melt from the mold and drip into the tray. If the kiln gets hotter than 300°F/148°C, the wax may smoke and deposit carbon inside your kiln, causing expensive damage.

3 After one hour at 300°F/148°C, open the kiln. Remove the mold and wax tray. Pour the wax from the tray and leave the tray out of the kiln until your next wax elimination. (Do not leave the tray in the kiln!)

4 Heat the mold to the temperature recommended by your jewelers' supply house where you purchased the mold material. This is usually around 1350°F/732°C.

5 Lower the temperature to the casting temperature of the metal. Hold at that temperature until you are ready to begin casting. Remove the mold with tongs. Wear protective gloves and safety glasses.

Saving a Carbon-Damaged Kiln

If you follow the above directions, your kiln should be safe from wax damage. In some cases, a small amount of carbon may form on the walls over a period of time. This is due to the burning of wax residue that was left in the mold. For this reason we recommend that you periodically fire the kiln to 1500°F/815°C as follows:

1 Open the vent cover(s) or leave the door ajar ½”.

2 Fire the kiln empty to 1500°F/815°C at a rate of 300°F/166°C with a one hour hold (01.00).

Detecting a Broken Element

When an element burns out, it can sometimes fool a continuity test.

A continuity test determines if the element can carry electricity. You can perform this test with an ohmmeter, which measures electrical resistance. You can also check continuity with a small test light available from auto parts stores. The test light includes a battery and two lead wires. The preferred method to check continuity is with an ohmmeter.

When an element breaks, it should no longer be able to carry electricity. Sometimes, however, a broken element will show continuity when tested with an ohmmeter or a test light, because as the element cools, sometimes the broken ends touch. If the ends touch, electricity can still travel through the element. Yet when you fire the kiln, the element will produce little, if any, heat.

To test an element, find out the ohms of resistance that the element is rated for. You can get this information from the kiln’s wiring diagram. If an ohmmeter test gives a resistance that is close to the correct resistance, the element is not broken. If the resistance is much higher than the rated resistance, the element could be burned out.

If you suspect that the element is burned out even though you are still obtaining a resistance reading, check the element grooves with a flashlight. You should be able to see the break.

This pointer is from kiln technician Manuel R. A. Tony Diaz Rodriguez.

The Switch-Timer on Paragon SnF Kilns

Paragon SnF kilns use an infinite control switch plus one or two switch-timers. (The Limit Timer on the Dawson Kiln Sitter is a different type of timer.)

A wire from the PL terminal on the infinite control switch powers a clock motor on the switch-timer. After the correct amount of time has elapsed, the switch-timer turns on additional elements.

If you have just replaced a switch-timer, and the new timer does not operate, the reason is usually a crossed wire. The easiest way to track down the problem is to trace the wires inside the switch box using the kiln's wiring diagram. (Before examining the wiring, please unplug or disconnect the kiln.)

The 12-Key Sentry 2.0 Deviation Alarms

A glass artist recently asked me about the error messages on the 12-key Sentry 2.0 digital controller. When he programmed a cooling rate that was faster than his kiln could cool, FTC appeared in the display window. A heating rate that is faster than the kiln can heat results in an FTH message. (FTC = Fail to Cool. FTH = Fail to Heat.)

Even though FTC or FTH appears, the kiln will continue its normal operation. The messages are to alert you that the kiln could not cool or heat as fast as you had programmed. But they will not shut off the kiln.

FTC and FTH are “temperature deviation” alarms. There are four deviation alarms:

FTH (Fail to Heat) The temperature is too low during a firing ramp. (During a firing ramp, the temperature goes up.)

FTC (Fail to Cool) The temperature is too high during a cooling ramp. (During a cooling ramp, the temperature goes down.)

HTDE (High Temperature Deviation) The temperature is too high during either a firing ramp or a hold. When HTDE appears, the controller will shut off the kiln. This is a safety measure. HTDE is the only temperature deviation alarm that will shut off the kiln.

LTDE (Low Temperature Deviation) The temperature is too low during a cooling ramp or during a hold.

All four deviation alarms are turned off when you enter a cooling or heating rate of 9999 in Ramp-Hold mode. (They turn off only during a segment that has a 9999 rate.) Remember that the HTDE alarm (high temperature deviation) will also remain off. This alarm shuts off the kiln when temperature rises too much during a heating ramp or hold.

Some people worry when FTH, FTC, or LTDE appears. They wonder if something is wrong with the kiln. Here are the methods to set the deviation temperature so that the alarm messages do not appear during routine firings:

- 1) Test your kiln to find its fastest firing rate and its slowest cooling rate. Then program the controller using rates within the range of the kiln's heating/cooling capacity. If your fastest heating rate is 600° per hour, enter a rate no faster than 600°.
- 2) Set the deviation temperature to a higher number in the Sentry's Options. The higher the number, the less likely that an alarm message will appear.

3) Set the deviation temperature to 0 in the Sentry's Options. Note, however, that this turns off the HTDE alarm, which shuts the kiln off when the temperature is higher than the deviation setting. We do not recommend a 0 setting.

To adjust the Sentry 2.0 temperature deviation setting:

- 1) From IDLE, press OPTIONS repeatedly until TEDE appears.
- 2) Press ENTER. Change the deviation temperature. Press ENTER. Press STOP to return to IDLE.

When the Kiln Sitter Plunger Overheats

When the Kiln Sitter Plunger Overheats

If the Dawson Kiln Sitter overheats, the white plastic plunger can get so hot that it melts. The easiest way to prevent this problem is to make sure the high temperature washer on the porcelain tube is pressed against the firebrick kiln wall. A spring wire retainer keeps the washer in place. This helps prevent heat from escaping from the kiln.

It is also possible that the wires connected to the Kiln Sitter contact block are loose or corroded, causing the block to overheat. This, in turn, overheats the plunger. Another reason for overheating is that the wires connected to the Kiln Sitter contact block are too light a gauge.

Wishing you a happy summer

Firing Speed and Pyrometric Cones

During the last 100 – 200 degrees, the firing rate affects the bending temperature of a pyrometric cone. The faster the rate, the higher the temperature when the cone bends.

But the firing speed before the last 100 – 200 degrees has no influence on the final temperature of the pyrometric cone. The exception is an extremely fast firing that bloats the cone. I have seen that happen in the Paragon QuikFire, which can reach 1000°F in five minutes. When the cone bloats, it loses its accuracy.

Firing Corrosive Clays

The two elements in clay that are especially corrosive are fluorine and sulfur. Avoid clays with large amounts of these elements. Your clay supplier should be able to tell you how much of each is in your clay. Clays that are especially troublesome are the varieties that potters dig up themselves.

If your clay contains these impurities, you should use a KilnVent, downdraft type, to remove the fumes from the kiln. Make sure you have good air flow through the KilnVent.

Keep the vent running until the kiln reaches room temperature. If you turn the vent off too soon, the gases will condense on the vent motor, causing excessive corrosion.

Loose Thermocouple Connections

A loose connection in the thermocouple wires of a digital kiln can cause the temperature readout to fluctuate. Sometimes the temperature readout will appear normal, yet will not be accurate. Loose connections cause intermittent firing problems. Sometimes a loose connection will make the display readout freeze at one temperature.

To solve the problem, first check the thermocouple wires at all connection points. This will include the back of the kiln controller and, on most kilns, the ceramic thermocouple block where the wires attach to the thermocouple.

Pull on the wires at the back of the controller. If you have button-type connectors, it is possible that one of them has stuck in the downward position. Look at the buttons. Are they level, or is one lower than the other? If one is lower, it is stuck. This would be the cause of a poor connection. Press down on the sticking connection button until it releases and moves upward freely. Then gently tug the wires to make sure they are tight.

Check the ceramic thermocouple block for tight connections. It is possible that an over-tightened screw has broken a thermocouple lead, causing a poor connection. (The thermocouple leads are the two small wires that come directly from the thermocouple, which extends into the firing chamber.) In this case, you may have to replace the thermocouple.

It is also possible that the connection point inside the thermocouple is bad. If you have a sheathed thermocouple, you will not be able to see the tip, where the two wires connect. A poor connection inside the thermocouple can cause the same problems as a poor thermocouple lead wire connection.

Preventing Wire Damage After Removing a Switch Box

Occasionally it is necessary to remove the switch box of a kiln to replace elements, thermocouples, a switch, etc. An important last step, often overlooked, is to arrange the wires inside the switch box before fastening it to the kiln.

After you have finished the kiln repair, arrange the switch box wires so that when the switch box is placed against the kiln, no wire touches an element connector or the kiln case. These get hot enough to eventually burn off wire insulation, which could cause a short circuit. If you ever turn on the kiln and you hear a loud bang, it is due to a short. I've seen 1/2" holes blown in switch boxes caused by a short circuit.

If your kiln includes wire nuts inside the switch box, tuck them out of the way. They must not contact the kiln case or element connectors. If you have a Kiln Sitter, keep wires away from the plunger mechanism and contact block. Wires in the way can interfere with normal Kiln Sitter operation.

On digital kilns, you will find a thermocouple (temperature sensor) inside the firing chamber. On the outside of the kiln wall, you will find wires that connect the thermocouple to the digital controller. Try to keep the thermocouple wires away from other wires. The electrical field around heavy-amperage wires can interfere with the thermocouple readings, especially when the thermocouple wires are wrapped around other wires or are pressed right next to them and kept parallel.

Check that the element ends of a new element are cut off flush with the element connectors. If the element end sticks into the switch box, it can short out against other components.

If you are replacing a switch with one of a different brand, observe any difference in size between the switches. If the new switch is deeper than the old, it may short out against an element. If the new switch is deeper, use “stand-offs” (available from hardware stores) to add space between the switch box and the kiln. (A stand-off is a ¼” long barrel that fits over the switch box screws. It is inserted between the kiln case and switch box.)

It takes only a moment to arrange the wires inside a switch box. Please do this every time you remove the switch box of a kiln.

Thermocouple Placement in the Firing Chamber

A thermocouple reads the temperature inside the kiln. It is used on pyrometers and digital controllers. It looks like a ceramic or metal rod protruding into the firing chamber through a kiln wall.

The thermocouple must extend into the firing chamber far enough to pick up an accurate temperature reading. If a shelf bumps against the thermocouple and pushes it out of the firing chamber, a digital kiln may over-fire. This is because the thermocouple will measure the cooler temperature inside the kiln wall rather than inside the firing chamber. The controller will try to compensate by making the kiln fire hotter.

So, every time you load the kiln, be sure the thermocouple extends into the firing chamber by the correct amount. Your instruction manual should include that information. As a rule of thumb, the thermocouple must extend into the firing chamber four times its diameter. Example: a ¼” wide thermocouple should extend into the firing chamber by 1”.

Some thermocouples are housed inside a separate ceramic sheath, which protects the thermocouple from the harsh kiln atmosphere. It is possible for the sheath to extend into the firing chamber by the correct amount, yet the thermocouple may not be pushed far enough into the sheath. In this case, the thermocouple will appear to extend the correct distance into the firing chamber even though it does not. This can cause an over-fire. When you install that type of thermocouple, be sure to push it into the ceramic sheath by the correct amount. That information should be included with the installation instructions.

Finding Electricians

Several months ago I was helping a customer fix a kiln over the phone. She was very upset and had worked on it for hours out in the cold.

Then she had an electrician come over. He had never seen a kiln before in his life, yet he fixed it in minutes, because he knew how to read a wiring diagram and was highly skilled with circuits. It was a pleasure to deal with him.

Suggestion: if you can't find a kiln repairman, look for an electrician who has had experience working on machinery.

How to Position Cones on the Shelf

Most people have difficulty seeing the witness cones on the kiln shelf during firing. But if you position them just right, you can see them even at cone 10, when the kiln interior turns white-hot.

Being able to see the cones during firing is your assurance that the kiln is firing normally. If the kiln takes longer than usual to fire and you cannot see the cones, you may worry that something has gone wrong. Maybe the kiln is even over-firing.

In formulating these guidelines, I tested a welder's facemask, mirror, and high intensity flashlight. You don't need those items, even for cone 10 viewing.

- 1) Place the cones 8" - 12" away from a peephole. Positioning them closer makes them difficult to see.
- 2) Have enough space around the cones to keep them from touching a piece of ware when they bend.
- 3) Position cones so that when viewed from the peephole, they are silhouetted by an element on the opposite kiln wall. (Keep cones at least 2" from an element.) The element that silhouettes the cones should be level with the lower part of the cone. If the element is in line with the upper part of the cone, you won't be able to see the cone when it bends.
- 4) If you use the three-cone system, always have the higher temperature cone on the same side in every firing. Otherwise you can lose track of which cone is which.
- 5) Wear firing safety glasses when viewing the cones through the peephole. See your dealer if in doubt about which cone number to use with each clay and glaze.

The Orton KilnVent

Question:

I am using a clay that produces more fumes than usual. Should I keep the kiln lid open during candling? Should I vent the lid to get rid of the extra fumes? (I am using the Orton KilnVent.)

Answer:

Some clays contain an especially high number of impurities. If the Orton KilnVent has enough intake vent holes, it can vent the fumes from even those problem clays.

a) When using the KilnVent, keep the lid or door completely closed and the peephole plugs inserted throughout the firing. Otherwise the KilnVent will not remove the fumes. This is because the KilnVent requires negative air pressure inside the kiln. Keep the door/lid closed and plugs inserted even during candling.

b) If you smell fumes in the room while the KilnVent is running, you may need an additional air intake hole for the KilnVent. Orton has published a chart showing recommended number of intake holes for each size kiln. You can obtain that chart by calling Orton at 800-999-5442.

3 Phase Wiring

3 phase electric is more efficient to wire than single phase. It takes smaller breakers and thinner circuit wires.

Some electric companies charge less for 3 phase power than single phase, because of reduced distribution costs.

However, a 3 phase kiln uses the same number of watts as a single phase kiln.

Ordering Checklist

Ordering a kiln can be complicated. But it doesn't have to be. Save checklist for future reference to avoid problems.

1. Is your dealer knowledgeable about firing? This can be as important as the price of the kiln.
2. Can the dealer perform warranty repair? If not, you may have to do any warranty work yourself or send the kiln to the factory. Especially if you buy the kiln over the Internet, find out how the dealer handles warranty.
3. If comparison shopping, have you asked about the cost of crating? Are you paying extra for the stand or the Limit Timer?
4. Do you have a covered, well-ventilated location for the kiln, protected from the weather? Is the area free of flammable materials? If you are going to use the garage, plan on parking the car in the driveway during firing.
5. Is the kiln room large enough? You will need 12" of additional clearance on all sides of the kiln during operation. We do not recommend small, enclosed rooms such as closets.

6. Will the kiln fit through the doorway? Measure to be sure. I know of cases where doorways had to be torn down to move the kiln into the firing room.
7. Are you sure about voltage and electrical phase? 240 and 208 volt outlets cause confusion because they look the same. Check with your power company if in doubt. Ordering a kiln of the wrong voltage can be very expensive!
8. Will you need special wiring? Figure this into your budget before ordering the kiln.
9. Larger kilns: will you need help unloading the kiln upon delivery? Package handling companies off-load and uncrate for a small fee. Otherwise make sure you have enough people to help unload the kiln. Unless you have a forklift, ask if a truck with lift gate is available.

Repairing a Bulging Element

It is important to heat the elements before pushing them back into the groove. You can do that with a propane torch, which costs about \$20 at building supply stores. Use long-nose pliers to squeeze the coils together slightly while the element is hot. That should shorten the bulging section of element, allowing it to go back into the groove.

Then fire the kiln above cone 05. At higher temperatures, the elements soften to the point where they will not support their own weight. Thus, they conform to the shape of the element grooves.

Elements pop out of the grooves usually in the corners. When you install a new element, it is important to push the element all the way to the back of the corners.

I once asked the former plant manager at Paragon, who had worked here since the early fifties, for pointers on element installation. His main advice was to keep a steady pressure against the element as you thread it into the grooves. If you let go of the element or let up on the pressure, it will spring out of the corners.

He added that the bends in the pre-formed element must fit into the corners. Occasionally stretching or compressing is necessary to get the bends to fit into the corners. He suggested that if one section of element is too long to reach the next corner, let that portion bulge out of the groove. After the element is installed, go back and compress the bulging portion of element with long-nose pliers.

Before firing the kiln, seat the element into the bottom of the grooves using a plastic comb or wooden tongue depressor.

A Kiln's Voltage (3-28-02)

The voltage of your power supply affects the kiln's firing speed.

When you buy a kiln that fires too slowly, check the kiln's voltage. It is listed on the electrical data plate located on the side of the switch box. Make sure the voltage matches that of your building. A 240 volt kiln in a 208 volt building will fire too slowly.

Sometimes the heating elements of a used kiln do not match the voltage listed on the electrical data plate. This is because the elements were changed to suit a different voltage. If you suspect this of your used kiln, call the manufacturer and ask for the wiring diagram. It will list the resistance of the elements, which you can check with an ohmmeter.

Paragon Kiln Maintenance Seminar (3-28-02)

You are welcome to attend the Paragon In-Plant Kiln Maintenance Seminar, to be held April 19 - 20, 2002.

For details, please call 800-876-4328 or email paragonind@worldnet.att.net.

Thermocouples

The small rod that extends into the firing chamber is the temperature sensor, or thermocouple. Bumping the thermocouple can push it out of the firing chamber. This could cause an overfire! The controllers do not include an alarm to detect this type of failure.

Thermocouples come in different widths. The wider the thermocouple, the farther it should extend into the firing chamber. A ¼" diameter thermocouple should extend into the firing chamber about 1". A 1/8" thermocouple should extend ½" – 5/8".

The thermocouple wires attach to the earlier DTC 600 – 1000 series controllers using screws. When turning the thermocouple screws on the back of the controller, grasp the thermocouple attachment block to prevent it from turning. Thermocouple wires attach to the new Sentry controller with push button connectors. After attaching, pull the thermocouple wires to be sure they are tight.

The Kiln Sitter Tube

Our good friend David Coggins from "Down Under" shares the following pointer:

Debris from exploding ware inside the kiln sometimes lodges in the Kiln Sitter refractory tube. These fragments can interfere with the travel of the actuating rod, resulting in an over-fire. After you have removed exploded clay fragments from the firing chamber,

always check the refractory tube for debris. It may not be readily apparent that fragments are still inside the tube.

David also recommends that each time you vacuum the kiln, also vacuum the tube assembly. First, remove the cone supports from the Kiln Sitter tube. Then place a vacuum hose directly over the tube. This removes not only debris but also rust from around the pivot point.

I would add that whenever placing a cone on the cone supports, check the travel of the actuating rod. It should be free to move up and down without binding.

Thanks, David, for the great idea.

Tightening Element Connectors

One of the most common reasons for element failure is loose connectors.

Paragon element connectors should be tightened to 30 - 36 inch pounds. This is about 1 1/4 turns past the point of firm resistance.

A loose element connector will get too hot, which can turn the connector a greenish color. (Sometimes white.) If you observe this on your kiln, you can try tightening the connector. However, since the element has already been fired, tightening the connector may break the element. This is why it must be tightened properly at the time of installation.

If, when tightening the element connector, you feel the threads strip out, remove the connector and install another. A connector with stripped threads will be burn out. Suppose the head of the screw or bolt on the element connector twists off? That's okay, as long as the threads are still holding.

Use locking pliers (i.e. Vice-Grips) to hold the barrel of the connector while you tighten the screw. Then tighten the hex-head screw with a 1/4" nut driver. You can grip the screw better with a nut driver than with pliers.

Another important point: after installing the element, cut off the element end even with the connector. I have seen cases where the pigtail shorted out inside the switch box because the end wasn't cut off.

You can probably find a use for the pigtail ends. Some people untwist them and use them for element staples.

I hope these suggestions help you the next time you change an element.

Glass Fusing: Cleaning & Gluing

Glass fusing is the process of heating two or more layers of glass to the point where they deform and stick together. In this email, I will share a couple of simple pointers: how to clean and glue the glass before firing.

Grease, dirt, and fingerprints etch permanently into glass during firing. Clean the glass with glass cleaner (the type without silicones), rubbing alcohol, or even plain water just before assembling the pieces on the kiln shelf.

Use white glue, such as Elmer's diluted 1:1 with water, to hold the glass pieces together after you place them on the kiln shelf. Use the glue sparingly. Glue is especially important when fusing wire into the glass. The glue prevents the glass or wire from moving out of place before they fuse. The glue disappears during firing.

Avoid using glue on the coated side of dichroic glass. If you lay dichroic glass carefully onto the piece, glue is unnecessary, so avoid it altogether if you do not know which side of the dichroic is coated.

Downloading Instruction Manuals

I'm writing to let you know that you can download instruction manuals, free of charge, at Paragon's website: www.paragonweb.com. I just added the new Caldera 20 page manual to the download list.

The manuals are in Adobe Acrobat format, which can be read on any computer, PC or Mac, that contains the Acrobat Reader. You can get the reader at no charge.

To download the manuals:

- 1) Go to www.pragonweb.com.
- 2) Click on MANUALS at the top of the home page.
- 3) Select the manual. Specify where you want to store it on your computer.

Please be patient. The downloads sometimes take 10 minutes or so.

In a few days I will add another manual to the website. Here is the list of our current on-line manuals:

Caldera Instruction and Service Manual

Cone-Fire Firing Record

Ramp-Hold Firing Record

Ramp-Hold Firing Profile Sheet

Disassembling the Paragon Sectional Kiln

DTC 100 & 100C Instructions

DTC 1000 Instructions

How to Install a ¼" Diameter Thermocouple

Installing Dragon Accessories

Kiln Maintenance Seminar Registration

LiteLid Adjustment

SC Series Instruction and Service Manual

Sentry 12-Key Controller Instructions

Sentry Xpress 3-Key Controller Instructions

Trouble Shooter for the DTC 100, 600, 800 & 1000 Series Controllers

Upgrading the Duncan Kiln Controller

I hope you find the information useful.

ELEMENT PINNING AND BULGING

Was your new element pre-bent where it fits into the wallbrick corners? A replacement element with pre-formed corner bends is fairly easy to install. If you push the bends all the way back into the corners, you should not have extra element length at the end of installation.

Elements should not be pinned if possible. One way to avoid pinning is to heat the kiln to at least 05 after installing a new element. At higher temperatures, the elements will soften and conform to the grooves. This prevents the elements from bulging out past the groove recess later on.

If you do pin a new element, you should wait until after the element is completely installed before inserting pins. That way, if the element is too long or too short, you won't have to remove the pins to reinstall the element.

It is important to keep a constant pressure against an element as you install it. The pressure is a push with one hand while you thread the element with the other hand. The pressure keeps the element in the

corners of the grooves. Without that pressure, the new element will tend to spring out of the corners, causing element bulging later on.

Replacing an element is not difficult. I replaced my first element during a demonstration at a repair seminar. John Hohenshelt Sr. had just purchased Paragon. At his first seminar, he told the group, "And now Arnold will show you how to install an element." He didn't know that I had never installed one before.

As students crowded around and peered into the kiln, I threaded the new element into the grooves. I pushed the bends into the corners, and the element was the exact length needed.

If I installed my first element successfully, other beginners can, too. The important thing is to follow the instruction sheet that comes with the element.

Repair Cement

The firebrick repair cement we use in the factory is "Liquid Kiln Coating & Repair Cement," available in pint bottles. This cement holds very well.

Several miscellaneous repair pointers:

We have found that the thinner the cement seam, the better. Try to make the two firebrick surfaces match as closely as possible.

Spray water onto both firebrick surfaces before cementing. Tony Rodriguez, a kiln repairman, recommends adding soap to the water. Mix 1 drop of liquid dishwashing soap to one cup of water. The soap reduces surface tension of the water to help it absorb better into the bricks. Use a small spray bottle.

Sometimes kiln users fill in the low spots of their firebrick bottoms with repair cement. The cement breaks out from the firebrick when applied full-strength as a filler. If you need to fill in a gap, use Kaolin Grog mixed 1:1 with cement. Kaolin Grog, available in 5 lb. bags, is powdered firebrick dust. With kaolin grog, the filler more closely matches the coefficient of expansion of the firebrick and stays in place.

The Importance of the Wiring Diagram

A kiln's wiring diagram is invaluable when you are having electrical problems with the kiln. It takes little skill to compare the kiln's wiring to the diagram.

Unplug the kiln. Remove the screws fastening the switch box to the kiln. With the help of the diagram, identify each electrical device in the switch box. You will find, on a digital kiln, a transformer, relay(s), fuse, and controller. A manual kiln uses switches.

Once you have identified the parts, use the diagram to trace the wiring, one wire at a time.

A customer called me a few years ago with continuous, baffling problems with her kiln. After several calls, I finally suggested that she check the wiring diagram. She did, and sure enough, someone had mis-wired the kiln. She fixed it in minutes, and the kiln fired to her complete satisfaction. That's when I realized the importance of the kiln's wiring diagram in solving kiln problems.

I might add that it is easier than you think to get the wrong diagram, even in the packet that came with the kiln. Check the voltage listed on the diagram.

Dawson Kiln Sitter Pointers

You should not fire your kiln until you have read instructions on the Dawson Kiln Sitter. You need to know how to calibrate it with a firing gauge, how to load it with the small cone, and how to adjust it. It is a very simple, reliable device that shuts the kiln off when the small cone bends. But if used improperly, it can overfire your kiln.

Misunderstanding the Kiln Sitter has caused a lot of frustration.

One time a customer wanted me to fly to her home in North Carolina to pick up her kiln and take it back. The problem was only a Kiln Sitter out of adjustment.

Another customer thought her heating elements were bad. Again, the problem was only a Kiln Sitter with a bent rod. In both cases, problems that seemed serious were easy to repair.

If all the switches on your kiln fail, it is likely due to dirty Kiln Sitter contacts. Before replacing the switches, check the Kiln Sitter.

As you can see, a little information can save hours of frustration. We hope you find the instruction manual a useful time-saver.

Pyrometric Cones

Ceramists of the past judged when the firing was completed by the color of the heat and length of firing. In 1886, a German ceramist named Seger made clay cones that bent when the ware received the proper heat work. He positioned the cones on a shelf inside the kiln. By looking through a view port in the kiln, he could see the cones bend and knew when to turn off the kiln. His cones took the guesswork out of firing.

Today we still use Seger's cones. They are small pyramids of clay and mineral oxide that soften and bend when exposed to heat. When consulting your dealer with a glaze problem, you should have a bent cone from that firing. The cone will help trouble shoot the problem. The cone lets you compare one firing to the next. If the cone bends less and less with each firing, it indicates that the thermocouple is wearing and will soon need replacement. Without cones it would be difficult to know that.

Cones are manufactured by the Orton Ceramic Foundation and available from your distributor.

Cone Numbers

The most confusing thing about cones is the way they are numbered. But once you understand the reason behind the numbers, the system becomes clear. Pyrometric cones are numbered from 022 through 01 and 1 through 10. Cone 022 matures at the lowest temperature, and 10 matures at the highest. Seger numbered his original cones from 1 to 20, with 1 being the lowest temperature. Later, cones of even lower temperatures were needed, so new numbers were added. The new numbers started with "0" and went from 01 to 022, with higher numbers getting progressively cooler.

To avoid confusion, think of the "0" as minus. Numbers without the "0" are positive. The higher the positive number, the higher the temperature. "0" numbers are negative. The higher the negative number, the lower the temperature. With this understanding, you can quickly see that cone 5 is hotter than 05. The number is stamped on the base of the cone. The cone number for each material is usually stated on the label by the clay or glaze manufacturer. Your supplier can also give you the cone number.

Heat Work

Cones are rated by temperature. But it is more accurate to think of them as measuring heat work, not temperature alone. Heat work is the combined effect of time, temperature, and the atmosphere inside the kiln. All these factors affect the maturity of your ware and not just temperature. For instance, firing to a lower temperature for a longer time will produce the same maturity as firing to a higher temperature for a shorter time.

Consult your supplier for recommended firing rate. (Rapid firing is like cooking: the turkey may be done on the outside but not on the inside.)

Using Cones

Place the cone on a kiln shelf with the ware. Kiln wash shelves before placing cones on them. The cone slants 8 degrees from vertical and bends in the direction of the slant. Place the cone so that it will not touch nearby ware as it bends. Cones come in either standard or self-supporting. Standard large cones must be mounted in a clay or wire plaque with 2" of the cone exposed above the cone holder. Self-supporting cones stand upright without holders. We recommend self-supporting cones; they are easier to use than standard large cones.

Handle cones carefully. If dropped, they may develop cracks that could affect their performance. Age and normal humidity do not affect the accuracy of cones. However, do not use them if they become wet.

Loading the Top Shelf of a Top-Loading Kiln

On top-loading kilns, placing a shelf too close to the top of the firing chamber can lead to over- or under-firing.

Suggestions for placement of the top kiln shelf:

- 1) Mount the top shelf low enough so that element grooves show between the kiln lid and top shelf.
- 2) Place tall ware on the top shelf. This necessitates lowering the position of the top shelf.
- 3) If the ware on your top shelf is over- or under-firing, try using two half shelves instead of a full shelf. Stagger the height of the shelves.

15 Kiln Safety Pointers

Some of these safety pointers came from experiences that I heard from kiln owners. Following these pointers adds very little extra time to a firing.

- 1) Do not leave the kiln unattended during firing. Check the kiln from time to time. Observe the normal sounds that it makes and length of firing time. Once you are familiar with the normal operation of your kiln, you will know when something goes wrong.
- 2) Keep the lid closed when the kiln is not in use. This keeps dust out of the kiln. Also, should someone turn on the kiln while you are away, the closed lid will keep the heat safely inside the firing chamber.
- 3) Never place anything on the kiln lid, even when the kiln is idle. If people become accustomed to placing papers and other objects on the kiln, they may forget and do that while the kiln is firing. During operation, the lid may get hot enough to burn combustible materials placed on top of it.
- 4) Remove all tripping hazards from around the kiln. Keep the kiln's supply cord out of traffic areas.
- 5) Do not let the cord touch the side of the kiln, which may damage the cord.
- 6) Avoid extension cords.
- 7) Do not remove the ware from the kiln until the kiln has cooled to room temperature. It is possible for thermal shock to break hot ceramic pieces. The sharp edges of broken ware can injure hands.
- 8) After firing glazed ware in your kiln, examine the shelves for glaze particles. Sharp slivers of glaze stuck to the shelf can cut hands. Before rubbing a hand over a shelf, be sure the shelf is free of glaze shards.

9) Fire only approved materials purchased from a knowledgeable supplier. Do not fire marbles, pieces of concrete, rocks, and other objects. Rapid heating to high temperature can cause violent reactions in many materials.

10) Greenware, which is unfired clay, must be bone dry before firing. Moist greenware can explode inside the kiln, damaging the ware and the kiln. Place a piece of greenware against the inside of your wrist. If it feels cool, it is too wet to fire.

11) Do not fire cracked shelves. They can break during firing, damaging the ware inside the kiln.

12) Store kiln shelves in a dry area. Moist shelves can explode inside a kiln.

13) If you smell burning plastic, turn the kiln off. Examine the wall outlet and supply cord for signs of burning.

14) Never place extra insulation around the kiln in an attempt to conserve energy. The extra insulation can cause the wiring and the steel case to over-heat.

15) Do not wear loose-fitting clothing around a hot kiln.

Wishing you success in all your firings

From Paragon: Two New Downloadable Kiln Manuals

We have just loaded two new kiln manuals to our website:

1) The Home Artist Kiln Instruction and Service Manual. The Home Artist kiln is a new ceramic fiber, portable kiln that fires to 2000°F. Download the 24 page Acrobat document by clicking on

<http://www.paragonweb.com/catalog.cfm?type=manuals>

Then click on Home Artist Kiln.

2) The new Sentry Xpress 3-key Controller Manual. This 16 page manual includes the new features of our current 3-key controller. This controller just began shipping. This is the controller that the Home Artist kiln uses.

To download the manual, click on

<http://www.paragonweb.com/catalog.cfm?type=manuals&startrow=11>

Then click on Sentry Xpress 3-key Controller Manual, New.

Ceramic kilns with a 3-key controller, such as the Home Artist kiln, include Cone-Fire and Ramp-Hold modes with the Sentry Xpress. Glass kilns with a 3-key controller, such as the Fusion series, include Single Segment and Ramp-Hold modes.

The Basics of Loading a Kiln with Ceramic Ware

These general guidelines apply to all types of ceramic ware. In future emails, I will send guidelines for loading greenware, glaze, and overglaze.

- 1) Never fire glass or glazed ware directly on the kiln's brick or fiber bottom. Always fire these items on a shelf coated with kiln wash or glass separator.
- 2) To make full use of your kiln's firing capacity, group similar sizes of ware together inside the kiln.
- 3) Place taller pieces on the top shelf.
- 4) Keep ware at least 1" away from a heating element. If the tip of a large piece of ware comes closer than 1" to the kiln wall, position that section of ware between rows of elements.
- 5) For stability, stack posts so that they are directly in line with each other vertically.
- 6) Minimum spacing between shelves is 2 ½".
- 7) Stack shelves so there is at least one row of element between any two shelves.
- 8) Posts used with each shelf layer should be at least 1" taller than the ware.
- 9) Keep ware and kiln shelves 1" - 1 ½" away from the thermocouple or Kiln Sitter tube.
- 10) Load the top shelf to a height where one element row is between the top shelf and the top of the kiln.
- 11) When loading ware and shelves, do not dislodge the thermocouple.
- 12) Do not move the kiln or bump into it after you have loaded it. This could topple the ware inside.
- 13) Angle a witness cone on a shelf so that when the cone bends, it does not touch nearby ware.

Loading and Firing Low-Fire Greenware

Low-fire greenware has a firing range from cone 06 to 02. The greenware must be bone dry before firing. Otherwise, it will crack or even explode during firing. Check for dryness by touching to cheek or the inside of a wrist. Ware will be cold if not dry. Another indicator of moisture is patches of darker color in the clay.

Handle greenware carefully. Cradle the pieces from the bottom. Do not lift by a rim.

Low-fire greenware pieces do not stick together during firing. Therefore, greenware may be stacked so that it touches each other. Place small items around larger ones. You can also place light greenware pieces inside larger ones. This is called nesting. Be sure that there is plenty of room for expansion inside the larger pieces. Pack nested pieces lightly so that heat can still circulate freely around each piece. Black rings in the fired ware indicate that the nested pieces were packed too tightly to burn off all the carbon.

Greenware does not need stilts. Fire ware in the position in which it will be used when finished, except for large pieces with flat, vertical surfaces such as wall plaques and clocks. These should be fired flat to prevent warping. Pieces to be used together, such as a box with its lid, should be fired in place to ensure a good fit. You can also stack mugs and bowls rim to rim.

Low-fire greenware firing is simple. Just be certain the greenware is fired to the pyrometric cone recommended by the clay supplier. If the greenware is not fired hot enough, the piece will absorb moisture after it has been glaze-fired, causing the glazed surface to crack. This is called “crazing” and is most often due to underfired greenware. To help eliminate crazing, fire greenware at least one cone hotter than glaze, and even hotter if glaze can still be applied easily to the hard bisque. While glaze may be applied to greenware and fired once, separate firings produce better quality, so we do not recommend single firing of greenware and glaze.

Allow the kiln to cool to room temperature before opening the lid.

Greenware and Glazed Ware In the Same Firing

The clay is fired in two separate firings: the greenware, or bisque, firing, and the glaze firing. Greenware should not be fired in the same load as glazed ware. Not only do the two types of ware mature at different temperatures, but gases from the greenware can discolor the glaze and also cause glaze bubbles.

If you must fire greenware and glaze pieces in the same load, place the glazed pieces in the bottom of the kiln and the greenware pieces on a shelf above.

Firing Low-Fire Glaze

Your hands must be clean when touching glazed ware. Oil and hand lotion will leave fingerprints. If you scrape off or damage the color during handling, you can usually repair it by applying more glaze over the damaged spot before firing.

The difference between loading greenware and glazed ware is that glazed pieces must not touch each other, the floor, or a shelf in your kiln during firing. If this happens, they will be permanently bonded together and ruined by the melted glaze.

The natural expansion and contraction of the kiln's firing chamber during each firing generates tremendous stresses. As a result, fine grains of dust may form on the firing chamber and should be removed before each firing. Vacuum the walls, bottom and inside surface of the lid with the soft brush nozzle attachment of a vacuum cleaner.

Glaze and clay must expand and contract at the same rate. If the glaze shrinks more than the clay, the glaze will "craze," forming small cracks. If it expands more than the clay, it will "shiver," breaking off in sections. Test each clay and glaze combination using clay scraps such as broken bisque pieces.

Use stilts to support low-fire glazed ware during firing. The shelf tops and floor MUST be kiln washed with all purpose, high fire kiln wash for protection from glaze drops. (Apply kiln wash to insulating firebrick floors; do not apply to ceramic fiber.) Kiln wash only the top side of the shelf. Kiln wash on the underside of the shelf will flake off onto glazed ware placed below the shelf.

Glazed pieces must be thoroughly dry before firing and should not be fired with greenware unless both mature at the same cone. Even then, separate the glaze from the greenware by loading glazed pieces in the bottom of the kiln and greenware on shelves above. Low-fire glaze usually fires to a lower cone than greenware, so firing time will be shorter if glazed pieces are loaded separately.

Check to make sure that first, no two pieces of glazed ware are touching each other, the kiln walls, the floor or the shelves; and second, that the underside of the kiln shelf is clean before you place it over glazed pieces. Any dust falling on your ware will cause pinholes.

To eliminate stilt marks, you can prevent glazed pieces from sticking to the shelf by "dry footing." This is an alternative to stilting. To "dry foot" a piece, remove all glaze from the portion of the piece that will rest on the shelf. Using a wet sponge or a piece of grit cloth, clean off the glaze from the bottom of the ware and slightly above the base so that it will not run down and touch the base. Do not use dry footing for low-fire glazed pieces that will be placed in water while used or cleaned. The unglazed areas will absorb water, which can cause glaze crazing.

Vent the lid with the lid prop for about an hour. Red glazes should be placed in the top of the kiln for extra venting. Separate clear glazes from colors. Load clear glazes in the bottom of the kiln and colors above them. Pieces that go together, such as a cup and

saucer or bowl and lid, should be placed next to each other. This helps assure uniformity in color. Keep pieces at least ¼ to ½” apart. The bubbles and gases emitted from glazes can contaminate other nearby pieces. If you are firing ware draped with lace, vent the lid until all smoke disappears.

To keep holes in glazed salt and pepper shakers from closing in with glaze, insert tooth picks in the holes. They will burn away during the firing.

Allow the kiln to cool to room temperature before opening the lid.

Feel free to experiment with firing speed using throw-away samples of bisque. Some glazes look better when fired at a particular speed.

Remove the stilts from the ware after firing by breaking the thin film of glaze holding them. Handle with caution. Remove the sharp stilt edges by rubbing with a stilt stone, electric grinder or hand grinder.

KILN SITTER CONES

A general rule of thumb is to fire one cone hotter in the Kiln Sitter than on the shelf. This applies to some kilns. Only experimentation will determine if it applies to yours.

If the shelf cone of the correct number does not bend all the way, and the Kiln Sitter shut off properly, fire a hotter cone in the Kiln Sitter the next time. To fire to 06, you might try an 05 cone in the Kiln Sitter. If the shelf cone bends too far, fire a cooler cone in the Kiln Sitter.

The freestanding cones (self-supporting) are easier to use than the standard large cones. Results are more consistent, too. However, you can make a cone "pack," or holder, by pressing the standard cones into a small wad of wet clay--just enough clay to make the cones stand upright. Poke holes into the clay with a toothpick to speed drying. The important thing to remember with this method of cone placement is that the slant of the cone must match the slant built into the base (8 degrees). With the wrong slant, the shelf cone will not bend accurately.

Kiln Sitter Cone Does Not Bend

A customer complained to me that the Kiln Sitter cone would not bend. The most common reason for this is that the wrong cone was used. The cone number stamped on the side of the cone is small. It is easy to load the wrong cone.

If the Kiln Sitter does not trip, even though the cone bends, check the rod for free movement inside the porcelain tube. (The porcelain tube will last longer, by the way, if the top peephole is left open, or if you use a downdraft vent. This reduces the flow of fumes through the porcelain tube.)

It is also possible that a wire inside the switch box has obstructed the movement of the Kiln Sitter parts, not allowing the Kiln Sitter to trip. I have seen that happen.

Downloadable Wiring Diagrams and Instructions

We have just added more instructions at www.paragonweb.com, which you can download at no charge:

Ohmmeter Test for A-Series and other early Paragon kilns

Recommended Tools for Kiln Repair

To download, click on the link below:

<http://www.paragonweb.com/catalog.cfm?type=manuals&startrow=11>

We have also added these wiring diagrams to the website:

A-11-6B
A-23B-3
A-24B
A-24B-3
A-28B-3
A-55B
A-66B
A-66
AA-6B
AA-6
A-77B
A-82B
A-82B-3
A-81B
A-88B
AA-8B
AA-8B-3
A-99B
A-99
A-100B
H-16A
H-16B
H-17A
H-17B
K-6A
K-6B

To download, click on the link below:

<http://www.paragonweb.com/catalog.cfm?type=wiring>

Buying a Used Kiln

The condition of the heating elements is important. The elements should not sag out of the grooves.

Elements are not difficult to replace, though. A more important consideration in buying a used kiln is the condition of the bricks. That is a good indicator of how well the kiln was treated. If the bricks are in mint condition, the kiln was cared for.

Also, bricks are difficult to replace; elements are comparatively easy.

Another important consideration is circuit wiring. Will you need a new circuit installed? If so, be sure to install the circuit recommended by the manufacturer. For that, you will need the kiln's wiring diagram.

The reason I mention this is that Paragon A-series kilns (last made in 1987) use the 4-wire system. Some electricians insist on installing a 3-wire circuit for the A-series kilns. But the 4-wire system is safer. You should be aware of that when buying a used kiln.

Sometimes, the used kiln will have the wrong cord. So before installing the circuit, look at the wiring diagram. Don't depend on the cord plug as a guide.

Peephole Plugs in Ceramic Firings (sent 10-18-02)

It is important to vent the kiln thoroughly at the beginning of the firing. Leaving the peephole plugs out at the beginning helps venting.

Most people leave the top peephole plug out throughout the firing. But if you are getting a glaze defect near the peephole, then you would want to keep the peephole plug inserted. Sometimes air exposure crazes the glaze on ware placed near the peephole.

If you are using a fan to lower room temperature, do not let the fan blow air into the peepholes. Position the fan to blow air across the non-peephole side of the kiln.

If you leave the top peephole out throughout the firing, the Kiln Sitter tube will last longer. This is because fumes exit through the peephole rather than through the porcelain tube. The fumes cause a build-up of glaze inside the tube.

If you use a downdraft kiln vent, leave the plugs inserted throughout the firing, including the top plug. This is because the vent draws air

from the bottom of the kiln. The plugs must be inserted to form adequate negative air pressure inside the kiln.

3 New Manuals to Website

I have just added three new Paragon instructional publications to our website. Please feel free to download them to your computer.

1) Digital Controller theory: how the controller is wired inside the kiln. This chart shows how the transformer, controller, and relays work together. Controllers are not as complicated as they seem, as you will see by this chart.

2) Firing Guidelines poster:

Firing checklist
Kiln loading guidelines
Pyrometric cone chart
How to see cones on the shelf
Monthly kiln maintenance
°F/°C conversion formula

This is an 11" x 17" wall poster to be placed near your kiln. Unless you have a large-format printer, you may have trouble printing a copy. Email your postal address and we will mail you a copy. Send your request to paragonind@worldnet.att.net.

3) 4 page Kiln Installation and Safety booklet:

Choosing a location
Electrical installation
Orton KilnVent & Vent-A-Kiln hood
Kiln safety rules

We have an extensive collection of on-line manuals available free at our website. They are in Adobe Acrobat (pdf) format.

You can get to the manuals download page by clicking on the link below:

<http://www.paragonweb.com/catalog.cfm?type=manuals>

How the Downdraft Vent Affects Glazes

Penny Hosler of Sequim, Washington asked a question about a recent Kiln Pointer I sent out.

I had said that if you place low-fire greenware and glazed ware in the same load, the glazed pieces should be in the bottom of the kiln and the greenware should be on shelves above.

I also stated, "Vent the lid with the lid prop for about an hour. Red glazes should be placed in the top of the kiln for extra venting. Separate clear glazes from colors. Load clear glazes in the bottom of the kiln and colors above them."

Penny said, "I have an EnviroVent under the kiln floor, so I have always assumed that the greenware should be at the bottom so the gases are sucked out first and don't contaminate my glazed pieces above them. Does having the heat and oxygen traveling downwards make a difference?"

The Skutt EnviroVent that Penny mentioned is a down-draft kiln vent. The Orton KilnVent is similar to the Skutt. This type of vent draws air from the bottom of the kiln through small holes drilled into the firebrick bottom. Makeup air enters the kiln through holes drilled into the lid. The air removed from the kiln is vented outside through an aluminum dryer duct.

My Kiln Pointer recommending that glazed ware and greenware be loaded separately in the kiln was for kilns without the down-draft vent. With the vent, you can mix glazed ware and greenware on the same shelf in the kiln. Because the atmosphere is oxygenated and replenished, glazes are not as affected by surrounding ware.

I asked Penny about her experience with the down-draft vent. She replied, "I've had EnviroVents for about eight years with no problems whatsoever. The heating and cooling are very even - no hot spots, no difference in glaze appearance from one side of the pot to the other, and they really make a difference when I'm firing thick pieces. My thick, carved tiles used to crack if they weren't precisely in the middle of the shelf, but with the vents running it doesn't seem to matter where I put them."

Thanks, Penny, for responding to the Kiln Pointer.

The Down Draft Vent (sent 12-26-02)

The down draft vent system is positioned under a top-loading kiln and usually on the back wall of a front-loading kiln. The vent removes fumes through small holes drilled into the firebricks. There are several brands of vents available. An example is the Orton KilnVent.

If you fire a top-loading kiln with the Orton KilnVent turned off or removed for repair, cover the air exit holes in the kiln bottom. An easy way to do this is to place a kiln shelf over the holes.

Leave the vent on throughout the kiln firing and cooling cycle. Turn the vent off when the kiln is cool enough to unload bare-handed. The vent will help remove

moisture during “candling” at the beginning of the firing. The moisture inside the duct and motor will dry out as the kiln heats.

When using the vent, leave the kiln’s peephole plugs in place and lid down all the way throughout the firing. The vent operates under negative pressure, which requires that the lid and peepholes be closed.

When the aluminum duct begins to deteriorate, small holes will appear, and you will begin to smell kiln fumes. At that point, replace the duct rather than attempt to repair with duct tape.

Wishing you a happy New Year

Preventing Kilns from Rusting (Sent 1-7-03)

Firing clay with a high sulfur content will rust the kiln. If you cannot avoid this type of clay, be sure to install the Orton downdraft KilnVent. It removes the fumes before they can rust the kiln.

Another cause of rust is firing moist greenware. This slows down the firing, too, because burning off the moisture requires energy. A sign that you are firing moist greenware is water dripping from the kiln case. Before you decide to change elements because your kiln is firing so slowly, find out if moist greenware is the reason for the slow firing.

If for some reason you must fire moist greenware, use the Orton KilnVent. Again, it will help prevent rust, because it will draw the moisture from the kiln during candling.

The Sounds Your Kiln Makes

We can often tell when something is about to fail on a car by the sounds it makes. Sometimes kilns give warning sounds, too. Here are some of the sounds that a kiln makes:

- 1) The elements on some kilns hum when they turn on. This is because they vibrate in the brick grooves due to magnetism between the coils. This sound is normal.
- 2) The clicking noise of a manual fire kiln is also normal. It is the sound of an infinite control switch cycling on and off. Each time the switch turns on the power, the elements may also hum. When the clicking turns into a popping noise, the switch is probably about to fail. You should keep a spare one on hand.

3) Another source of clicking is from the relay, which is found on digital kilns and a few manual fire kilns. To turn on the elements, a digital controller sends 12 volts to the relay. The relay, in turn, sends full voltage to the elements. Every time the relay turns on, it clicks. (Note: mercury relays are silent.) If you hear a chattering noise, the relay is about to fail. Keep a spare one on hand.

4) A popping from inside the kiln may be ware exploding due to moisture in the clay. During the initial heating stage, water expands. If the kiln heats slowly, the water evaporates harmlessly. If the kiln heats too fast, the water inside the clay blows up. Dry the greenware before firing, vent the kiln, and fire slowly.

5) A loud POP from the kiln's switch box usually means that a loose electrical connection has just failed. This is sometimes preceded by a crackling noise. If you hear crackling, which sounds like sparks, turn off the kiln.

The loose connection creates a tiny electrical arc, which overheats and fails. A rapid arcing causes the popping noise. Whenever you change elements or have the switch box open for any reason, check all the wire connections. Make sure they are tight. (The power must be disconnected, of course.) Tug on the wires. If a wire pulls out of a terminal, replace the terminal with a new one using a good crimping tool. Remove dust before closing the switch box. When you replace elements, make sure the connections are tight.

If you have questions about kilns, feel free to send an email to me. Maybe you can think of other kiln sounds that I left off my list.

Recently I asked for feedback on Paragon kilns and service. Many of you kindly responded. I will answer your emails soon. I appreciate the helpful feedback you gave me.

Dichroic Glass

Dichroic glass has a bright, reflective surface that can add a dazzling touch to a fused glass piece.

However, I have found that too much dichroic can overpower the basic design. Sometimes a tiny sliver of dichroic glass can add more drama than large pieces, especially in jewelry.

Dichroic is so expensive that artists use every scrap. I've even used the smallest bits of dichroic left over from cutting. I used them in a jewelry piece. Cut dichroic on a surface where you can collect the smallest shards afterward.

You should use a good oil reservoir glasscutter for dichroic glass. I learned this the hard way. We were cutting dichroic sheets at Paragon for the first time, and the pieces kept breaking. Then I brought an expensive oil reservoir cutter from home, which sliced the dichroic effortlessly.

Dichroic shows up well against a dark glass background.

Do not use glue with dichroic. Lay the pieces in place without the glue, loading carefully into the kiln to avoid jarring.

When the glass side of dichroic is up, the bright reflective coating looks richer. The glass acts as a coating that enhances the dichroic. You may prefer to have the coated side up. Just be aware that having the coated side up or down produces two different effects.

Element Pins

Sidewall Elements

Ordinarily, you should not need pins in sidewall elements that use dropped, recessed brick grooves. One of the few exceptions is sometimes a large square kiln. Element pins should be avoided in a sidewall element, because replacing a pinned element takes twice as long as replacing one without pins.

If elements are popping out of a dropped, recessed brick groove, it is probably because the element was not pushed all the way to the back of each corner. The element should also be bent at the corners. The bends must be pushed the back of the corners.

If the element is too short for the corner bends to fit into the back of each corner, expand sections of element with automotive snap-ring pliers. If sections of element are too long for the corners to fit properly, shorten the element sections with needle-nose pliers. As you thread the element into the groove, maintain a constant pressure that pushes the element into the groove. If you let go of the element while threading it, it will pop out of the groove. The element is like a spring under tension.

Glass Kiln Roof Elements

When placing element pins in the lid of a glass kiln, push the pins in at a 45 degree angle. They will stay in longer when inserted at an angle rather than straight.

Insert the pins in such a way that they do not touch other nearby pins. If two element pins are angled toward each other inside the firebrick and touch, they will short out part of the element.

Preparation of Copper for Enameling

Enameling is the process of fusing glass powder to copper, silver, or gold. The fusing temperature is 1450°F/787°C. A small front-loading kiln, a kiln with a bead annealing door, and the Paragon QuikFire are suitable for copper enameling. You will also need either a pyrometer or a digital controller.

The first step in enameling is to prepare the copper.

Enamels come in transparent or opaque. They can be purchased directly from Thompson Enamel at www.thompsonenamel.com.

Start with one of the many pre-shaped copper forms available, or shape and trim the copper to your own design.

You will need an enameling wire rack, available from your kiln supplier. Heat the copper on the enameling rack inside the kiln to about 1400°F/760°C. This will burn off oil or grease. Burning impurities on the copper will form smoke. When the oil and grease have completely burned away, the smoke will disappear and the copper color will change to a purple-red-pale green iridescence. Do not fire the copper any longer than this point. Otherwise excess fire scale will form.

After the copper cools, brush any loose scale from the copper. Use a brush or paper towel, being sure that you do not put any grease or oil onto the copper, such as fingerprints. Clean the copper with a 3M Scotch-Brite® pad. This pad does such a good job that in most cases no further cleaning will be required. Additional copper cleaning products are available from Thompson Enamel, including Sparex No. 2.

It is best to clean the copper just before you decorate it. If you wait too long to decorate after cleaning, the copper could collect dust and dirt again.

Paragon In-Plant Basic Kiln Maintenance Seminar Oct. 3 – 4, 2003

Paragon In-Plant Basic Kiln Maintenance Seminar October 3 – 4, 2003 (Friday & Saturday)

At our in-plant seminar you will learn basic electricity, the multi-meter, switch replacement, electrical troubleshooting, element replacement, Kiln Sitter operation, and much more. Seminar students will receive a service manual in a 3-ring notebook.

Meals, Airport Pickup, Hotel

As a seminar student, you are a VIP guest at Paragon. We furnish lunches on both days and dinner the first evening. At the seminar you will not only learn about kilns but meet new friends from all over the country.

Suggested Lodging: Holiday Inn Express, IH 635 & Military in Mesquite, Texas. 972-288-9900. Ask for Paragon's corporate rate.

If you arrive before 8:00 p.m. the day before the seminar, we will pick you up at Love Field or D/FW International Airport. Please call ahead with flight number, arrival time and airport. We will take you back to the airport between 6 and 8 p.m. Saturday or 9 and 12 a.m. Sunday.

We will spend one day teaching the seminar at the Holiday Inn Express (972-288-9900) and the other day at Paragon's Mesquite, Texas plant.

Schedule

Friday: 8:00 a.m. to 5:00 p.m. (Coffee and snacks served around 7:15 a.m.)

Saturday: 8:00 a.m. to around noon. (Coffee and snacks served 7:15 a.m.)

Registration:

Seminar Fee: \$90.00

Please call 800-876-4328 to register. The seminar fee is refundable if you cannot attend. For information by email please write to paragonind@att.net.

Directions to the Paragon Plant

If you are driving, take the Town East Blvd. exit off Highway 80. This is east of downtown Dallas, 1 1/2 miles west of where Highway 635 crosses Highway 80 in Mesquite. We are a block south of Highway 80 on Town East Blvd.

We hope you can make it to the seminar!

Reasons for Cones Breaking in the Kiln Sitter

- 1) The cones might have been roughly handled, resulting in fine hairline cracks. These can break during firing.
- 2) If the Kiln Sitter sensing rod is binding at the pivot point, it can exert too much pressure against the cone. Binding of the rod can be due to glaze buildup inside the porcelain tube. Make sure the sensing rod can pivot freely.
- 3) A very fast firing can break the Kiln Sitter cone.
- 4) The Kiln Sitter could be out of adjustment. Please adjust every month or so with the Kiln Sitter firing gauge.

The cone has a number stamped onto one of the sides. You should place the cone in the Kiln Sitter with the number side down. That side is the smoothest of the three sides. Placing that side down lessens the chance of breakage.

If you know of other reasons for Kiln Sitter cone breakage, please let me know by sending an email to arnoldhoward@att.net.

Correcting Reversed Thermocouple Wires on a Digital Kiln

The thermocouple is a temperature sensor that protrudes into the firing chamber. The wires that connect the thermocouple to the digital controller are color-coded. It is important to follow the color coding when installing a new thermocouple.

If you reverse the thermocouple wires, you will get an error message. It varies depending on the brand of controller. For the Sentry 3-key and 12-key controllers, “TCR” means reversed thermocouple wires.

If the thermocouple wires are reversed at one location, reversing the wires at another location will not fully correct the problem.

Example: You remove the controller and find that the thermocouple wires are on the correct terminals on the back of the controller. The wires are reversed at the thermocouple block. If you reverse the wires at the controller, the temperature readout will appear to be correct, but it will not be accurate.

The thermocouple wires must be on their correct terminals at both the thermocouple block and the controller. Reversing wires at the controller to avoid gaining access to the thermocouple block will not fully correct the problem.

Decorating Copper with Enameling

Decorating the Copper

Counter Enameling

Most enameled pieces should be counter enameled on the back side. This gives the piece a much more finished look, it eliminates a great deal of fire-scale cleaning, and it controls the chipping and cracking that can result from the different rates of expansion and contraction in copper and enamel after the enamel has been fired.

Counter or backing enamel, a mixture that gives a mottled effect, can be used for counter enameling. Or you can use regular enamel. Counter enamel is applied by the sifting method described next.

When firing counter enamel, underfire it so that the fire scale on the front of the piece isn't too difficult to remove. You can purchase a masking preparation from your supplier to help prevent fire scale. You must place the piece on a stilt when firing the other (front)

side of the piece. The stilt prevents the back of the counter enameled piece from sticking to the enameling rack.

Applying Enamels

Apply enamel over a clean sheet of paper so you can pour the excess back into the bottle for reuse. Transparent enamels should be applied in several thin coats. Transparent enamels can be mixed with fairly good results. If opaque enamels are mixed, however, a grainy effect results. The two basic methods of applying enamels are sifting and spatula.

Sifting Enamel

Spray or brush Thompson holding agent onto the copper. Then sift a 1/32" layer of enamel onto the copper. Use a #60 mesh sifter. If the coat is too thin, you can easily add another coat after firing. But a coat that is too thick will bubble and crack. The enamel must dry completely before firing.

Spatula or Inlaid Method

You can use this method to decorate a small area with many different colors. Using a diluted solution of Thompson holding agent, dampen the enamels just to the saturation point, and maintain this moisture while working with the enamels. Apply the enamels onto the copper with a small spatula, and spread them out with a spreader to a coat of about 1/32" thick. Lines of contact can be formed by the spatula blade. Then spray the enamels with the holding agent to keep the grains of enamel in place. Allow the enamel to dry completely before firing.

Kiln Wash

This information also applies to glass separator.

Kiln wash does not melt at high temperatures and thus forms a protective barrier between kiln shelves and ceramic glaze.

Do not apply kiln wash to the bottom of a ceramic fiber kiln such as the Paragon SC-2 or Home Artist. However, you should apply kiln wash to the bottom of firebrick kilns.

Do not let kiln wash splash onto the walls of the kiln when applying it to the kiln bottom. You can protect the walls with a piece of cardboard. Kiln wash that has splashed onto the walls may eventually end up in an element groove. This could burn out an element.

Do not apply kiln wash to the posts. Apply it to the top of each shelf but not to both sides. Kiln wash on the underside of a shelf will flake onto the ware underneath.

Let the kiln wash dry overnight. You can speed drying by placing shelves in the kiln and heating to around 200 degrees F. for an hour or so. The kiln-washed shelves are still wet if they are cool to the touch.

Hold porcelain and stoneware away from the kiln when wiping off kiln wash from freshly fired pieces. If you wipe off the kiln wash while holding the pieces above the kiln, the dust can settle into an element groove and destroy an element.

How to Program Cooling in a Digital Controller

To control the cooling rate, program a segment to a lower target temperature than that of the preceding segment. Most controllers do not use minus numbers for cooling. Just enter a lower target temperature than that of the previous segment.

If you want controlled cooling down to room temperature, use a target temperature of around 100 degrees F. If you want to control cooling through the annealing range of glass, you might use a target temperature of 750 degrees F.

The kiln will cool down to the target temperature (i.e. 100 or 750 degrees F) at the rate you specify. Then the kiln will shut off.

Suppose you enter a cooling rate that is faster than the kiln is able to cool? Depending on the rate you enter, you may get an alarm message. The controller, of course, cannot speed cooling beyond the kiln's natural cooling rate.

Note how long it takes your kiln to cool down naturally after it shuts off. Divide the temperature the kiln cooled by the hours of cooling. That is the kiln's natural cooling rate. To avoid error messages, program a slow cooling segment at a slower rate than your kiln's natural cooling rate. If your kiln cools at 200 degrees per hour, the controlled cooling rate should be 200 degrees or less.

Some glass artists flash-cool the glass just after it fuses. They open the door a few inches to remove heat, then close it again. This takes the glass down rapidly through the devitrification range. To program a flash-cool, use a rate of 9999. This shuts off the heating elements during that segment, allowing the kiln to cool rapidly. Cooling slowly through the annealing range would require a separate segment.

Note: During fast cooling, do not open the door all the way. Do not force-cool the kiln with a fan.

Controlled cooling is available on most but not all digital controllers. (That feature, for instance, is not available on the DTC 100, Paragon's first controller. But it is available in the DTC 600, 800, 1000, Sentry 2.0, and Sentry Xpress series Ramp-Hold mode. The Sentry 2.0 also has Slow Cooling in Cone-Fire.)

How to Estimate the Kiln's Natural Cooling Rate

After last week's kiln pointer, several people asked more questions about slow cooling.

Q. Why would one need slow cooling?

A. With some projects, it is necessary to control the kiln's cooling rate. For instance, fusing thick glass pieces requires slow cooling to avoid cracking the glass. Certain ceramic glazes look better when cooled slowly after the kiln reaches maturity.

Q. I get an FTC message on my Sentry controller when I use a slow cooling rate.

A. Most digital controllers can slow down the cooling rate. But if you program a cooling rate that is faster than the kiln's natural ability to cool, you may get an error message. For instance, Paragon's Sentry 2.0 will flash FTC (Failed to Cool) if the programmed cooling rate is too fast. To avoid that error message, estimate your kiln's natural cooling rate:

During a typical firing, write down the temperature and time that your kiln fired to maturity. Let the kiln cool naturally. Every two hours, write down the temperature shown on the digital controller. If you have a switch-operated kiln, you will need a pyrometer to read the temperature.

To figure cooling rate, subtract a temperature from the one that came two hours before. Then divide by two hours. That is the hourly rate.

Example:

The kiln shuts off at 2200°F.

After two hours, the temperature falls to 1800°F.

2200 minus 1800 equals 400

400 divided by 2 hours equals 200

In this example, the cooling rate is 200° per hour. The cooling rate may get slower the closer the kiln gets to room temperature.

To avoid the FTC (Failed to Cool) message, program a slow cooling segment at a slower rate than your kiln's natural cooling rate.

A Vibrating Down-Draft Kiln Vent

The down-draft kiln vent is widely used on ceramic kilns.

The vent pulls a small amount of air from the kiln during firing. The fumes removed from the kiln are then vented to the outside through a duct. Most vents are placed under the kiln, often between the kiln bottom and the kiln stand.

There are several reasons for the motor to vibrate:

- 1) The kiln stand is unlevel. This can twist the vent plate and cause vibration. This may be the cause if the vibration begins right after you move the kiln or after you first install the vent.

2) The squirrel cage is dirty, which throws the vent off balance. To clean the cage, disconnect the 4" duct where it attaches to the squirrel cage. Vacuum the dirt from the vent. Do this regularly.

Some people sweep dirt under the kiln while the vent is on. This sucks up the dirt and vents it outside. Avoid this practice, because it will clog the vent. Keep the kiln room clean, especially around the kiln, to lengthen the life of your kiln vent.

3) The kiln fumes eventually rot away the squirrel cage, resulting in vibration. The solution is to rebuild the kiln vent from a parts kit or to replace it.

Top/Bottom and Center Section Elements

Before changing heating elements, you must know if your kiln uses more than one type of element.

The top and bottom are the most difficult areas to heat in a typical top-loading electric kiln. Since these areas require extra heat, the top and bottom elements of most Paragon SnF and TnF kilns generate more heat than the center elements.

If a top/bottom element is reversed with a center element, the kiln will fire unevenly. So when you receive a new set of elements, check the element labels. Install elements marked TOP/BOTTOM and CENTER in the correct locations.

Your kiln's wiring diagram and the element price list will show if your kiln uses top/bottom and center elements. (Some kilns use only one type of element throughout the firing chamber.)

When ordering elements, give the correct kiln model number. This is shown on the kiln's electrical data plate—the small black plate riveted to the side of the switch box.

Repairing Lid/Roof Element Pins

Most of Paragon's glass kilns use a new element groove in the lid or roof that eliminates element pins. The element coils are wider than the groove opening, so the elements stay in place without pins.

The earlier lid/roof elements were held in place with pins. Follow these steps to repair a pin that becomes loose or falls out:

1) Dip the element pin into a mixture of kiln repair cement. You will need only a small amount of cement on the prongs of the pin.

2) Insert the pin into the firebrick lid or roof at a sharp angle—almost sideways. If instead you insert the pin so that it is vertical when the lid is closed, the pin may eventually work its way out of the groove again.

3) When inserting the pins, make sure that the tip of a pin does not touch another pin inside the firebrick lid or roof.

KILN REPAIR SEMINAR

Just a reminder—Paragon is holding a Basic In-Plant Kiln Maintenance Seminar October 8 & 9, 2004. Click on the following link for information:

<http://www.paragonweb.com/news.cfm?type=seminar>

We hope you can attend.

SENTRY 2.0 TROUBLE SHOOTER

We have just added a new 16-page trouble shooting guide for the Sentry 2.0 digital controller. You can download it from this link:

<http://www.paragonweb.com/catalog.cfm?type=manuals&startrow=51>

How to Alter a Digital Firing in Progress

Someone asked, “How do I override a digital controller during firing? Can I press Stop but somehow continue firing?”

There are several ways to override a digital controller, depending on the brand. One method is to just press Stop. Make a change in the program, such as adding another segment, and press Start again. The controller will continue firing, taking up where it left off before. You might want to double-check your manual, but this would apply to most brands of controllers.

When you turn the controller back on after pressing Stop, the controller will go to the first segment that encompasses the current kiln temperature. If the kiln is at 1500 degrees F when you press Start, and segment 2 starts at 1400 degrees and ends at 1700, then the controller would begin firing at segment 2. This is the way most controllers operate.

Some models, such as the latest Sentry 12-key, allow you to edit a program during firing. Press the 4 key. The display will show the target temperature of the current segment. Change the temperature if needed. Then press Enter. The display will then show the hold time of the current segment. Change the time, if needed, and press Enter. The kiln will resume firing.

Some controllers, such as the Sentry 12-key, also have an "add time" feature that allows you to add time to a soak without having to press Stop to make the change.

Inspecting the Thermocouple of a Digital Kiln

Digital kilns use a thermocouple to measure the temperature inside the kiln. The thermocouple is the small rod protruding into the firing chamber.

Bumping the thermocouple can push it out of the firing chamber. This could cause an overfire. The controller does not contain an alarm to detect this type of failure. Bumping the thermocouple could also cause it to give inaccurate readings.

Thermocouples come in different widths. The wider the thermocouple, the farther it should extend into the firing chamber. A 1/2" - 3/4" diameter thermocouple should extend into the firing chamber about 1". A 1/8" thermocouple should extend into the chamber 1/2" - 5/8". (Do not be concerned if your thermocouple extends into the firing chamber even farther.)

Keep shelves, posts and ware 1" - 1 1/2" away from the thermocouple. If these items are too close, they can temporarily throw the temperature reading off. Keep an extra thermocouple on hand, especially if you fire hotter than 2000°F/1093°C.

Just a reminder: We have loaded a new publication to www.paragonweb.com: "Trouble Shooter for the Sentry Controller." You can download it from the following link:

<http://www.paragonweb.com/catalog.cfm?type=manuals&startrow=61>

Or go to www.paragonweb.com and click on "Manuals" at the top of the page. Then scroll through the manual titles. Please be patient when downloading. The trouble shooter is 16 pages and takes awhile if you have a dial-up connection.

The Inner Workings of a Digital Kiln

A digital kiln is not complicated. When you understand how it works, you may find greater satisfaction in firing the kiln, because it won't seem so intimidating. Knowing how it works will also simplify the maintenance on your kiln. This information applies to basically any brand.

The first item in the digital circuit is a 1/2 amp fuse, which helps protect the controller from power surges. This fuse is usually located on the side of the kiln's switch box. If the controller display ever stops working, the first thing to check is the 1/2 amp fuse.

The next item in the circuit is a transformer, which converts the power to 24 volts AC. The transformer is easy to recognize. It is a square block wired between the power cord and the controller. The transformer is needed because the controller operates on 24 volts.

Wired to the controller is a heat sensor, which is a small rod that protrudes into the firing chamber. We call this sensor a thermocouple. It is made of two wires of dissimilar metal joined together in the thermocouple tip. When heated, the thermocouple actually produces a small voltage. The controller is a computer that converts that voltage to a temperature.

The controller is a switch that turns on the heating elements to maintain the correct temperature inside the kiln. But the controller cannot turn on the elements directly. It uses an electromagnet called a relay. When the controller needs to raise the heat, it sends a 12 volt signal to the relay. That energizes an electromagnet inside the relay, which pulls electrical contacts together. This, in turn, sends power to the heating elements. When the controller senses that the heat is about to rise too far, it shuts off power to the relay. (Some kilns have more than one relay.)

Monthly Maintenance on a Ceramic Kiln

Monthly Kiln Maintenance

1. Make sure the kiln is centered on the stand and that the stand is stable. Remove flammable materials from around the kiln.
2. Vacuum the kiln with the brush nozzle of a vacuum. Remember to vacuum the brick grooves. If you have difficulty removing debris inside the grooves, use a narrow wand-type vacuum cleaner nozzle being careful not to scrape the brick walls.
3. Vacuum around and under the kiln: floor, shelves, and walls. This keeps the kiln interior cleaner and adds life to the vent motor.
4. Check the kiln wash on shelves and kiln bottom for cracks and bare spots in the coating. Remove any glaze drips. Reapply kiln wash if needed.
5. Check the power cord and outlet for heat damage. Has the cord touched the side of the kiln during firing? This will damage the cord insulation. Replace the cordset or wall outlet that shows signs of heat damage.
6. Make sure elements are not bulging out of the grooves. Repair if necessary.
7. Coat the inner lid surface and the top rim of firebrick with kiln coating cement after every few months of regular firing.
8. Kiln Downdraft Vent: Check the aluminum vent duct for leaks.
9. Digital kilns: Make sure the thermocouple extends far enough into kiln. (1/4" wide: 1"; 1/8" wide: 5/8".)

Kiln Sitter Maintenance

1. Use the Kiln Sitter firing gauge to calibrate the trigger every 20 firings. If you do not have a gauge, order one.
2. Remove and examine the cone supports. Replace if warped.
3. Apply kiln wash to the cone supports and end of the actuating rod.

4. Move the actuating rod up and down. It must move freely inside the porcelain tube.

Please send other kiln maintenance tips if you have any that I haven't listed.

Understanding Digital Firing Rate

At Paragon we are often asked about the firing rate of a digital kiln. "Does the increase in temperature always assume a one hour time period?" someone asked. "If I need to get to 300 degrees in 30 minutes, would I set the ramp for 600 degrees per hour?"

The answer is yes. Rate is figured in degrees per hour. At a rate of 100 degrees per hour, the kiln would take 10 hours to reach 1000 degrees.

It may be easier to understand rate if you compare it to miles per hour. 60 miles per hour, for instance, is one mile per minute. A firing rate of 60 degrees is one degree of temperature rise per minute.

Once you understand that firing rate is figured in degrees of temperature change per hour, you can transfer a firing record from a switch-operated kiln to a digital kiln. Here is an example from a manual kiln that I test-fired:

4:00 p.m.: START

6:00 p.m.: 1876 deg. F.

The kiln reached 1876 degrees in two hours. Room temperature was about 76 degrees. Subtract room temperature from the final temperature to figure the kiln's actual temperature rise. $1876 - 76 = 1800$, or total temperature rise. Divide that amount by hours fired to figure degrees of temperature rise per hour. 1800 divided by $2 = 900$. The rate to be programmed into a digital kiln is 900.

Basic Kiln Sitter Maintenance

Here are more pointers for the Kiln Sitter:

Last week Dave Coggins mentioned the importance of regular Kiln Sitter maintenance. I have included Kiln Sitter tips with this newsletter at the request of a reader:

1) Before loading a cone onto the cone supports (the metal tabs where the small pyrometric cone is placed), check that the actuating rod can lift up and down freely. If the rod movement feels sluggish, corrosion may have built up inside the tube. Sometimes you can clean out the tube using long cotton-tipped applicators. (They look like Q-Tips.) Do not fire the kiln until the actuating rod moves freely. If necessary, replace the tube.

2) The cone supports must be clean. Use emery cloth to remove traces of greenware, corrosion, or bits of melted cones. These foreign materials will catch on the cone,

preventing it from slumping freely. Coat only a light coat of kiln wash on the lower side of the rod and on the upper edges of the cone supports. A build-up of kiln wash will alter the cone's shut-off temperature.

3) If the Kiln Sitter does not shut off when the weight drops, the locking slide inside the Kiln Sitter may be corroded or dirty. About once a year, unplug the kiln and remove the switch box that houses the Kiln Sitter. Pull the box straight out to avoid damaging the Kiln Sitter tube. Leaving wires attached, clean the backside of the Kiln Sitter. Canned air is helpful. (But do not blow air into the Kiln Sitter tube.) When you reinstall the switch box, arrange the wires so they do not interfere with the locking slide that trips when the weight drops. (You can see how the locking slide works by lifting the weight, pressing the plunger, and then dropping the weight.) Also, arrange the wires inside the switch box so that wires do not touch element connectors or the kiln case.

4) Adjust the Kiln Sitter every dozen or so firings using the firing gauge. This is a small disk that ships with new kilns. (Many people throw away the firing gauge thinking that it is used only during shipping.)

THE KILN SITTER FIRING GAUGE

Place the gauge on the cone supports, sliding the actuating rod through the hole in the gauge. If the actuating rod is not centered in the porcelain tube, loosen the two screws on the guide plate and move the plate from side to side.

Lift the Kiln Sitter weight to the raised position. With the firing gauge in place, the trigger should just barely clear the release claw, coming as close as possible without touching. If the gap is wrong, loosen the set screw in the center of the weight, move the trigger, and retighten the set screw.

This adjustment is easier to understand when you see pictures. You can download the Kiln Sitter instruction manuals at Paragon's website: www.paragonweb.com

<http://paragonweb.com/catalog.cfm?type=manuals>

5) Never lean anything against the kiln's switch box. After reading last week's kiln pointer, Joe Spitzer wrote that he knows of two cases where a shelf leaning against the Kiln Sitter prevented the weight from dropping, causing an over-fire. Leaning something against the Kiln Sitter can also put it out of adjustment.

Preventing the Kiln Sitter from Over-Firing

The Kiln Sitter is a mechanical shut-off used on some ceramic kilns. The Kiln Sitter operates so reliably that it is often neglected. When used improperly, it can over-fire the ware. These pointers will help prevent that problem.

- 1) Warn others not to touch your kiln while it is firing. Bumping the Kiln Sitter release claw can move the guide plate out of alignment, preventing the actuating rod from dropping. This will over-fire the kiln. (The actuating rod rests on top of the small cone in the Kiln Sitter. The release claw is on the other end of that rod. The guide plate adjusts the release claw from side to side and is held in place with two screws.)
- 2) Place only stable ware inside the kiln near the Kiln Sitter tube. If someone bumps the kiln, an unstable stilted piece could fall against the actuating rod, causing an over-fire.
- 3) Keep ceramic shelves at least one inch above or below the Kiln Sitter tube. If jarred, a shelf that is even with the tube could press against the actuating rod, causing an over-fire.
- 4) A piece of exploding greenware could lodge against the actuating rod, causing an overfire. Make sure greenware is bone dry before firing.
- 5) Keep a record of your firings so that you will know how long a firing should take. Then set the Limit Timer on the Kiln Sitter for 30 minutes to an hour longer than the expected firing. (If your Kiln Sitter does not have a knob, it doesn't have the Limit Timer.)
- 6) Learn to estimate the temperature inside the kiln by the color of light around the lid. This will help you to know at a glance if the kiln is over-firing.
- 7) Place witness cones on the shelf and position them so you can see them through a peephole. If you ever suspect that the kiln is firing too long, check the cones.
- 8) Never leave the Kiln Sitter unattended during firing. Though it shuts off the kiln automatically, it still needs the operator's attention.

Pottery Time Capsules

I am sending an interesting message from a potter named Mel Jacobson, with his permission. His idea applies to any of the fired arts.

LEAVING A TIME CAPSULE

One of the great things about being a potter is your work will last forever.

When you want to save some of your pots for the future, why not drop one in a lake or pond. Just sink it deep. Sometimes I drop one way back in our woods. I have dropped some in our big Lake Minnetonka near our home. Always pick good ones.

They just sit there and wait for someone to find them...maybe five hundred years from now.

On a few occasions I have had people over for New Years, have had them write notes to the future on clay tiles, or they can make their own

shapes. Fire to cone 10. Then I drop them into ice holes on Lake Minnetonka.

We are lucky as potters. Our work will last and last. I often tell folks that every pot ever made still exists..just some times in small pieces.

It is good to remind new students that those donut pots, heavy as a boat anchor, will last thousands of years, with their name on the bottom. Better to put them in the water scrap barrel. They do not want that sort of fame. Keep things that you are proud of. Save them for your grandkids. I have done that. Save a few each year...pack them away.

I know for a fact that Warren MacKenzie has stacks of great pots in his basement in cardboard boxes saved for his children. The best of the best. I admire that thinking.

Anthropologists will need material a thousand years from now. Most everything else will be gone forever. So, add to the loop.

Mel Jacobson
Minnetonka, Minnesota, U.S.A.
<http://www.pclink.com/melpots>

Digital Controllers Firing to Completion

CPLT (complete) appears on digital controllers after a kiln has finished firing. If your controller shows a low temperature, the CPLT message assures you that the kiln fired to completion while you were away, and the kiln is now cooling down.

“My digital kiln fired normally and showed the CPLT message,” someone asked me. “But how do I know that the elements have turned off after firing to completion? At what point should I disconnect the power to the kiln?”

It is okay to turn off the power to the kiln after the CPLT message appears. The power to the elements has turned off, anyway.

Indications that the heating elements have shut off:

- 1) The kiln temperature is dropping.
- 2) You no longer hear a clicking sound.
- 3) You no longer hear a humming sound.

If you hear an intermittent clicking, the elements are still powered. Even most kilns with silent mercury relays use a driver relay that clicks. Whenever the elements turn on, you will probably hear a faint humming. That is another sign that they are under power.

You should disconnect the power after the kiln has cooled to room temperature. The easiest way is to have a power disconnect box near the kiln. Otherwise you will need to unplug the kiln or turn off the circuit breaker each time.

The Plug and Wall Receptacle of a Studio Kiln

The Plug and Wall Receptacle of a Studio Kiln

The wall outlet should be installed so that the kiln cord hangs downward—not upward—from the wall outlet. Do not place the outlet so close to the floor that the kiln cord bends at a sharp angle. In either case, the plug may not seat properly in the outlet, which will cause the plug to over-heat and corrode.

Make sure the plug is pressed all the way into the outlet. Heavy amperage plugs sometimes work their way out of the wall receptacle due to the weight and movement of the cord. This leads to poor contact between the plug and outlet.

One time I was firing a kiln and smelled burning plastic. The wall outlet was overheating due to a loose electrical connection. If you smell plastic or hear a faint crackling noise, turn off the kiln and inspect the wall outlet and cord plug.

Remove the plug from the wall every few firings and check for blackened plug prongs and melted or discolored plastic. At these signs of heat damage, replace both the wall outlet and the kiln's electrical cord. Make sure the receptacle feels tight when you press the plug back into the outlet. A loose receptacle indicates worn springs, which will lead to overheating. While the kiln is firing, occasionally touch the cord near the plug, and the wall outlet cover. It is okay if they feel warm, but if they are hot, turn the kiln off. Have an electrician inspect the circuit.

Some people apply a light coating of oxidation inhibitor to the prongs on the kiln plug. This helps insure good contact between the plug and wall outlet. The inhibitor is a paste available at electrical supply stores.

Electrical Installation of a Studio Kiln

We recommend an electrical shutoff box near the kiln, in addition to having a circuit breaker at the electrical panel. The shutoff box is a must for direct-wired kilns, which can't be unplugged to disconnect the power. The shutoff box is also important for kilns with plugs. We recommend disconnecting the power when the kiln is not in use. If you unplug the kiln frequently, the spring tension on the wall outlet may eventually weaken. The shutoff box disconnects the power without having to unplug the kiln.

Install the kiln within 25' of the fuse or circuit breaker panel. For every additional 50' from the panel, increase circuit wire size by one gauge.

But do not place the kiln right in front of the electrical panel. Keep the panel at least 3' - 4' away. Otherwise, the breakers may trip more easily on a hot day. This is because a circuit breaker is triggered by heat, and a nearby kiln can raise the temperature of the electrical panel.

Use a circuit wire size large enough for the wall receptacle amperage, even if the kiln amperage is less than the wall receptacle amperage. **WARNING:** changing the cord plug on Paragon kilns will void your warranty.

Use braided copper wire. Do not allow an electrician to use aluminum wire on your new circuit. Aluminum terminals corrode worse than copper and require greater installation care. Avoid using extension cords.

The kiln catalog lists recommended breaker and wire sizes for the circuit. Local codes, however, supersede our catalog recommendations.

You may have a 240 volt circuit conveniently located where you will keep your kiln. But do not assume that the circuit is the correct size. Dryer circuits are too small for most studio kilns. Even if you have the correct wall outlet, you should verify that the wire and breaker sizes are also correct. Make sure the equipment grounding wire is properly installed. Sometimes circuits have been installed by home owners with limited electrical experience.

Note: Do not use the circuit breaker to disconnect the kiln. Frequently switching the circuit breaker will weaken it. Instead, use a shutoff box located near the kiln.

Please have only a qualified electrician wire your kiln circuit.

The Three Stages of Learning in Glass Fusing

Here is an article on creativity that John Hohenshelt Sr. and I wrote in 1986. It is about glass fusing but applies to any creative discipline.

The Three Stages of Learning in Glass Fusing

Until you actually fuse something yourself, glass fusing seems pretty technical. You hear forbidding terms like annealing, coefficient of thermal expansion, devitrification.

Yet the challenge in glass fusing is not really in learning how to fuse. That takes you only a few sessions. In no time you can even be an expert. The challenge is in what to fuse, because making exciting glass fusing is not as easy as it seems. I'll explain this challenge by describing the three stages of learning the typical glass fuser goes through: the Process Stage, the Design Stage, and the Creative Stage. If you're already a glass fuser, you might be curious about which stage you've reached.

In the Process Stage, you are excited and curious about the process of fusing glass. In only hours you can fuse a piece that would have taken days to make with leaded stained glass. You can mix glass colors by fusing overlapping colors. You can create different shades of one color by fusing clear glass over that color. There's so much you can do in glass fusing!

Glass fusing does not require the discipline of leaded stained glass. A leaded window might take you a hundred hours to make, so you design it with great care. Yet you can turn out a whole shelf full of fused glass in one evening. And this is just what glass fusers do in the Process Stage. You'll let yourself go and just have fun with fusing. You'll fill every inch of kiln shelf with odd scraps of glass piled into interesting designs. When you show these pieces to your friends, they look at your new creations as if you had just pulled them out of the trash. This is what happens in the Process Stage.

In the Design Stage, which comes next, you've gotten over the initial excitement of fusing glass. Your curiosity has been satisfied, to an extent, though it never is completely. You know what happens when you fuse red glass over green glass, for instance. You've experimented with tack fusing and flat fusing. In fact, before you enter the Design Stage, you might already be a technical expert. But in the Design Stage, you begin to understand that the fused piece is a reflection of the time and care you put into it. So instead of tossing glass onto the shelf and firing, you discipline yourself and work hard to come up with something you can get excited about. You go through disappointments along the way, but eventually, if you stay with it long enough, you make fused pieces that really do excite you.

In the Creative Stage, which comes next, you are relaxed with fused glass. The hard work and discipline of the Design Stage somehow leads to a stage where you can make exciting pieces without even trying. In the Creative Stage you can create without the constraints of discipline that you needed in the Design Stage. Your creative ability in this medium has developed to the point where you can make pieces that are even more beautiful than you made in the Design Stage, yet you can do it with the indiscipline that you enjoyed in the Process Stage. You understand the term "effortless effort." At this stage you find that glass fusing is enriching your life. So from the indiscipline of the beginner, to the discipline of the craftsmen, you return to the indiscipline of the beginner.

Each stage is necessary in developing your creative talent in this medium. So if you're in the Process Stage now, enjoy it. Experiment all you want. Don't try to make every piece a masterpiece. But don't get discouraged if your first pieces end up in someone's trashcan. When you're in the disciplined Design Stage, don't try to hurry through to the Creative Stage. Creative Stage fusing comes by itself. If you try to rush it, you'll just end up in the Process Stage again.

When you do enter the Creative Stage—and you will definitely know when you do—you will find your life enriched. You'll begin to see things differently. The Creative Stage is well worth waiting for, but in the mean time, enjoy whatever stage of glass fusing you're in.

READER RESPONSE: BUZZING NOISE FROM A CALDERA KILN

Emma Ralph, who lives in the UK, asked, "I have noticed that when ramping up my Caldera kiln slowly, I get the usual clicking noise of the relay cycling on and off, but there is also a soft buzzing noise in between. This has me worried."

Magnetism is formed when electricity passes through a coil of wire such as a heating element. Depending on where you live, AC electricity changes direction 50 to 60 times per second. When it flows in one direction, the coils attract each other. When it changes direction, they repel each other. That causes the humming noise.

You will notice that the humming lessens as the kiln gets hotter. This is because the element coils become soft and no longer vibrate.

The sound of elements humming is reassuring to me. It means that all is well and the kiln is firing normally.

We have holding an Advanced Kiln Maintenance Seminar here at the Mesquite, Texas Paragon kiln plant February 24 - 25, 2006. For information, please email Customer Service: info@paragonweb.com.

This is likely our last communication before Christmas. I hope you stay warm, have a chance to spend time with your family, and have a joyous holiday season.

Best wishes from all of us at Paragon

Increasing the Life of Firebricks

I have seen 10-year-old kilns with firebricks still in pristine condition and one-year-old kilns that looked like they had been dropped from a roof. You can tell at a glance when a kiln has been cared for. Please follow these guidelines to make your kiln last:

Vacuum the kiln interior regularly using the brush nozzle of a vacuum cleaner. Be gentle when you touch the firebricks with the nozzle.

Apply kiln wash to the kiln's firebrick bottom. But keep kiln wash away from the walls and elements. (In a glass kiln, you could also use glass separator to coat the bottom.)

If possible, do not fire moist greenware. It should be bone-dry and warm to the touch. If you must fire moist ware, wait until all signs of vapor have disappeared before heating

past 200 degrees F. The moisture at higher temperatures is not good for the firebricks and can cause the ware to explode.

Do not lean too heavily against the firebrick walls while loading and unloading. Some people use a small stepladder to reach into a deep kiln. You can also cut a piece of plywood to fit across the wall that helps protect the wall during loading.

Lower the kiln lid (or close the kiln door) gently. Slamming the lid can crack the lid the first time it happens. Fully disengage the lid support before lowering the lid. Forcing the lid downward can break the bricks near the lid hinge. From time to time, check the condition of the lid support.

Keep the lid closed when you are not using the kiln. This keeps dust out and prevents the lid from dropping while you are away from the kiln. Do not store anything inside the kiln.

The kiln stand should be level and rock-steady. An unlevelled stand can stress the firebricks. A stand that rocks can cause the kiln to move when jarred, knocking over ware against the sidewalls inside the kiln.

During loading and unloading, do not touch the sidewalls of the kiln with anything. Do not allow a shelf to bump into the firebricks. The extra time and care you spend loading and unloading may add years of life to your kiln.

If glaze, glass, or other materials drip onto a kiln wall or the kiln bottom, repair before the next firing. Otherwise these materials will remelt and embed deeper into the firebricks. Remove the contaminant by scraping gently with a putty knife. If you remove kiln wash from the kiln bottom, apply a fresh coat to the bare spot.

Do not be concerned about small cracks that appear in the firebricks. The cracks are normal and act as expansion joints. During firing, they close tightly.

Wishing you a great holiday season.