July/August 2007

Pottery Making Illustrated

Your Resource for Ceramic Techniques

Tom Radca

Living Large with Raku

Making and rakuing large platters

It's a Wrap

Saggar firing with aluminum foil

Beyond the Norm

Experimenting with "alternative" raku glazes

Raku Lite

Building a portable fiber raku kiln


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TABLE OF CONTENTS

Features

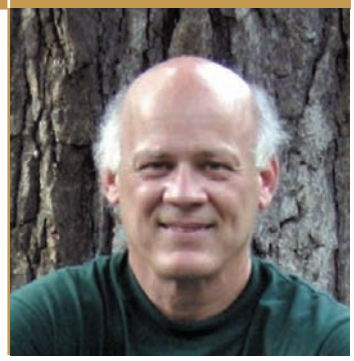
Departments

Tom Radca stokes a raku kiln with seasoned oak for post-firing reduction. See story on page 24. Photo by Celuch Creative Imaging.

Fired Up

Instant Gratification

EDITORIAL



Instant gratification is not soon enough.
Meryl Streep

Meryl Streep would be discouraged by pottery if, indeed, she believes that instant gratification takes too long. Many processes in pottery are painfully slow, making it a craft of waiting—waiting for pots to become leather hard, waiting for pots to bisque fire, waiting for pots to glaze fire. But, as potters, we do have our "fast" times in the form of raku, where we can get nearly instant results on a glaze test, then turn around and glaze a whole piece and have finished results within the hour.

This instant gratification of raku has its allure and also its benefits as a teaching tool, as first espoused by Warren Gilbertson in the February 1943 issue of the *Bulletin of the American Ceramic Society*. Gilbertson toured the Far East for two years prior to World War II studying traditional craft methods. When he saw Raku bowls used in tea ceremonies, he wanted to visit the pottery that made them. To his surprise, there was little to see as he says, "All the equipment for making Raku ware, besides the benches, consisted of a few wooden decorating wheels, some bamboo modeling tools, and the brushes and colors for decorating."

In this simple setup, Gilbertson recognized the potential for using raku as a way to introduce ceramics to students. He concluded his detailed description by stating "The opportunity of seeing, in working with the raku kiln, the effect of the fire on the glaze, the simple effortless control of the fire, and the quick, direct results obtained was stimulating and should help to explain the meaning of pottery to the beginning student, who is not likely to have any conception of this vital aspect of ceramics."

Summer is a great season to enjoy raku (unless, of course, you live in wildfire country!), and we've introduced some interesting concepts in this issue. Tom Radca does his post-firing reduction right in the kiln so he doesn't have to handle hot work and can walk away from the smoke; Steven Branfman emphasizes just how loose the glazing process can be, while Daryl Baird shows us that we can all build a raku kiln from wire and fiber. And it doesn't even have to be raku to be simple and fast as illustrated by Paul Wandless's aluminum foil saggar project, which shows us how to decorate our work with the latest in "baked potato" technology.

We hope you find the issue gratifying.

Bill Jones
Editor

Ed. note: In our "Tools of the Trade" article on pugmills and mixers, we stated that some mixers/pugmills operate as a single unit while some mix and pug clay independently. There is a significant difference between the two designs so be sure to get all product details from manufacturers prior to making a purchase.

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Tools of the Trade by David Ogle

Ergonomic Egotes

THROWING STICKS

Examples of egotes (Japanese throwing sticks).

Being a sculptor as well as a ceramic artist, I'm familiar with all manner of wood and metal-working tools. I've made the majority of my own ceramics tools over the past forty years of working with clay because in the early days (the 1960s) there weren't nearly as many choices of commercially-produced tools as there are today. When you wanted a "pear corer" trimming tool, you went to the local hardware store and purchased a real pear corer. If you wanted a modeling tool, you just got a piece of hardwood scrap and made one.

Another reason for making your own tools was that the tools that were available might not have been "just right" for the forming, carving, trimming or whatever task was at hand. So tool savvy ceramists just modified or made entirely new tools to suit their needs. Most of the tools available from the ceramics tool manufacturers today, potters and sculptors have invented and made at one time or another over the years.

Most recently, I've been working with saggar-fired narrow-necked porcelain bottle forms. I've always made my own *egotes*, commonly referred to as Japanese throwing sticks. The egotes available from the pottery suppliers were always too cumbersome for making the tight and narrow curves and shoulders of my narrow-necked forms.

My first attempts at curved egotes were very time consuming and required a lot of meticulous work for forming and sanding the rounded ends. Through experimentation, I discovered an easier method for creating these tools with "ball" ends that simulate the shape of a fingertip.

Tools

I make several variations of the egote, but the one illustrated at the bottom of the photo to the left can be made with readily available simple tools and materials. Pictured below are most of the tools necessary to make the egote. They include a scrap piece of ¾-inch hardwood (maple preferred, but a close-grained hardwood such as walnut, cherry, birch, or even pear wood can be used). Also, two ¼×2-inch hardwood dowels, a saber saw (band saw, if available, makes cutting out the form much easier), a half-round rasp, a round rasp (sculptors wood rifflers make rounding wood easier), a flat rasp, coarse and fine sandpapers, a 6-inch piece of ½-inch PVC pipe (used as a contouring sanding block), epoxy (or any waterproof glue), and hardwood balls (½ inch and 1¼ inch, available at local craft, hardware stores, or mail-order woodworkers catalogs). The balls may be wooden beads or drawer pulls. Not shown are a drill and a ¼-inch drill bit.

CAUTION:
Follow all safety instructions when operating power tools!

Tools and supplies needed to make a curved, narrow-neck egote are common and easy to locate.

Procedure

Start by tracing the natural curve of your hand as if it were in the shoulder forming position (figure 1).

Sketch a corresponding curve leaving equal amounts of extra material on each side of the ends (see dotted lines) to facilitate drilling the holes for the dowel rods (figure 2). Draw intersecting lines to find the centers. Cut out the curved form with a saber or band saw.

Mark the center with the awl and carefully drill through the center with the ¼-inch drill bit, about ½-inch deep (figure 3). Wooden balls intended to be used as beads often have ¼-inch holes predrilled all the way through. If not, clamp the ball in a vise and drill a ¼-inch hole through each one.

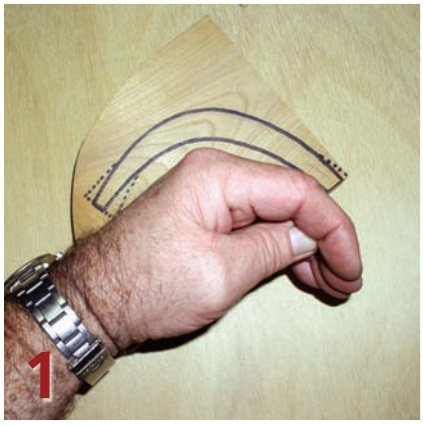
Trim off the excess wood down to the dotted lines on each end using a band saw or saber saw (figure 4).

Mix the epoxy according to the package instructions and fill the holes in the curved handle and the holes in the wooden balls. Insert the hardwood dowels and press the balls into place (figure 5). Make sure the joints between the balls and the handle are filled with the epoxy mixture.

After the epoxy has thoroughly cured (when it is no longer tacky to the touch), cut off the excess dowel protruding through the ends of the balls. Begin shaping and rounding the handle with the rasps (figure 6).

Using the coarse and fine sandpapers, smooth the tool. Use the round rasps and sandpaper-covered PVC pipe on the concave side and the flat rasps and a flat piece of sandpaper covered wood on the convex side until the tool feels comfortable to the touch (figure 7).

Tip: Wipe the tool with a damp cloth to raise the grain and allow



Trace the natural curve of your hand to create a tool that conforms to your throwing position.

Be sure to leave extra wood on each end of the egote to facilitate drilling the holes.

Find the center, cut out the curved form and drill ¼-inch diameter holes for the dowel connectors.

Epoxy the dowels into the drilled holes on the stick. Trim off the dowels after the glue dries.

Use wood rasps to begin to rough out the final shape.

Use coarse then fine sandpaper to smooth the entire tool until it feels comfortable to the touch.

it to dry. Sand again and repeat this a couple of times for a very smooth finish.

You can finish the egote with an acrylic spray or soak it in mineral oil. Occasional sanding may be necessary after a few uses, but you'll find the tool improves with age after a little breaking in.•

As a Ceramics Department founding member and program coordinator, David Ogle has taught both handbuilding and wheel throwing at West Valley College for the last 34 years. He has maintained his own pottery studio creating both functional and sculptural ceramic works. For questions or comments, you can reach him at brnzpnut@aol.com.

After using epoxy to attach hardwood dowels to wooden balls, test fit the parts, then trim excess wood from the ends on all four sides.

The egote extends your reach inside closed and narrow neck forms.

In the Mix by Jeff Zamek

Raku Color and Opacity

RAKU GLAZES

A simple approach to color development and opacity in glazes, coupled with the fast-firing raku process, can greatly aid in learning about the effects of adding metallic coloring oxides, stains and opacity-producing agents to a base glaze. Since you can easily mature glazes in a raku firing in 20–30 minutes, you don't have to wait long to find out what happens when you add copper, chrome, cobalt or any number of other coloring oxides or stains to a glaze. The pot is removed red hot and either oxidized (left in the air to cool) or reduced in a combustible material. When reduced, the burning materials pull oxygen from the metallic oxides in the glaze resulting in color variations.

The raku technique is fast and dramatic, and the speed of the process compresses the time between the cause and effect of adding and subtracting various glaze materials. In addition, the results learned from these glaze tests can be applied to other temperature ranges.

Raku Glaze Requirements

Raku glazes are appreciated for their ability to offer various colors and textural variations, however, there are several requirements for an effective glaze.

•For safety reasons, lead or lead-based frits are not recommended for raku glazes even though recipes appear in many older texts.

•Raw materials should be readily available.

•Soluble glaze materials such as Gerstley borate, colemanite, borax, pearl ash, soda ash and boric acid can be used; however, they can leach into the glaze water resulting in unpredictable glaze effects. In some instances, the results can be aesthetically interesting, but soluble glaze materials can also cause blistering, running and dry areas in some glazes.

•The glaze should stay in suspension for a reasonable length of time to allow for glaze application.

•Raku glazes must be able to mature over a wide range of temperatures because not all kilns fire evenly or accurately.

•Raku glazes must be able to withstand variations in reduction atmospheres.

Getting Started

Just a few raw materials are needed to produce a glaze with different colors and surface textures. For example, you can make 1½ gallons of a base glaze with 8 pounds of Ferro frit 3110 and 2 pounds of EPK kaolin. Superpax can be purchased in 3-pound increments. Some metallic coloring oxides and stains are more expensive, but they can be ordered in ¼-pound increments. For small tests, use a 300 gram batch, which is suitable for several vertical test tiles.

A base glaze formula (one that's clear, semi-opaque or opaque in light transmission, and glossy, satin matt or matt in surface texture) is the foundation for any addition of metallic coloring oxides, stains or opacity producing agents. It offers a known constant to judge the effects of color and opacity. In the raku temperature range (cone 010–cone 04 or 1657°–1945°F), any frit can be considered a glaze by itself since it contains a combination of flux oxides, alumina and silica needed to form a low-fire glaze. Additions of clay can increase opacity and matt surface texture while the Superpax further aids in opacity.

Top, raku base glaze with 10% Mason stain 6308 Vivid Blue; middle, raku base glaze with 10% Superpax; bottom, raku base glaze plus 10% Mason stain 6271 Mint Green.

Any of the metallic oxides (iron oxide, cobalt oxide, copper oxide, chrome oxide, nickel oxide, iron chromate, manganese dioxide, rutile) or their carbonate forms (copper carbonate, cobalt carbonate, manganese carbonate or nickel carbonate) adds color to a glaze. Adding approximately ⅛ percent yields a

tint of color, 5% provides color with medium intensity and 10% imparts intense color to the glaze. The advantage of using just one base glaze aside from the simplicity of understanding cause and effect when using ceramic materials is that glaze color variations can be overlapped with a good chance of compatibility. And testing glazes on vertical test tiles will provide valuable information on how runny the glaze is.

Raku Base Glaze

Clear Gloss Crackle

Ferro Frit 3110	80 %
EPK Kaolin	20
	100 %
Add: Bentonite	2 %

White Opaque Gloss

Superpax	15 %

Blue Variation

Mason stain 6306 Vivid Blue	10 %

Green Variation

Mason stain 6271 Mint Green	10 %

- Ferro frit #3110 provides the flux you need in the glaze for it to melt. In fact, at the raku temperature range, frits are complete glazes by themselves.
- EPK kaolin, which is a clay containing alumina and silica, prevents a molten glaze from running down vertical surfaces.
- Stains provide color to the base glaze.
- Superpax is an opacifier that makes the clear, gloss, transparent base glaze an opaque, gloss white.

Adjusting the Base

You can adjust the glaze by adding 5, 10 or 20 parts kaolin to the base for a stiffer glaze. Conversely, deleting 5, 10 or 20 parts of kaolin from the base makes the glaze more fluid. The spacing of the crackle lines (a fine network in the glaze due to tension over the clay body) depends on the fit of the clay body and glaze upon cooling. The rate of contraction varies with different frits causing craze lines in the glaze to enlarge or shrink. The rate of contraction in the clay body also affects the craze line pattern. Selecting a different frit with a different chemical composition may alter the colors obtained from metallic oxides or stains. •

Jeff Zamek is a ceramics consultant and frequent contributor. For comments, visit his website at www.fixpots.com.

Tips from the Pros by Frank James Fisher

Brush Bottle

A small bottle with a flared lip used for brushable liquids.

STUDIO TOOL

I use white vinegar in my studio to mend cracks in greenware, inspecting every piece before it's fired. But I prefer to keep glass out of my studio, particularly because the tall glass bottle that vinegar comes in is prone to tipping over. I needed a short bottle with a wide base for stability, not unlike an antique ink bottle. My bottle design calls for a larger flared lip suitable for wiping a paint brush, making the bottle useful for any brushable medium.

The bottle is thrown in two pieces: the bottle form and the base platform. Because this vessel uses the narrow-neck bottle form, the centering must be perfect. If the clay becomes even slightly off-center, the lip will flutter, bend or tear later during the compression and forming of the neck. Use well-wedged clay, then pull and compress it at least three times when centering to align the clay particles.

Center a one-pound ball of clay and open it all the way down to the bat. Pull the clay ring outward until the diameter of the bottle base is achieved (figure 1). Slowly pull up and in toward the center—pulling too fast creates an uneven wall. The slightest difference in thickness creates difficulties later when forming the neck (figure 2). Use a wooden rib and press the inside surface against it to remove excess surface clay and remove throwing lines (figure 3).

Slow the wheel and begin forming the neck approximately a third of the way down from the top. Use three pressure points and slowly squeeze inward (figure 4). Run your finger tips simultaneously on the inside and outside of the neck and lip to evenly distribute the clay. Use a chamois to refine and smooth the lip, then compress the clay at the narrow part of the neck using the handle of a needle tool and your fingertip (figure 5). With the basic shaping complete, fine tune it as needed (figure 6).

Continued on page 38

Open clay to the full diameter of the base.

Pull walls up and inward.

Even out the walls with a rib.

Compress the neck as you collar in.

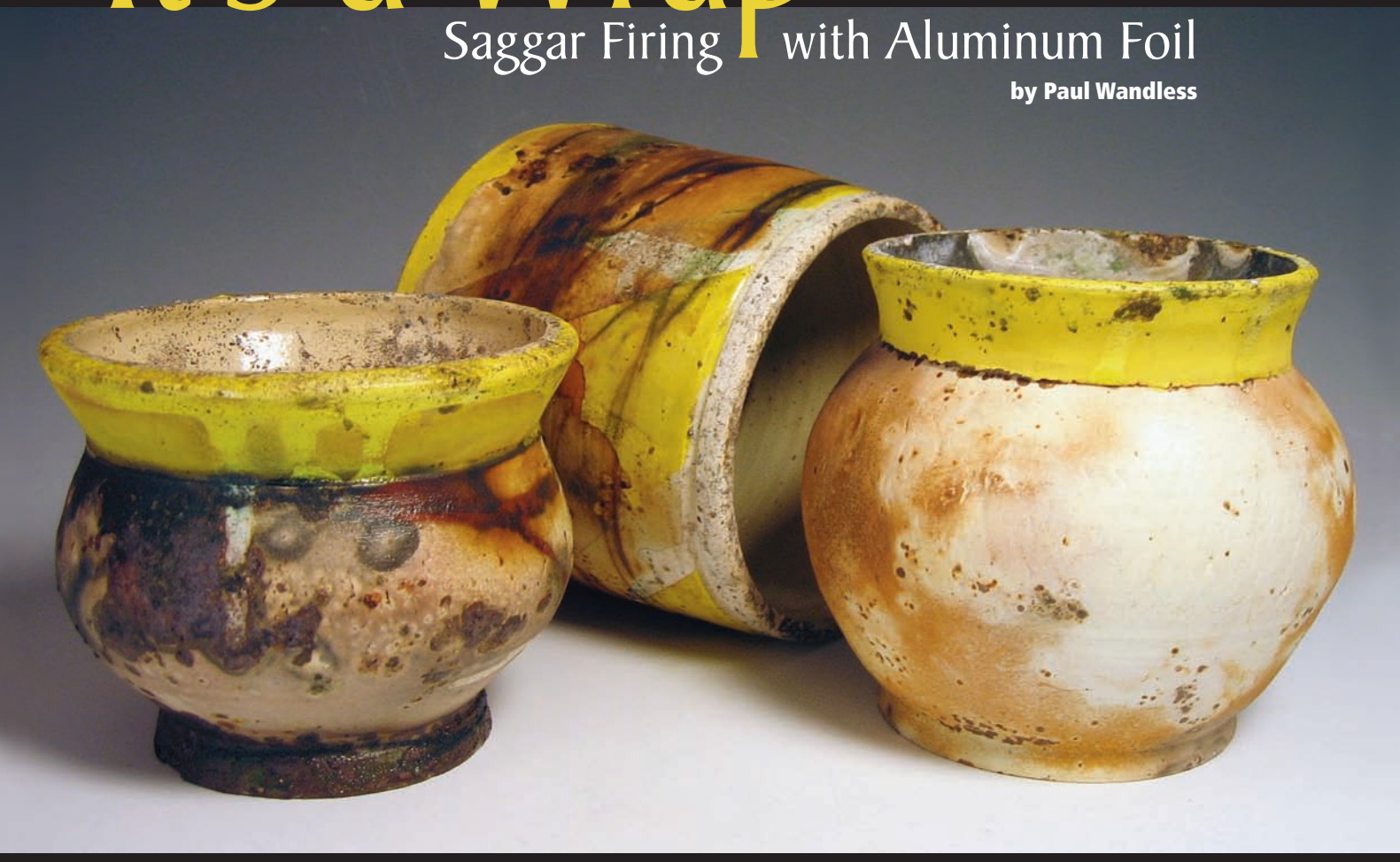
Smooth and compress the inside.

Make final adjustments to the shape.

It's a Wrap

Saggar Firing with Aluminum Foil

by Paul Wandless



Saggar firing is an alternative firing process with several variations on how the technique can be used. The word "saggar" is thought to have come from the word "safeguard" due to its use as a protective casing. Traditional saggars were reusable refractory containers that would protect ceramic ware from the smoke, fumes or flying ash of wood or coal kilns. The opposite is true today since we want all the carbon and fumes inside the container!

Think of a saggar as a container that creates and holds a mini-atmosphere surrounding your piece. This atmosphere is comprised of burning combustible materials that fume and smoke the clay surface during the firing process. One common kind of saggar is a clay or metal container that allows for about 4–6 inches of space around your clay work. The space around the clay work is filled with all the combustible organic materials, oxides, salt, soda ash and other chemicals that you want to create your colors. The atmosphere of smoke and fumes stay inside the saggar and carbonize, flash and blush the surface of your piece. This type of saggar can be fired in a gas, electric or raku kiln. Depending on what you put in the saggar to make color, this kind of saggar firing works at any temperature, so you can go to cone 10 if you like and get good results. Some saggar containers (especially those used between cone 01 or cone 10) have small holes in the walls to help it vent a little and also to prevent pressure from building up inside and blowing the lid off.

Aluminum Foil Saggars

Aluminum foil saggar firing is a different approach that's meant to work exclusively at lower temperatures. You can get results as low as 1500°F up to around 1850°F. The firing is performed in a pit, barrel or raku kiln and relies mostly on local reduction and the fuming of chemicals to get visual results. In place of a metal or clay container, heavy-duty aluminum foil is used to create the saggar that surrounds the clay work. Wrapped around the piece, heavy-duty aluminum foil holds all the combustible materials in place against the surface to fume and flash. I like to think of this process

as the "baked potato" approach to firing. Just like all the seasonings are held in place by the foil to soak into a potato when you bake it, all your combustibles are held in place to "season" your clay.

What to Expect

As with any alternative firing process, getting successful results on the first try can be elusive and unpredictable. Preparing your pieces properly to take full advantage of the fuming materials in the saggar atmosphere is the best way to achieve good results. Another important factor for alternative firing is having realistic expectations of achievable results. Every firing technique has certain parameters for what can be achieved visually on the surface. Many of the colors are subtle and it often takes more than one firing to achieve the visual effects you want.

Preparing Your Work

For this saggar firing technique, you'll need bisqueware, brushes and underglazes, and a clear low-fire liner glaze (figure 1). The color of the clay and the temperature you bisque fire at strongly influence surface effects. Porcelain, white or light-colored clay bodies allow the creation of more subtle colors on the surface, while a soft bisque (cone 010–06) keeps the clay body porous enough for fumes to better penetrate the surface. Bisque your clay body at different temperatures (e.g., cone 010, 08, 06) to see which porosity works best. If you prefer deeper values and richer blacks, use darker clay bodies and surfaces. Another option is to

Sources of Color

Foil saggars produce strong contrasts between darks and lights, with blushes and flashes of color from a palette of earth-tone hues. The temperature reached inside the kiln and length of firing also greatly affects the color results. The strongest colors appear from local reduction, which is where direct contact is made between the surface and the materials. Here are a few examples of materials to use, but not a complete list. Experiment with other oxides, carbonates and combustible materials that fume to see what else you can create on the surfaces of your work. The temperature the kiln reaches and how long you fire also affect your results. Keep good notes of every firing.

- **Oxides, salt and soda ash washes yield fairly strong colors depending on the strength of the mixed solution. Fuming in the gaps between the surface and foil creates more subtle flashes of colors.**
- **Copper carbonate gives flashings of deep red to maroon and shades of pink.**
- **Copper wire can result in the same colors but, when in contact with the surface, often just leaves behind black lines.**
- **Miracle-Gro®, which contains copper sulphate, also produces the same hues and colors as copper carbonate, but it's a stronger chemical to work with. If it comes in direct contact with the surface or too much is used, it can leave a crusty, dark green or black surface.**
- **Salt/salt washes, baking soda, soda ash/soda ash washes and seaweeds introduce sodium and give flashes of pale yellow and ochre. Sodium washes work very well when brushed or sprayed on the surface.**

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Wrapping cheese cloth soaked in the washes around the pot also results in stronger effects.

- **Red iron oxide gives flashes of earth tones from peach to rust**
- **Liquid ferric chloride will give a range of earth tone colors that includes rusty oranges, browns, and even brick reds if used at full strength. These colors can be very overpowering due to the strength of this chemical and visually overwhelm all of your other materials in the saggar. When diluted 50/50 with water the hues are lighter and lean toward peach and tan.**

CAUTION:

Copper sulphate is a very powerful chemical and should only be handled while wearing protective latex or rubber gloves.

Ferric chloride is a very powerful copper etchant and should only be handled while wearing protective gloves and a respirator for vapors.

Recipe

White Slip

Cone 04

Custer Feldspar	15
EPK Kaolin	40
Ball Clay	30
Silica	15
	100

burnish your work while still green to give it a smooth satin surface after it's bisque fired. You can apply terra sigillata before burnishing or simply polish the clay surface itself.

In these examples, all work was made using a cone 7, buff stoneware bisque-fired to cone 04. If you don't use a white clay body, brush a thin coat of white slip on the bisque to assure a light surface (figure 2).

For variety, use commercial white and other light-colored underglazes (I use Amaco Velvet Underglazes) on the surface and mask off areas with painters tape to make designs (figure 3). Even simple stripes add variety and make all the difference on a finished piece. Sometimes I just use the colored underglazes to paint the rims and get some drips down the body (figures 4 and 5). I use a cone 04 white glaze on the inside of all the pots and drip the white glaze on the outside of them as well. Once all underglaze and glaze is applied, refire the work to cone 04 (figure 6).

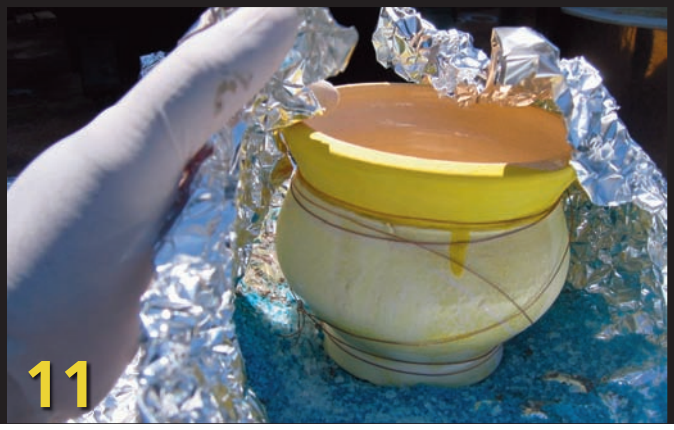
Preparation

Gather the materials you'll need for your saggar (figure 7). The aluminum foil *must be* heavy duty. For this firing, I used course and fine sea salt, red iron oxide, liquid ferric chloride and Miracle-Gro. I do everything outdoors next to the kiln and immediately load and fire as soon as the saggars are done.

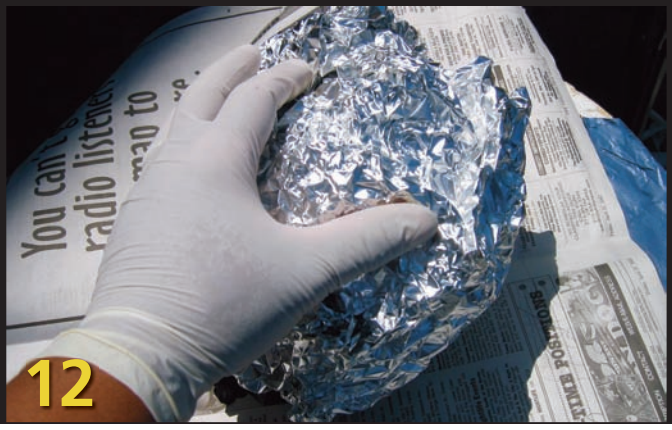
Choose a pot and tear off three lengths of aluminum foil. Each sheet of foil should be long enough to wrap completely around the pot. Crinkle up all of the foil and lay them down on your work surface (figure 8).

9

10



11



12

The crinkled foil creates pockets that trap the materials and fumes against the surface for fuming.

I like to wrap copper wire around the work, which leaves deep maroon to black lines where it touches the surface (figure 9). Other options at this point include applying salt or soda washes or the liquid ferric chloride to the surface of the bisqueware.

CAUTION

Use a glass spray bottle to apply the ferric chloride. Mix the ferric chloride 50/50 with water while wearing rubber or latex gloves. Be sure to apply it outdoors while wearing a respirator so you don't inhale the vapors.

After applying wire and washes, lay down the sheets of crinkled-up aluminum foil in a criss-cross pattern on your work surface and place your pot in the middle. Start sprinkling each dry combustible material, one at a time, on the pot, using about 2 tablespoons of each material (figure 10). I do this by sight and am usually fairly liberal with the colorants to assure some kind of color results. Experiment with your own proportions for a few firings to get the exact kind of flashings of color you want.

After adding all the ingredients, slowly fold the foil up and around the pot (figure 11) being careful not to spill any of the materials, and gently press the foil against the surface (figure 12). You want it to touch the surface, but not have it pressing flat against it. The crinkled foil needs to have pockets of space around the form so the materials and fumes can be kept in place. The foil also leaves a light pattern where it touches the surface, but if the foil is pressed too tightly against the surface, colors won't develop. You can wrap additional sheets around the piece if you think you need more to keep it together. Remember that the longer the foil stays intact, the longer the work fumes. As soon as the foil starts to disintegrate at the end of the firing and holes are formed in the saggar, the fumes will escape. This is why heavy-duty foil is used because it takes longer to burn away.

Pick up the foil saggar and roll it around in the air so all the materials can tumble evenly around the piece. It should sound like a rattle. If you can't hear any noise, your foil is pressed too tightly against the surface. Now place the piece in the raku kiln (figure 13). You can tumble stack the work or just place them all next to each other depending on how many you're firing.

Firing

Firing foil saggars is pretty straightforward, but just be sure to load them so you can clearly see them through an opening in your kiln. The firing should take about 45–60 minutes and reach a temperature of 1500–1800°F. I reach about 1000°F in about 30 minutes, at which point the kiln will show a little color and the foil starts to sag and looks a little thin. Then I let it continue to climb the last 500–800°F over the next 15–30 minutes. Once the foil starts to burn away, the saggar no longer holds in the fumes so the firing is complete. When you look inside, there will be a strong orange color, maybe some green or blue in the flames

from the copper burning and the foil disintegrating. If you let it go a little longer, you'll lose a lot of the subtle colors. The optimal experience is for the aluminum foil to start burning away when you hit 1500–1700°F, but you may find that you can get satisfactory results as low as 1400°F. Let the kiln cool slowly before removing work to prevent cooling cracks. On your first firing, stop when the foil saggar first starts to break down. I fire by simply looking into the kiln, but you can use a hand-held pyrometer to be more accurate about your temperatures and to avoid overfiring.

I normally let a lot of the foil burn away and am left with mostly the stronger saggar effects (figure 14). Since I use a lot of colored slips on my work, this works for me visually. The amount of work you fire, proportions and types of combustibles, size of the kiln and size of your burner all factor into your timing and what effects you'll get. After one or two firings, you'll have a good sense of how to fire your work to get the results you want. Experiment with your own firing schedules to see what you like best. Keep good notes so you can duplicate the successful preparations and firings. Pieces you're unhappy with can always be rewrapped and refired.

Cleaning and Sealing

After about an hour, the work should be cooled and ready to be removed and cleaned. Use water, a rag and a stiff nylon brush to scrub off the foil and other residue from the surface of the pot (figure 15). Avoid abrasive or metal brushes that could scrape the surface. Once scrubbed, dunk the piece in a bucket of water and lightly scrub a little more just to make sure it's clean (figure 16). The wet surface is always beautiful and rich and this is when I decide which ones are keepers and which ones need to be re-wrapped and re-fired.

After drying, the surface will typically have a dry matt look, especially if the work wasn't burnished. To achieve the look it had when wet, using paste wax on the surface will deepen many of the subtle colors and bring back the richness. It also gives the surface a light sheen, but won't get glossy. Apply a thin coat of paste wax with a rag, let dry 3–5 minutes, then polish with a soft cloth. Use a soft nylon brush to polish the surface and get the wax out of any crevices.

Final Thoughts

As with all alternative firing processes, there's no one specific way to foil saggar fire and get perfect results. Talk to five different people and you'll get five different approaches to firing saggars. Practice and experience ultimately determines the best approach for your work. Experiment with other combustible materials and colorants in different combinations and proportions and you'll see the variety of finishes that can be achieved. In addition, stop firing at different temperatures and see how that affects your surfaces. Most importantly though, keep good notes on every detail at every step so you can duplicate successful results. •

Paul Andrew Wandless is a studio artist, workshop presenter, educator and author. He is the author of Image Transfer On Clay *(Lark Books) and co-author of* Alternative Kilns and Firing Techniques: Raku, Saggar, Pit & Barrel. *His website is www.studio3artcompany.com and he can be emailed at paul@studio3artcompany.com.*

Beyond the Norm

Experimenting with "Alternative" Raku Glazes

by Steven Branfman

Vessel, 15 in. (38 cm) in height, combed and incised surface, brushed and splattered commercial low-fire glaze, raku fired, by Steven Branfman.

Raku—even those new to clay and the various ways in which it can be fired have some notion and make some assumptions about raku. Most often, the image that is conjured up is a roaring, flaming kiln, an unusual collection of tools more commonly seen next to a fireplace or welding station, metal cans and enough smoke to summon the regional fire department. What's also most commonly envisioned is the expected result of high copper luster, white crackle glaze and black, raw surfaces. Of course, this is not surprising as the lure of copper, bronze and pearl-like iridescence contrasted with the black or gray of an unglazed area is attractive, can be startling and is often seen as exotic.

For good or for bad, raku is a technique that's simple in concept, requires rudimentary firing facilities and is easy to do. Because of this simplicity, many wares display superficial aesthetics and lack individuality and power. The kind of effects described above offer an exhilarating and sometimes intoxicating foray into the technique, but the excitement that they stir can be short lived, not to mention commonplace. A deeper understanding of the process along with experimentation and higher expectations can yield sophisticated colors, textures and surfaces not necessarily recognized as "raku."

The Western Raku Method

Raku as we practice it in the West is a low-fire method in which we quickly heat the ware, remove it from the kiln when the glaze has melted, and perform some type of post-firing process to the piece. Though the post-firing phase is not part of the traditional Japanese practice, it has become the signature of Western raku. The post-firing phase is usually an immersion in sawdust or some other organic combustible material in order to affect the final outcome on the glaze and the raw clay. Deciding when the glaze has melted takes practice and

is best done by visual observation, though many potters use pyrometers to aid in making that decision.

There are many aspects to the raku technique, all of which have the potential to affect the final outcome, and all of which require practice, experimentation, trial and error and patience. In a previous article, I discussed raku glazes in depth covering a variety of types (see PMI July/Aug 2006). Here, we'll concentrate on so-called "alternative" glazes; that is, glazes not usually associated with, or understood to be used in the raku technique. I will also discuss methods of application that have the potential to yield new and exciting surfaces and results.

Getting Started

Though there's no accepted standard firing temperature for raku, most potters fire between cone 010 and

A collection of commercial low-fire glazes and underglazes; all perfectly suitable for raku firing.

06. I have a collection of commercial low-fire glazes and underglazes, all of which are perfectly suitable for raku firing. In addition to low-fire glazes and underglazes, I also routinely use cone 6 and cone 10 stoneware glazes. There will be more on their use later. I also use home-

A collection of cone 6 and cone 10 stoneware glazes that I use in raku firing.

made low-fire and so-called "raku" glazes. The brushes I use are inexpensive Chinese bristle brushes designed to be used and thrown away. Throw away? No way! These are my favorite brushes and they're available in any paint or home center.

My glazing method centers around applying thin, multiple layers of glaze. While the application appears

I apply multiple thin layers of glaze by drawing the brush lightly over the surface of the pot.

to be quite random, it's carefully planned and executed. I may use a single glaze or as many as fifteen different glazes on a single piece. The brushes I use are perfectly suited as they do not hold much glaze and they transfer glaze very unevenly. I draw the brush lightly over

In this image, you can see that the brush has multiple glazes on it.

the surface of the pot, depositing varying thicknesses of glaze.

With each successive layer, the surface gets deeper and the glaze coating becomes more and more variable. Most of my pots have deeply textured surfaces to begin with. My application is intended to accentuate the texture in the clay. In certain areas the thickness and unevenness of glaze becomes a texture in and of itself.

Other methods of application that I use frequently are splattering, dripping and very controlled pouring. These approaches add movement and contrast to the somewhat static effect achieved by the way I brush. Experimenting with the thickness of glaze for pouring will give you different results depending on the way the glaze runs, drips and melts.

Though we all know to thoroughly mix a glaze before using it, there are times when I either don't bother or I will purposely gather glaze from the inside wall or lid of the bucket or jar. Doing this often gives you an "incomplete" glaze that may offer unusual and unpredictable results.

Every step of my process is predicted and planned. My choice of glazes and application of those glazes determines the firing. Though some potters use pyrometers or even cones in their raku firings to carefully judge glaze maturity, I find that doing this eliminates an important degree of variability and control. The most important component of my firing is the degree to which I allow the glazes to melt and flow. Since I'm using glazes that mature at different temperatures, careful observation of the surface is necessary to achieve the "correct" melting. My intention is to have some areas smooth and glossy, some not quite as melted, and others with the appearance of dry and underfired glaze. I can also control the degree to which poured glaze runs and drips over the surface of the pot by how much I allow it to melt.

The Firing Process

My firing site contains six kilns of different sizes and types, including four recycled electric kilns fired with propane, a wood-fired kiln and kiln manufactured by Ceramic Services of Chino, California. The site is clean, organized and has plenty of space. Successful firing requires planning, choreography and concentration, which results in a calm atmosphere. I always fire with the help of a single assistant.

After carefully examining the surfaces for desirable glaze melt, a piece is removed from the kiln. Bowls and small pieces are taken with tongs directly through the flue hole in the top of the kiln.

In this photograph, my assistant has just removed the lid so I can retrieve a larger piece with tongs.

Next, he sprays areas of the surface with water. This brightens the glazes and reduces the likelihood of copper lusters. You can also control cooling by pouring water onto your piece as you would pour a glaze, or by using compressed air.

After sufficient spraying, the piece is placed in a small metal container, sprinkled with coarse sawdust, allowed to flame, then covered.

Being patient and allowing the piece to cool to the touch before opening the container all but eliminates cracking due to fast cooling.

Raku ware must be cleaned to rid the piece of soot, ash and carbon that gets deposited on the surface. Use an abrasive cleaner and scrub brush or steel wool. Anything that washes off is supposed to come off!

Glazes are always formulated and designed to be fired within certain cone ranges. However, when using glazes for strictly decorative purposes, the prescribed firing range can be ignored. Raku, with its style of visual observation to determine glaze readiness, lends itself perfectly to experimenting with glazes that mature at different temperatures. If used alone, high-fire glazes will be very dry and slip-like at the low temperatures of raku. If combined with low-fire or raku glazes, contact with these glazes will flux the high-fire glazes causing them to melt (more or less). I have a random stock of commercial low-fire glazes and underglazes that I have collected over the years. Use what you have, what you can find and what is available.

Turn to page 46 for some of Steven Branfman's glaze recipes.

Left: The finished piece.

Living Large with Raku

Making and Rakuing Large Platters

by Tom Radca

I've been making pottery for more than twenty years, specializing in large platters and murals composed of hand-cut tiles. My first venture into making large platters ended in disaster. Out of more than seventy large platters, only eight survived. Through experimentation (and determination), I was able to resolve all the technical issues dealing with throwing, manipulating, drying and firing these large forms.

As for glazing, I wanted to get back to the kind of glazes I used at Kansas State University working under Angelo Garzio, but I just didn't want to go up to high-fire stoneware temperatures. So I developed the raku glazing techniques that I now use on my platters. I found a cone 04 glaze that I thought would be good for a raku-type firing, and sprayed it on a vessel, applied a stain of iron and copper, then fired it in an old electric kiln that I had converted to a raku kiln. I've also discovered that the cone 9 white glaze I used in school could be used at the much lower raku temperatures. The under-fired glaze had a cratered lava look and by using iron and copper stains, I was able to achieve surfaces reminiscent of landscapes from my many travels abroad.

Tom Radca uses slips and stains on his large thrown platters to create works of art influenced by his many travels around the world.

Firing large platters using a raku firing method would be extremely challenging if I used a conventional firing regimen, that is, fire to temperature, then remove the work and immerse it in a post-firing reduction receptacle. With platters weighing more than 30 pounds, this method would not only be dangerous, but it would most likely increase the breakage rate. My solution was to place my work in a kiln, fire it up to cone 09, at which point, I shut off the gas and stoke the firebox full with oak. After a good fire has started in the kiln, I close up the flue hole in the top, brick up the burner port and then walk away; no lifting, no hassling with heavy red-hot work, and no breathing smoke. Unloading the kiln the next day nearly always reveals success.

An alternative post-firing reduction technique decreases losses from thermal shock on platters up to 36 inches in diameter.

Photos: Celuch Creative Imaging www.celuch.com

1 Use 36 pounds of fairly stiff clay for these large platters. To reduce stress on your back and arms, center only 12 pounds at a time.

2 Center and flatten each 12-pound lump before the next lump is added. Standing will improve your leverage.

3 Open up the centered clay and check the thickness of the bottom. It should be about ¾ inch thick.

4 Start the platter as a funnel shape before pushing the sides down into a platter form.

5 Trim excess clay from the base of the platter, then remove the bat and platter from the wheel and hold chest high.

6 I discovered that it's next to impossible to flip a freshly thrown large platter upside down onto a drape mold. Intentionally collapsing the rim makes it possible, but you have to bounce the bat to get the clay to collapse.

TIP Using a steel yardstick on the inside brings the wall down quickly and evenly.

7 With the rim completely collapsed, get your shoulder under the rim of the bat to prepare to flip the platter over.

8 If the rim had not been collapsed, it would have folded under when flipped over. Once it's on the form, remove the bat.

The form that I flip my platters onto is made from the hood of a Vent-A-Kiln, which I ordered without a motor or hardware. You can also use a child's saucer sled. Cover the form with enough plastic to extend 6 inches beyond the platter you're making.

9 To reduce cracking problems, trim the excess clay from the base to get a more even thickness between the lip and the foot.

10 Alter the form using a rolling pin. Since the clay is still very wet at this point, use plastic as a barrier so it doesn't stick to the pin.

11 Roll clay from the rim toward the base so that the foot becomes a dome.

12 Using your thumb, press in on the center of the dome to create a foot. This will allow the platter to sit flat.

13 Once all the forming is complete, cover the lip of the platter with plastic so it will dry slowly. The plastic should stick because the clay is still wet, but it will release as the clay dries.

14 Use a bent nail to make holes for a hanger. Depending on the time of year, these platters can take anywhere from a few days to a couple of weeks to dry—don't rush it.

15 After bisque firing and glazing, place the platter in a kiln. Once it reaches cone 09, remove the burner, stoke the kiln with ten pieces of dry split oak, then plug up the burner port.

16 Once the fire is going strong, cover the top hole and walk away.

17 When using the kiln for both firing and post-firing reduction, large work remains safely in place until it is cool enough to handle.

WARNING Do not use this firing method with an electric kiln.

The indentations on this platter were made by pushing a board up under the plastic while the platter was still on the form after the foot was formed. The pits came from placing rock salt on the surface before flipping the platter onto the form. The rock salt dissolves leaving the pit. The colors on this platter were achieved with a stain consisting of 50% iron oxide and 50% copper oxide.

One effect I enjoy using is a cone 9 slip applied thick. This leaves a lava-like effect, as shown in the detail to the right.

Recipe

Kansas State White Slip

Cone 9

Dolomite	9.5%
Custer Feldspar	14.3%
Ball clay	28.6%
EPK Kaolin	38.1%
Silica	9.5%
	100.0%

Tom Radca has been a potter for more than twenty years, and will begin conducting workshops at his studio in rural eastern Ohio in the spring of 2008. Another of Tom's passions is rescuing race horses and he has saved ten so far. For more information and comments, visit Tom's website at www.tomradca.net.

Cone 9 Kansas State White Slip applied thick with iron and copper stains applied. The thick lava effect results from underfiring the cone 9 glaze.

Raku Lite

Building a Portable Fiber Raku Kiln

by Daryl Baird

I began raku firing at my local community college using a gutted electric kiln. Later, I put my own kiln together using a metal trash can lined with Kaowool™ Cerablanket®, outfitted with a weed burner and fueled with propane from a barbecue tank. This design was fairly inexpensive, simple to construct, and easy to transport and set up. But, good as it was, this kiln had a several drawbacks.

The time arrived to build a new raku kiln, so my engineer-potter friend, Robin Smith, and I went to work. Our first task was to list what we wanted in the kiln, then we pulled together the best design elements we'd seen in other kilns over the years and made up a list of requirements. The kiln needed to be:

- **Low-cost, sturdy, lightweight, efficient and safe**
- **Made of readily found materials**
- **Easy to construct using ordinary tools**
- **Capable of handling a pot 15 inches high**
- **Easy to access when removing pots**
- **Safe to look inside during firing**
- **Portable and easy to set up**

Kiln Construction

For a 19-inch diameter kiln, cut 64 inches of fencing material from the roll. This allows for a 4-inch

What You Will Need

Tool List

- Medium- to heavy-weight leather gloves
- Dust mask
- Goggles or safety glasses
- Wire cutters
- Channel lock pliers
- Needle nose pliers
- Hack saw
- 18- or 24-inch carpenter's square
- Spirit (bubble) level
- Yardstick
- Permanent marker (medium point)
- Retractable-blade cutter and extra blades
- ¼- and ½-inch round files

Materials List

Burner, hose and fittings [see note 1]
Propane tank [see note 2]
7 feet of 24-inch wide farm fencing with 1×2-inch openings [see note 3]
8 J-clips (require J-clip pliers) [see note 4]
7 feet of 24-inch-wide Kaowool Cerablanket (1-inch thick) [see note 5]
13 K24 insulating fire bricks [see note 6]
28 feet of 16-gauge high-temperature nickel-chrome wire [see note 7]
2 feet of 24- or 26-gauge steel wire [see note 8]
40 fired clay "buttons" made from 10-12 lbs. of stoneware clay [see note 9]
⅛×6×6-inch Pyrex glass [see note 10]
3 6-inch kiln posts
15-inch kiln shelf (1x15x15)

Notes

1. We used a weed burner for this kiln, but a commercial raku burner equipped with a regulator is best. The burner requires an adjustable valve.
2. Any fairly new propane tank serves the purpose. The small, BBQ-size tanks for outdoor grills tend to freeze up as they empty, so consider a larger tank or several tanks connected with a manifold.
3. Farm fencing (not chicken wire) is available at farm supply stores and home centers. It's easy to cut with a good, sharp pair of wire cutters.
4. J-clips and J-clip pliers are great for joining the ends of the farm fencing. Trouble is, you have to buy more than you need for just one kiln and the J-clip pliers are almost essential in order to use the clips. As an option you can join the farm fencing with short lengths of light-gauge wire.
5. Kaowool Cerablanket is available in 1- and 2-inch thicknesses, but the 1-inch is fine for this kiln. Purchase from a ceramic supply store.
6. Insulating fire bricks (ISB, soft bricks) are available at ceramic supply stores. Hard bricks are not suitable for this application.
7. High-temp, 16-gauge wire is one of the most expensive components of this kiln. Check your local ceramics supply store.
8. This is ordinary steel wire that's easy to bend and twist. It's used to hold the Pyrex glass window in place. Some ceramic supply stores stock an item called "stem wire," which is used in glass ornaments, etc.
9. For fired buttons, use cone 6-10 stoneware clay, roll it to ¼-inch thick, and cut 3-inch squares. When leather hard, drill two ⅜-inch holes a half inch apart. Use a damp sponge to smooth the edges of the holes on both sides. Use 24 buttons for the kiln frame, twelve for the lid and keep four spares. Make two half-size buttons but with the same hole placement. One goes under the burner port, and the other is a spare.
10. Purchase the Pyrex glass window from a local glass supplier/installer. We bought three for about nine dollars.

overlap (figure 1). Roll and shape the cylinder, check the diameter, and then use J-clip pliers to install J-clips down the length of the frame (figure 2). Twisted wires also work, but they bend the ends inward.

Carefully flatten the remaining fencing for the top, and trim it to a 20-inch square. Center the piece on top of the kiln, mark lines at a 45° angle just outside the edge of the kiln frame on each corner (figure 3).

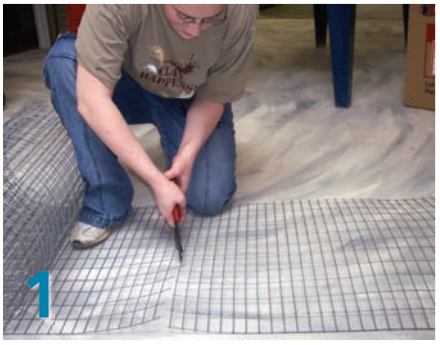
CAUTION
Wear gloves and dust mask while handling ceramic fiber.

Bend the corners to make the lid's "feet." These feet elevate the inside of the lid and protect it from damage when setting the lid on the ground (figure 4).

To provide a nice view of the kiln's interior, install the 6×6 Pyrex window on the overlap six inches down from the top of the frame (figure 5).

Stand the kiln frame on the floor and loosely fit the fiber blanket inside of it. Mark the excess material to be trimmed leaving less than an inch of overlap. Note: The fencing and fiber are both 24 inches wide. If the fiber is a little longer than the fencing, do not trim it. With repeated firings, the fiber will likely settle down for a better fit. Lift the fiber out and lay it on a table, and cut it to length using a sharp knife and the carpenter's square. With the Pyrex window in the 6 o'clock position, reinstall the fiber in the frame with the seam at 3 o'clock. Cut a piece of wire that's 3–4 inches long. Bend it into a U-shape (figure 6a) and push it through the fiber until it's snug against it (figure 6b) and the wire tips protrude through the kiln frame. Hold the button in place with one hand and trim the tips so they protrude only ¼ inch past the frame. Back the wire out and measure its new length, then cut the remaining wires to length.

Put four buttons on one side of the seam, locating the first one an inch from the top and an inch in from the seam. Push the wires through and use the needle nose pliers to bend each tip into a tiny hook that attaches to the kiln frame. Install two buttons in the 12 o'clock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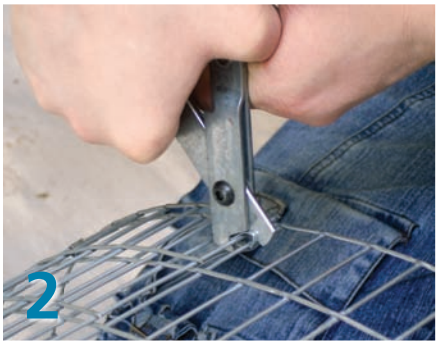
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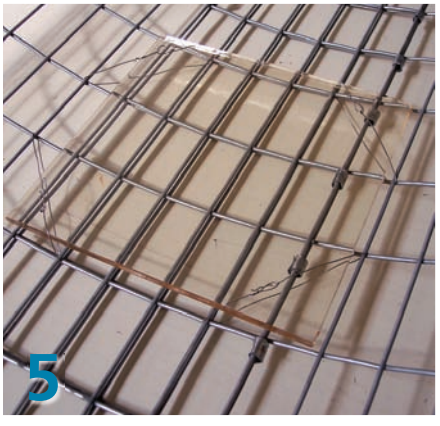
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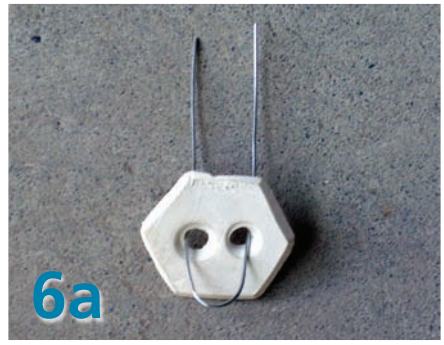
position—one an inch from the top and the other 8 inches below. At the 9 o'clock position, insert four more buttons. At the 6 o'clock position, place a button an inch from the top, then place one so that its bottom edge is located just above the viewing window (figure 7).

Push a wire into the blanket at each corner of the viewing glass and use the pen to mark where the wire comes through. Draw straight lines to connect the four marks and you will know where to place the button. Later these marks will help you know where to cut out the fiber to reveal the window. The third button in this column goes an inch or two below the window and the last button just about an inch off the bottom. Place a button on either side of the blanket area covering the window. Return to the 3 o'clock position and put in four more buttons down the other side of the seam. For the burner port, cut a 4-inch wide by 5-inch high hole on the side opposite the viewing window. Secure the fiber with a button on each side of the port. Use a half-height button to secure the fiber under the burner port (figure 8).

Before lining the lid, remove the eight center-most rectangles with wire cutters to make a 4×4-inch flue opening. Cut the remaining fiber piece down to 20×20 inches, then press it into the lid frame and trim the excess. Do not cover the upturned corners of the lid frame. Use twelve buttons on the lid, with eight around the perimeter and one on each side of the flue opening (figure 9).

Building a Kiln Cart

This kiln can be placed on a base of insulating fire bricks (ISBs), located on top of a concrete slab or concrete blocks. We wanted portability so Robin designed and constructed a simple cart. This cart makes it easy to move the kiln out of the way, even while it's still very hot. Building the cart requires basic skill with a metal-cutting saw, stick welder, angle grinder and welding clamps.


6a


6b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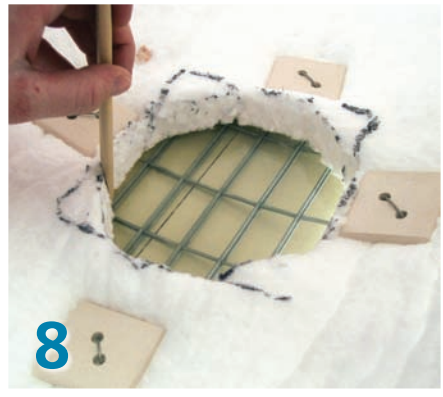
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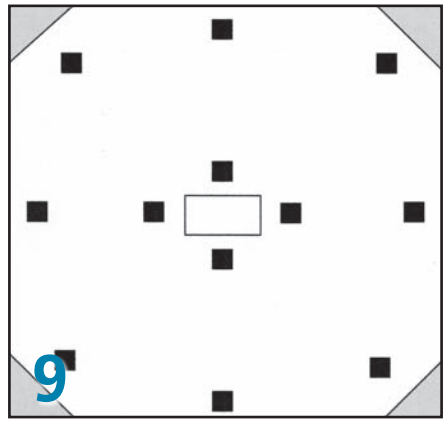
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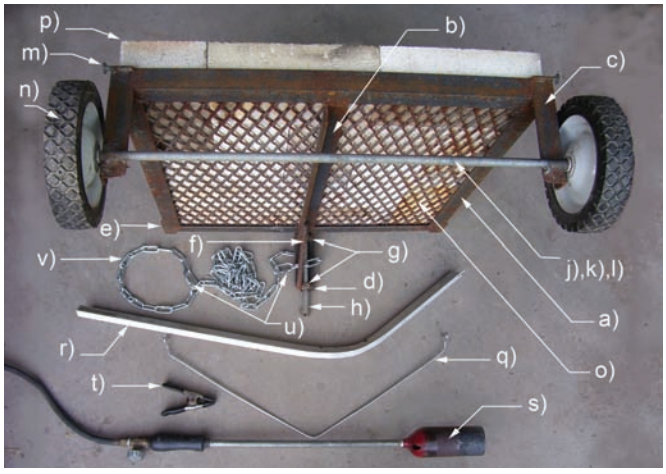


ID	Description	Material	Qty
a	Frame	⅛×1¼×22¾ inch angle iron	4
b	Centerline Brace	⅛×1¼×20¼ inch angle iron	1
c	Back Leg	⅛×1¼×6 inch angle iron	2
d	Front Leg	⅛×1¼×6 inch angle iron	1
e	Gusset	⅛×1¼×1¼ inch angle iron	2
f	Leg Brace	½×6½-inch-long round stock	1
g	Nut	½ inch diameter	2
h	Leveler	½×9-inch threaded rod	1
j	Axle Rod	½× 26¾-inch threaded rod	1
k	Flat Washer	½ inch flat	2
l	Nut	½ inch	2
m	Carriage Bolt	¼×1¼ inch	2
n	Wheels	7 inch diameter	2
o	Exp. Metal Mesh	22⅜×22⅜ inch	1
p	K23 Softbrick	4½×4½×9 inch	13
q	Mount Wire	9 ga.×31 inch	1
r	Mount Trough	⅛×1×36 inch aluminum angle	1
s	Weed Burner or Raku Burner		1
t	Squeeze Clamp		1
u	Quick Link		1
v	Pull Chain		1

Construction

Cut four pieces of angle iron (a) to the same length for the ISB frame. Cut 45° angles on the ends, weld them from the outside, and smooth the welds with an angle grinder.

Cut the center brace (b) to length and weld it into place, then weld a gusset (e) over each of the front corners to complete the frame.

Weld the two back legs (c) and the front leg (d) into place. The front leg needs a brace (f) to give it strength. It's welded on a diagonal from the bottom of the leg up to the center brace. Thread the two nuts (g) onto the leveler rod (h), adjust the nuts to line up with the brace and the leg, and then weld the nuts into place.

Weld the axle (j) approximately ½ inch up from the bottom of each back leg. Add a washer (k) to each end of the axle, slide on the wheels, then use the nuts (l) to hold them in place.

Two carriage bolts (m), with the heads protruding ½ inch from opposite sides of the frame, are welded on the back of the frame. The burner mount wire (q) will be anchored to these.

Lay the expanded metal mesh (o) into the frame and tack-weld it into place. The bricks must lay perfectly flat in the tray. Smooth out raised areas with an angle grinder. Set bricks into the frame and set the kiln in place.

Burner Mount

We used a weed burner for our kiln and devised a method to attach it. (Devise another system for the type of burner you choose.) Now for the trickiest part of the whole cart: the burner mount wire (q) and the burner mount trough (r). File a notch in one end of the trough to fit over the axle. We clamped the trough in a vise and used a ½-inch round file to cut this. Note: The notch you cut should be deep enough to hold the trough on the axle, yet open enough that the trough can be removed easily.

The trough had to be bent so that it would hold the burner horizontally in front of the burner port. We put the trough's notch back on the axle and then looked at the trough from the side to judge the height and angle of the bend. After marking the location of the bend, we put the trough back in the vise and made the initial bend. After a few trials we had it where we wanted it.

The burner mount wire (b) is 31 inches long. We marked the midpoint at 15½ inches and made a soft bend, a slight bend 2 inches in from each end, then, using needle nose pliers, formed hooks on the ends. Take your time here. The hooks have to be open enough to fit easily over the carriage bolts (m).

Hook the burner mount wire over the carriage bolts and let the mount wire rest on the floor. Next, put the notched end of the burner trough on the center of the axle, and then, while holding the trough horizontally, the mount wire was lifted until it touched the bottom of the trough. That contact point was marked so a notch, ½ inch deep, could be cut using a small round file. With the mount wire in this notch, the trough is held in place.

The burner was laid in the trough, positioned so the opening was just outside the burner port and clamped into place. With that, the burner hose was connected to the tank, we used soapy water around the connections to check for any leaks and, at last, we were ready for raku.

Using the Kiln

Before using the kiln, level it by adjusting the threaded leveler rod (h). After the first firing, we wired a couple of metal handles to each side of the kiln so it would be easy to move. We bought inexpensive gate handles and held them in place with the light-gauge wire. We also realized that it would be nice to be able to move the kiln out of the way while the kiln was still very hot so we attached a 4-foot pull chain (u) using a couple of 3⁄16 inch quick links (v). Place three 6-inch kiln posts in a triangular layout to support the kiln shelf. Locate one post directly opposite the burner at the back and widely space the other two on either side of the burner. •

Daryl Baird lives in Sagle, ID. He is the author of The Extruder Book *published by The American Ceramic Society. For questions or comments, you can reach Daryl at idahobaird@nctv.com*

Supply Room by Bill Jones

What's a Raku Clay?

RAKU CLAYS

The raku firing process requires a porous nonvitrified clay that can withstand rapid heating to low-fire temperatures (cone 09–04 or approximately 1702°–1958°F) and cooling without cracking or breaking from the thermal shock. By this definition, any clay that can withstand such stresses can be considered a raku clay; however, some clays will provide a greater degree of success, especially those with a high fireclay content. It's important to recognize that when deciding on a suitable raku clay, your chances for success increase with bodies specifically formulated or adjusted for the raku process.

Additions

Most clay bodies can be used for raku by adding up to 50% grog. Grog, which is crushed, fired clay, opens the body thus making it less prone to thermal shock. Other materials you can add to increase the ability of a body to withstand thermal shock include silica sand and kyanite. Silica sand can be used as a substitute for grog, especially at the lower raku temperatures. Because it is not as absorbent as grog, you may recognize some gains in plasticity. Kyanite is a refractory material that matures at about cone 36. One of the characteristics of kyanite is that it expands when heated, which counteracts some clay shrinkage. It also creates a network of needle-like crystals allowing you to make larger forms. Commercial raku clay bodies contain one or a combination of these ingredients depending on other qualities you need in a body, such as the ability to make large work, or whether you're throwing or handbuilding. You can add any of these materials to an existing body simply by wedging them in, although using a pug mill or clay mixer provides a more homogenous mix, and dry batching provides a more consistent mix.

Bisque Firing

Most raku clays can be fired as high as cone 6–10 since they are formulated as stoneware clays. But clay is clay and it should be noted that when bisque firing for raku, you should not bisque fire higher than cone 04 (1958°F). Between approximately 2012°F and 2192°F the material becomes more dense and glasslike, thereby losing some of its ability to withstand thermal shock.

Piece by: Tim Proud / Photo by: Glen Brown

The right raku clay must be suited to the type of work you want to do.

Tips for Buying Raku Clay

Most clay suppliers offer a range of raku clay bodies that can usually match the qualities you're familiar with in your regular body. They will be able to guide you either through their product descriptions or in consultation, and many clay producers will even custom blend a clay from your own recipe.

Plasticity: Clays with coarser grog are more suitable for handbuilding, while finer grog makes a better throwing clay. Some commercial clays are suitable for both.

Thermal shock: The larger and thicker the pieces, the more suitable and shock resistant the clay has to be. Increasing the shock resistance means adding more nonplastic refractory material, which may decrease plasiticity.

Color: The color of the raku clay body influences the colors of your glazes. Light-colored or buff bodies produce lighter, more brilliant glaze colors and bring out subtle shades, while darker clay bodies have a more muting affect. Raku clays made from buff stoneware, kaolins and ball clays produce lighter colors, while adding earthenware clays and colorants like iron oxide or burnt umber will create darker bodies.

Texture: Adding grog to a clay body affects the texture since the grog is already fired and does not shrink. While this is not much of a factor with fine or medium grog, it is more noticeable with coarse grog. If you're looking for smooth texture, you'll want a body with fine grog, sand or kyanite. You can also create unusual textures by wedging in sawdust or paper pulp, which also opens the body and increases resistance to thermal shock.

As with any clay or glaze, you should test a raku body before you invest a sizeable amount of energy in forming work. Many suppliers offer samples that you can test, or you can try out different additions to your existing body. Mark all of your samples and keep good records of your results. •

Continued from page 12.

Mark the cut-off line with a needle tool about a ¼ inch up from the bat. The walls should be thin enough at that point. Since there may be excess water inside the bottle, which could cause the form to dry unevenly and crack, remove a wedge of clay at the base and tip the bat to release the water (figure 7).

Make the base with about ¾ of a pound of clay. Throw it upside down to create a dish similar to a low-walled dog bowl. Use calipers to ensure that the diameter of the base is slightly greater than the diameter of the bottle (figure 8). Wire off the base from the bat and set both the bottle and base aside until leather hard.

Once the pieces are leather hard, cut the bottle from the bat with an X-acto knife (figure 9), running it along the groove marked earlier by the needle tool. Trim the base upside down, which is actually right-side-up in the final assembly. Score the surface of the base and the bottle with an old toothbrush, and apply slip (figure 10). Quickly line up the bottom and top and press them firmly together. The excess slurry will squeeze out of the joint ensuring a strong bond (figure 11). Clean up the seam with a chamois or elephant ear sponge and rotate the wheel until the joint is clean and smooth (figure 12). •

Antique ink bottles served as the inspiration for the form of the vinegar bottle.

Frank James Fisher has been a potter for more than 25 years and is a frequent contributor to Pottery Making Illustrated. *For more information, visit his website at www.frankjamesfisher.com.*

Cut out a drain hole at the base.

Use calipers to measure the base.

Cut the bottle from the bat.

Apply slip to scored areas.

Attach the top to the base.

Clean the seam with a sponge.

Instructors File by Wayne Ferguson

Seamless Cylinders

COIL/DOWEL TECHNIQUE

I first discovered the coil/dowel rod method about thirty years ago. It was a great method for making hollow tubes for stirrup spouted vessels and teapot spouts. It was just a natural progression to larger amounts of clay and larger dowel rods and rolling pins.

My first use of this method on a larger scale was to create a series of totem poles with a group of middle school students in Benton, Kentucky. Each student made a cylinder about 8 inches tall. They were then transformed into stylized animal heads. A wooden box sculpture stand and some metal conduit provided the stability for the cylinders, which were slipped over the top of the conduit and simply stacked one on top of another. After the display came down, each student could take their individual piece home. The project was well suited to the curriculum of Native American art, and there were a number of books and a films to prepare the students.

I also used this method in a project concerning folk art at Black Mountain Elementary, a school in a remote part of Harlan County, Kentucky. We were studying "face jugs" and the happy alternative to me throwing 100 small jugs on the wheel was to make "face mugs" using the coil/dowel method. Because the cylinders needed to be uniform and a little bit stiffened, they were premade by myself and a couple of volunteers, but the students did get a demonstration and an opportunity to attempt to make their own cylinder. These were fifth- through seventh-grade students and the mugs were creative, well crafted and functional. The project fit well with the curriculum of social studies and folk art of the region.

I have also used this method to make a larger cylinder (about 10×6 inches) that was then shaped into a hollow bust that became a self portrait. This project worked well for older students. We would prepare for this project by doing self-portrait sketches and printing out digital photos.

The most important aspect of this hollow cylinder method is to capitalize on pushing from within to expand the form or collaring in to constrict the form. Some very pleasing and more complicated forms can be created if one is patient and allows the clay to set up a little bit.

This method requires a table surface that is either unfinished wood or cloth covered. Formica will not do well. All of the tools are easily made or obtained at your local hardware store.

The coil/dowel technique can be used to make figurative forms such as this fish bottle by the author.

To begin, roll a solid clay cylinder that is rounded without any flat spots or facets. Next, skewer the cylinder with a sharpened wooden dowel. Using a forward and back rolling motion, open up the cylinder. As the size of the opening increases, a larger diameter object must be used. The final tool can be a rolling pin. This method works best with clay that is a bit on the stiff side.

TIP: The wooden tools must be clean and dry with a natural finish. Any slick varnish or shellac-type finish will cause the clay to stick to the tool.

Practice enables you to create stable seamless cylinders with uniform wall thickness. For large cylinders, it is nice to have an extra pair of hands. I have made cylinders two feet in height and ten inches or more in diameter using this method. Covered jars, teapots, spouted vessels, mugs, steins and low-walled bakers and casseroles are just a few of the possibilities.

The size of the project determines the amount of clay needed. The cylinder can be small, which works great for face mugs and small hollow animals, or it can be larger, which works best for sculptural forms and vessels. A thicker wall means one has more leeway for pushing from the inside to create a more inflated form. Since the cylinder has no bottom, it can be flipped over and worked from both ends.

A wet clay cylinder is amazingly stable if it is vertical. If a horizontal form is desired, one must create a soft cushion for the cylinder. A few minutes in front of a fan will allow the clay to set up enough to avoid problems. Pushing the clay too soon will, of course, result in collapse. Expect the first at-

Student work created using the coil/dowel technique.

A cushion below helps prevent warping during forming.

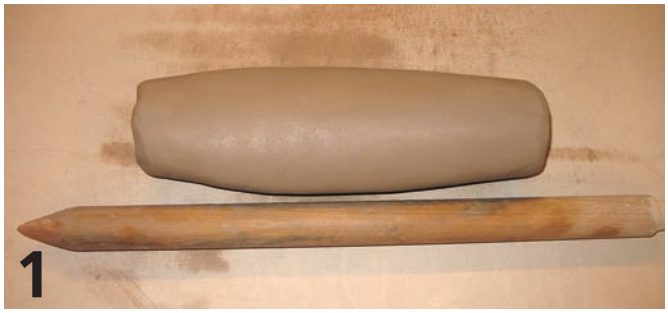
tempts to yield some fairly crude cylinders, but later on they will become consistent. With practice one can create more cone-shaped cylinders.

This cylinder method has many possibilities. It can be used for making components of figurative sculpture, such as animal bodies and legs. It also provides a solid foundation for building up with coils. The cylinder can be shaped into an oval opening, squared off, faceted, pushed from the inside or outside, paddled, stamped, textured, fluted, collared in or altered by removing a wedge or dart. Two advantages to this method are that there is no seam and the clay has had no water added to it during the forming process.

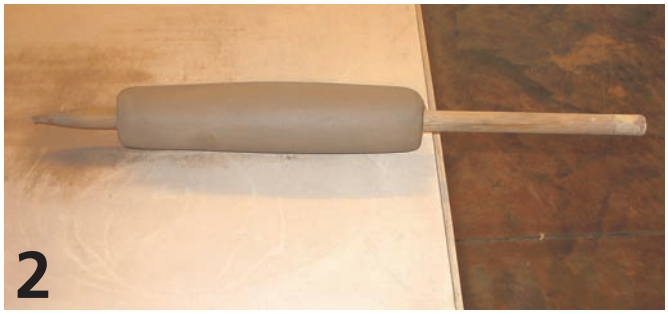
TIP: Be sure you are done with any modifications to the form before you add the base. Prematurely adding a base will limit access to the inside. •

Wayne Ferguson has been a potter and an educator for over thirty years. He lives and works in Louisville, Kentucky. For more information on his work, visit www.waynefergusonceramics.com.

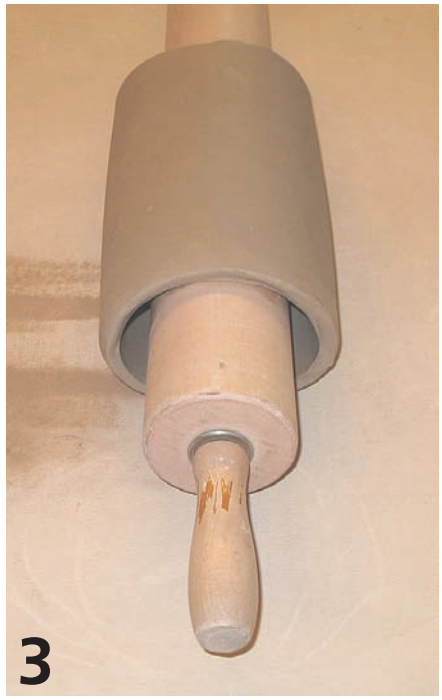
The Process



Roll a thick coil and skewer it with a sharpened wooden dowel or part of a broomstick.

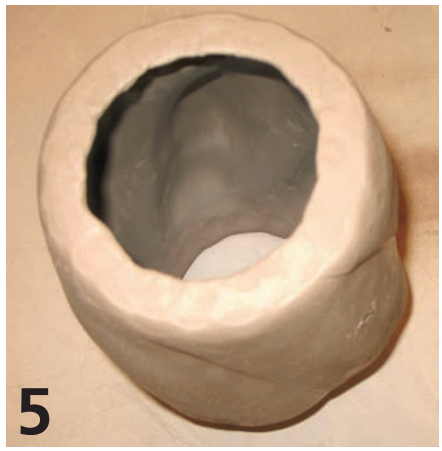


Gently roll the dowel back and forth to slowly widen the diameter of the opening.



Switch to a larger dowel or rolling pin and continue to open up the cylinder.

Continue this process until the cylinder is the desired size. This image shows the various sizes of dowels used for this cylinder.



Leave the cylinder on the thick side if you plan to alter it by stretching from the inside.

When you have finished modifying the form, roll a slab and cut a round bottom for it.

Ceramics: A Lifetime of Works, Ideas and Teachings

BOOK REVIEW

This latest book by prolific author Robin Hopper is part memoir, part technical manual, with some useful advice and a personal portfolio thrown in to round it out. This is a very personal book, from a writer whose style has always been down-to-earth and easy to understand. There are many informative chapters, such as "Survival Tactics," in which he discusses how to make it as a ceramic artist, and "Thoughts about Form," where he presents his analysis of form and proportion, and how pottery relates to the physical world, geometry, and the human body and psyche.

Some of the text and illustrations are imported directly from two of his earlier books, *The Ceramic Spectrum* (the most readable book I know of about glaze formulation) and *Functional Pottery*, in which he tells you not just how to make a pot, but elucidates principles for making pots that are both ergonomic and aesthetically pleasing. This reiteration of previously published material from his more singular titles emphasizes the importance of these principles to the field and study of pottery as a whole.

Part I of the book is the story of his life's journey as a potter, from his youth in England to establishing one studio after another before finally settling in Vancouver, British Columbia, Canada. Here he now has a studio, a showroom and a world-class garden, which draws tourists on its own. The lesson from his story, which he spells out in Part II, is that you can make a living as a potter if you work hard, develop an attractive and consistent product, and find galleries and stores to sell your work. Then you can work on becoming an artist and selling one-of-a-kind pieces. I'm not sure it's as easy now as it was when he was a young man, but, if you do make functional pottery, his advice about how to make it better is very useful.

Ceramics **documents a lifetime of living, learning and sharing information on all aspects of studio ceramics.**

Part III moves away from considerations of function to an analysis of form and surface, and offers suggestions for developing your own glazes. He does note that his approach is oriented towards creating an interesting surface for nonfunctional work, rather than making a food-safe glaze. However, if you don't understand what makes a glaze work or haven't tried mixing and developing your own, this section will leave you much better informed and, perhaps, braver about experimenting.

Part IV provides a brief overview for developing artistic ideas, as well as a portfolio of his beautiful work. This section will remind you that he doesn't just have good ideas, he really can make nice pots. If you're already a fan of his work and his books, and want to know more about his life, this book will appeal to you. If you know nothing about the author, this is a good introduction to his work, his writings and what he has to offer as a teacher. •

Ceramics: A Lifetime of Works, Ideas and Teachings
By Robin Hopper
Krause Publications
Iola, Wisconsin
2006
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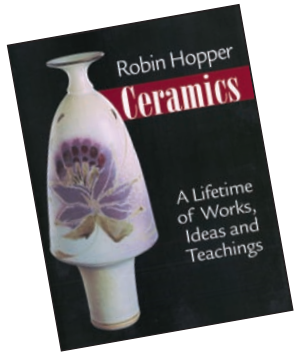

Teabowl, 3 in. (8 cm) in height, carved and altered, with Kelly's Low-Fire Shino, raku fired, by Steven Branfman.

Continued from page 23.

Branfman's Recipes

Though I have a repertoire of raku glazes, these two glazes are the ones that I most often use in combination with the low-fire and high-fire glazes when I want to further affect the melting.

Basic White Crackle

Gerstley Borate	65%
Tin Oxide	12
Nepheline Syenite	15
Tenn Ball Clay	5
Silica	5
	100%

An opaque white glaze.

Rogers White

Spodumene	35%
Gerstley Borate	60
Tennessee Ball Clay	5
	100%

Though it is called "white," this is actually a transparent glaze.

Kelley's Low-Fire Shino

Lithium Carbonate	26%
Nepheline Syenite	64
EPK Kaolin	10
	100%

Add: Light Rutile	6
Manganese Carb	0.5

This is a semi-opaque glaze with excellent crackle and lovely tan to silvery color characteristics and texture depending on firing temp. Works well in combination with other glazes.

Raku is a technique loaded with creative possibilities. A kaleidoscope of colors and surface effects can be achieved. Learn and become comfortable with the basic process by reading, and taking a class or workshop. Then, expand your practice with your own individuality, personality and character. •

Steven Branfman is a potter, writer and teacher. He is the founder and director of The Potters Shop and School in Needham, MA, and teaches ceramics at Thayer Academy in Braintree, MA. He is the author of Raku: A Practical Approach, Second Edition, The Potters Professional Handbook, *and the forthcoming* Pottery Forming Techniques: A Handbook For Students.

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Overview the book (*Tips and Time Travel from a Vernacular Potter*), an irreverent point of view by Marek Drzazga-Donaldson at www.keramix.com.

EXTRUDE IT! Getting the Most From Your Clay Extruder, new instructional videos by David Hendley. Volume I—extrusions as handles, feet and additions; Volume II—two-part dies for hollow extrusions; Volume III—the expansion box and extrusions as building components. $43 each or $105 for the set (more than four hours of video). Shipping costs included. (903) 795-3779; www.farmpots.com.

Tom Turner's Pottery School. For details, see www.tomturnerporcelain.com; or (828) 689-9430.

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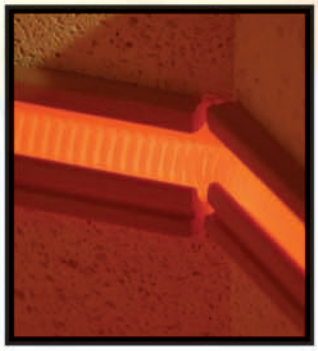

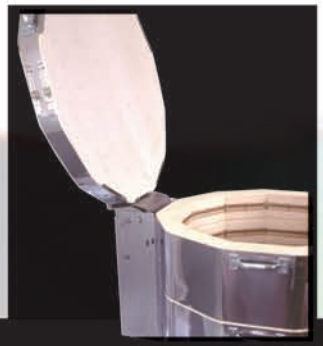

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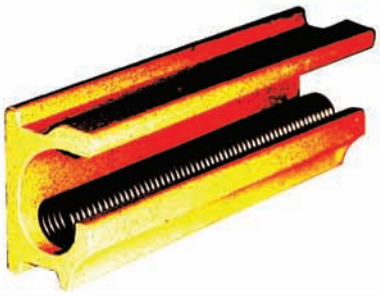

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