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Trying out new glazing techniques is always exciting because you don't know quite where you'll end up – even a mistake could hold a pleasant surprise! If you'd like to try something new, then one or all of these great glazing techniques may be just what you need.

These three glazing techniques are as varied as their origins. Majolica (also spelled maiolica) originates from the Mediterranean and is the techniques of applying color on top of a glaze; Lisa Bare Culp brings us up to date with contemporary commercial glazing techniques; and crystalline glazes originated in Europe and require specific glazes and firing conditions.

Whether you're looking for a fresh look or looking to see what you can do with a new glazing technique, you'll find your answers in these three great approaches.

The Magic of Majolica by Clay Cunningham

Posey Bacopoulos shares the historically rich and beautiful process of majolica glazing, a decorative process where colorful imagery is painted over a white glaze. This wonderful glazing technique allows her to create vibrant imagery on pottery without fear of the colors running or blending together as many glazes do when they accidentally overlap. Majolica is the perfect technique for Posey in her small studio, as it requires only one glaze, a few overglazes, and an electric kiln.

Adding Depth to Your Glazes by Lisa Bare Culp

If you're looking for some different glaze techniques, here are three glaze projects you can try out. Lisa Bare Culp learned a lot from her experiments with sgraffito, layering, mixing slip with stoneware glazes and multiple firings. She uses commercial glazes as an artistic tool that she shares with students, and here she demonstrates a pouring technique, a carving technique and a layering technique.

The Mystery of Crystals by William Schran

Crystalline glazes are among the most admired in ceramics. The fact that these crystals "grow" in the kiln seems a bit of a mystery to most, but to William Schran it was a mystery he had to figure out. Once achievable only at high-fire temperatures, Bill demonstrates how you can get elegant crystals at cone 6 using a programmable or manual electric kiln. He includes his recipes and his firing programs so you'll achieve success.

The Magic of Majolica

by Clay Cunningham

Majolica glazing techniques allow Posey Bacopoulos to create both bold lines and areas of bright color, as in the oil and vinegar ewer set above, without the fear of having them run or blur during the firing.

In her numerous workshops, Posey Bacopoulos shares with her students the historically rich and colorfully beautiful process of majolica glazing, a decorative process where colorful imagery is painted over a white glaze. This wonderful technique allows her to create vibrant imagery on pottery without fear of the colors running or blending together as many glazes do when they accidentally overlap. Posey creates and fires her work in her small New York City studio. Majolica is the perfect technique for her as it requires only one glaze, a few overglazes, and an electric kiln. Here's how she does it.

Applying the Base Glaze

The process begins with any leather-hard or bone dry pot made from earthenware clay; Posey uses Stan's Red from Highwater Clay. Before bisque firing, a thin layer of red terra sigillata is painted onto the foot of the pot, as well as any places that are to remain unglazed (*figure 1*). This creates a nice, rich shine to the exposed clay, and also helps to create a water-tight surface on the pot. When the pot is bone dry, fire it to cone 05½ on a slow cycle.

Apply terra sigillata to the lid of the bone dry piece.

Dip the exterior. Smooth out any overlaps with a finger.

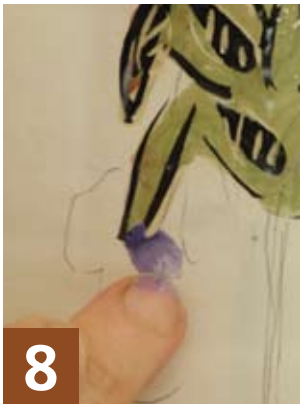
Clean the lip, lid, and foot with a sponge.

Draw on the design over the glaze with a pencil first.

Outline the floral foreground with black stain.

Use a stylus for creating sgraffito decoration.

Coat the foreground with wax resist.



Designing a 'blossom' with a finger.

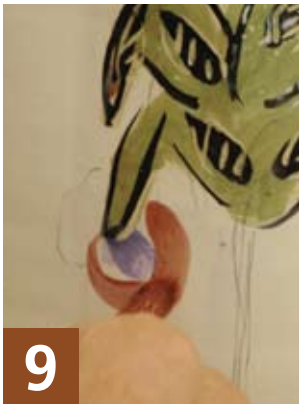
Glaze the bisqued pot with the PB Matte Majolica Glaze. Mix the glaze to a consistency slightly thicker than 'normal' glaze thickness. Smaller forms can be dipped using glazing tongs while for larger forms such as the one in this demonstration, the glaze needs to be poured and dipped. Pour the glaze into the pot's interior and dip it onto the exterior (*figure 2*). Take care to keep the glaze from overlapping too excessively. Heavily overlapped majolica glaze shows the discrepancies of thickness after firing and could crawl or pinhole if too thick.

With a sponge, wipe the foot of the pot thoroughly clean. If making a lidded vessel, remove the glaze on the rim of the pot and the underside of the lid with a sponge to avoid the lid sticking to the pot in the kiln (*figure 3*). After the glaze dries, smooth out any air bubbles, drips, or pinholes by gently rubbing the surface and dusting off the loosened material. Use a mask or respirator when rubbing or blowing the glaze dust.

Inglaze Decoration

Once the piece has 'cured' for a day, it is time to decorate! Begin by using a soft #2 pencil to lightly draw out the decoration (*figure 4*). Using the pencil first allows you to run through ideas before committing fully with the brush and stains. Decoration can be as minimal as a few dots of color or as elaborate as an overall pattern covering the piece. The choice is up to you. If you make a mistake, it can be gently 'erased' with a finger.

Unlike painting, where the background is usually painted on first, the majolica technique begins with painting the foreground using a stain paste and working backward toward the background so that colors are always painted onto a white ground. For her decoration, Posey often chooses floral motifs. However, the motifs that adorn her work are patterns, rather than actual representations of nature, that she uses to divide and define the space of the pottery in interesting ways.

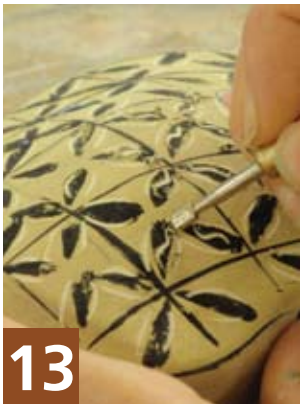


Add a middle ground around the waxed foreground.

Wax over the decoration and brush on the background.

Spray the lid using an atomizer for additional texture.

Add pattern and line work with black stain or paste.



Add sgraffito work on the lid to match the jar.

Drawings included on the bottom of the pot.

Mix the stain paste to a thinned glaze consistency. If it's too watery, it may drip or run down the side of your pot. Too thick, and the brush will not glide easily across the raw glaze surface. (To learn how to create your own stain pastes, see page 6). Starting with the foreground, apply the stain pastes with a brush. Posey uses a Marx 5 Long Dagger brush which is perfect for long, flowing lines with varied thickness. To create an added layer of interest to your decoration, load your brush by first dipping it into one color and then dabbing a second color onto the tip. When the brush moves across the surface of the pot, the colors gracefully blend together. Loading the brush can add an element of depth and interest to your brushwork.

To boldly outline your shapes, apply a smooth coat of black stain or paste with a Marx Dagger 636 brush (*figure 5*). Deemed by Posey as the "Magic Brush," this brush is angled at the tip which allows for great line variance as you move it. With practice, beautiful flowing lines are possible. The black lining around the shapes helps to define it from the rest of the pot, as well as creating a dark color on which to carve back through. Known as sgraffito, the process of scratching through the black outline to the white glaze underneath is a great technique to help define a shape or to add a little extra decoration (*figure 6*). Though any semi-sharp object can be used for sgraffito, avoid using objects that are very sharp or thin, such as a needle tool, as they make lines that are too skinny and offer very little line variance. Posey recommends and uses a Kemper Wire Stylus WS.

After finishing all the foreground decoration, it's time to start working toward the background. Instead of painting the middle ground and background color around the shapes painted on the pot, which can hinder the fluidity and evenness of your background, Posey prefers to wax resist her foreground decoration.

Large oval box, 11 inches (28 cm) in length, earthenware with majolica base glaze and overglaze stains.

Apply a thin coat of wax resist directly over the decoration (*figure 7*). Once dry, the middle ground and then the background color can be applied directly onto the entire pot and voila, the wax prevents the new stain from absorbing into the glazed pot. If the wax goes outside of the decoration's border, don't worry. A thin white line surrounding the decoration can add a loose, gestural quality to the piece.

Since the foremost decoration is already painted and now waxed, any new overglaze colors brushed over will appear to be directly behind the initial drawings, thus creating a middle ground. Posey uses her finger to dab additional color, for example, creating the center of a 'blossom' (*figure 8*). The blossoms are then elaborated upon with brushwork (*figure 9*). Once this decoration has been applied, coat it with wax resist. Depending on the number of layers desired in the drawing, this could be done in one or two steps, or may require multiple sessions of applying decorative elements and waxing.

Once all individual objects of decoration are painted on and protected with wax resist, it's time to give the rest of the piece an overall hue. Though it can be left white, Posey prefers to liven up the surface with a uniting color. To apply the background color, Posey uses a Loew-Cornell 275 brush as it can hold a large amount of stain paste and creates a nice, wide swath of color (*figure 10*). Here she brushes vanadium stain paste onto the piece directly

Tall oval box, 8 inches (20 cm) in height, earthenware, with majolica base glaze and overglaze stains.

PHOTO CREDIT: PROCESS IMAGES BY CLAY CUNNINGHAM, IMAGES OF FINISHED PIECES BY KEVIN NOBLE.

NOTE

Even though the wax is dry, allow it to cure for twenty-four hours before touching it with your hands. If it is still damp, it may stick to your fingers and thus pull the stain decoration off. However, it is safe to use a sponge on the waxed areas before the wax cures.

over her previous decoration. The entire surface can be colored or the decoration can be painted in any manner or pattern to design the background. To add variety to the surface, a small atomizer filled with rutile stain paste can be sprayed onto the surface (*figure 11*). This allows for a varied and mildly textured surface similar to pottery fired in atmospheric kilns. After applying the background, use a small damp sponge and carefully wipe over the waxed decoration to remove any beads of residual glaze.

Finishing and Firing

With the entire piece colored, any additional decoration can be added on top of the background color using the black stain or paste (*figure 12*). Here Posey paints on a grid design which adds additional patterning as well as helping to compose the space within the form of the pot. As before, sgraffito can be used to add variety to lines or for further decoration (*figure 13*). Don't forget the foot and the inside of the pot. Adding small, yet similar, decoration to the inside of your pottery helps relate all the parts of the work to one another, and gives the viewer an additional 'surprise' to find later (*figure 14*).

Load the glazed piece into the electric kiln and fire to cone 05. Fire the kiln slowly, particularly in the latter stage of the firing, for a total time of no less than twelve hours. This allows the glaze to even out and allows any additional gasses in the clay to burn off slowly, ensuring that your colors are even and free from pinholes. The good news is that majolica glazes are typically very stable, meaning they won't run. Not only does that mean that you won't have any glaze to grind off the bottom of your pot, your decoration won't run either.

Glaze Materials

Though most surface treatments can be adapted to work in more than one firing range, terra sigillata and majolica techniques are primarily intended only for low-fire. Posey Bacopoulos discusses using terra sigillata to create a satiny smooth and more water tight surface along with making stain pastes for use with the majolica decorating technique.

Terra Sigillata

Terra sigillata is an ultra-refined slip that can be applied to bone dry (or bisque fired) clay. When brushed onto bone-dry wares, the extreme fineness of the platelets in the terra sig causes them to naturally lay flat on the surface, resulting in a smooth, satiny coating, even with just a very thin translucent layer. If the terra sig is polished when still slightly damp with a soft cloth, the pad of your finger, or a thin piece plastic, it will give a high gloss without heavy burnishing. Since it is a slip, and not a glaze, Terra sig will not run or stick to other pieces in the kiln or to a kiln shelf. It works best at low temperatures retaining a gloss appearance even in pit and barrel firing, but can be fired higher with adjustments to the mix.

Making Terra Sigillata

Terra sig can be made from any clay, though some have a smaller particle size and will have a greater yield. No matter what clay you use, in order for terra sig to settle properly, it must be deflocculated, which makes the particles repel one another and keeps the finest particles in suspension. To achieve the best results, use a combination of 1 part sodium silicate and 1part soda ash, based on the dry weight of clay. Weigh out the deflocculant and dissolve thoroughly in hot water (already measured into a larger container). Slowly add the desired clay and blend thoroughly with a mixer or a large wire whisk. (Red or white earthenware can be used and colorants can be added to both after the middle layer is extracted). Allow the terra sig to sit undisturbed for several days or until three distinct layers become visible. Delicately remove the middle layer using a ball syringe or similar device, being careful not to overly disturb the mixture as a whole. This middle layer is the terra sig. Put it in a separate container for use. The top layer will be mostly water and the bottom layer will essentially be sludge, both can be discarded. The sig layer is now ready for use or can be colored if desired, generally 1 cup of sig to 1 tbsp. of stain.

Majolica Stain Pastes

Majolica stains are made with frits and/or Gerstley borate, which are fluxes and glass formers.

They allow the stain pastes to melt into the white base majolica glaze they are layered on top of and add to an overall and consistent glossy finish.

Majolica is a low-fire technique, you can use any commercial stain or coloring oxide to achieve the color you want.

Always test your recipes first before using them on finished work. And always wear a respirator or similar safety equipment when handling dry materials.

Applying terra sigillata to foot of the bone dry pot.

PHOTO CREDIT: CLAY CUNNINGHAM.

Add stain paste base to the colorant, 3½ parts paste to 1 part colorant by volume.

Mix the stain paste to the consistency of peanut butter.

Prepared stain pastes. Consistency remains the same with each batch.

Recipes

Toasty Red Brown Terra Sigillata

Cone 05

Water	14 cups
Red Art Clay	1,500 grams
Sodium Silicate	1 tsp.

Mix thoroughly and allow to settle into three distinct parts. Pour off the top, thinnest layer. Pour the remaining liquid (middle layer) into a lidded container to use as your terra sigillata. Discard the bottom sludge. Use on leather-hard or bone dry ware.

PB Matte Majolica

Cone 05

Ferro Frit 3124	65%
EPK Kaolin	20
Dolomite	10
Silica	5
Total	100%
Add: Zircopax	10%
Epsom salts solution	

Put water into a mixing container and add dry ingredients. Once settled, stir vigorously while adding a saturated Epsom salt solution (approximately 1 tsp. per 1000 gram batch). Add water to achieve a thick, creamy consistency slightly thicker than a typical glaze. To make a saturated Epsom salt solution, mix Epsom salts into a cup of water until no more will dissolve.

Stain Paste Base

Cone 05

Ferro Frit 3124	50%
Gerstley Borate	50
Total	100%

Mix by volume. This is the base recipe for making colors to paint on over the base glaze.

Stain and Oxide Colorants

For commercial stains, the ratio should be 3½ parts Stain Paste Base to 1 part colorant by volume. (Most commercial stains will work, but test first.)

Green: Mason Florentine Green 6202
Mason Bermuda Green 6242

Blue: Mason Navy Blue 6386

Yellow: Mason Vanadium Yellow 6404

Purple: Mason Pansy Purple 6385

Chartreuse: Mason Chartreuse 6236

Brown: Mason Chocolate Brown 6124

Gray: Mason Charcoal Grey 6528

Black: Duncan EZ Stroke Black EZ012

For oxides, mix 1 part Stain Paste Base to 1 part oxide by volume.

Brown: Red Iron Oxide

Turquoise: Copper Carbonate

For all Stain Pastes, mix to the consistency of creamy peanut butter and thin as needed for brushing.

Amaco Majolica Decorating Colors (GDC series)

GDC Red #54
GDC Purple #55
GDC Royal Blue #21
GDC Avocado #47
GDC Real Orange #65
GDC Rose #38

These work great right out of the jar to be brushed onto the Majolica Glaze. No mixing or measuring of materials required. For other colors, see the Amaco catalog.

Test tiles of stain pastes painted over majolica glaze and glaze fired to cone 05.

Adding Depth to Your Glazes

by Lisa Bare Culp

***Fish Bowl*, matt white glaze over commercial glazes, fired to cone 6.**

As a potter and in-home instructor for many years, I've always mixed my own glazes, or relied on other professionals who mix dry glazes to my specifications. Recently, an idea for a single pot challenged me to experiment with commercially-made glazes. The outcome has been succesful with vibrant new color selections, time savings and the convenience of readily available glazes screened for toxicity—all this without compromising my workspace or my standards.

What changed my thinking on commercially prepared glazes was my desire to introduce bold new colors into my work. I envisioned a piece with contrasting matt black-and-white slip surfaces offset against a single area glazed in vibrant red. My local supplier recommended a food-safe, non-toxic red glaze, Mayco's Stroke & Coat Cone 06.

Early Experiments

Early tests resulted in pieces with dramatic and beautiful contrasts between my porcelain slips and the red glaze. In one test, I used Stroke & Coat SC-73 Candy Apple Red, to highlight areas of bisqueware. In another, I used SC-74 Hot Tamale. Sometimes I applied the glaze with a big brush in a single, expressive stroke. Other times, I squeezed the colors from a slip trailer and a turkey baster.

After these loose applications, I dipped the entire piece in my usual cone 6 glazes. Because of their gum content, the commercial glazes resisted my glazes slightly, making the bold strokes of color come through vividly. Stroke edges were blended and their colors softly striking against the cone 6 palette. The outcome was as satisfying technically as it was aesthetically; I was satisfied with the melt (Stroke & Coat is a glaze, not an underglaze), the color and

the absence of pinholing or other major flaws at cone 6.

A New Tool

Further experiments with sgraffito, layering, mixing with slip and stoneware glazes, and multiple firings have opened up commercial glazes as a new artistic tool—albeit an unexpected one—to share with students. They have learned the importance of experimenting with new surfaces, new materials, combining techniques and achieving balance with different kinds of material.

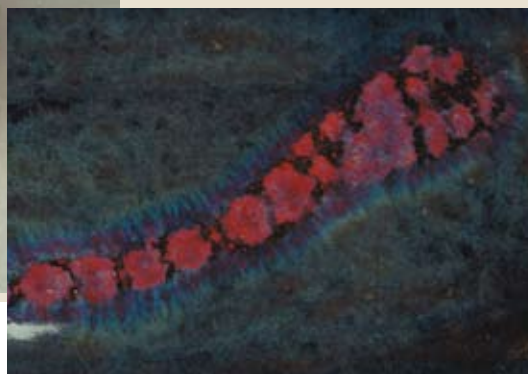
If you'd like to experiment with commercially prepared glazes, I've included three of my projects for you to try. Mixing my own recipes will always be an important part of understanding the science behind the art of pottery making. But successfully integrating commercial glazes in the mix is just one more way to pursue the function and beauty of ceramics.

Asparagus Tray

Pouring

Squeeze a large amount of Stroke & Coat SC-73 Candy Apple Red across the interior of a bisque-fired bowl. Use a 2-inch brush to apply a thin coat of Mayco's Elements Chunkies EL 203 Coal Dust (this is a low-fire effect glaze with crystals) over the Candy Apple Red.

A nice feathered edge is created when the piece is dipped into a cone 6 black glossy glaze.



Carving

Apply a thick coat of Mayco Stroke & Coat SC-71 Purple-Licious and SC-74 Hot Tamale with a large brush to the interior surface of a leather-hard bowl. Once the colors are slightly dry, the design is carved through the glaze with a loop tool, then bisque fired to cone 08. Dip the entire piece twice in a cone 6 matt white glaze and fire to cone 6 in oxidation. The commercial colors show well through the white matt.

Note: If the carved lines are too fine they may fill in when the glaze melts.

Fish Bowl

Gear Dish

***Gear Dish*, slab-built stoneware.**

Layering

On a heavily textured, bisque-fired piece, apply a cone 6 porcelain black slip as a stain, wiping off the high spots with a damp sponge.

Use a 2-inch brush to apply Stroke & Coat SC-71 Purple-Licious to the high spots with a dry brush technique. Next, dry brush Mayco's Stroke & Coat Red SC-74 Hot Tamale and SC-27 Sour Apple onto the interior. Apply a thick coat of the red glaze in isolated areas to obtain a bright color.

Apply wax resist to the interior surface of the piece and allow to dry. Dip the entire piece in a cone 6 blue glaze.

The Mystery of Crystals

by William Schran

Four vessels, to 8 inches in height, thrown B-Mix clay. Glazes are as follows. Left to right: Fa's Cone 6 Base (Revised) glaze with 3% manganese dioxide and .5% cobalt carbonate; MFE (Dan Turnidge Revised) glaze with 3% manganese dioxide and 1% cobalt carbonate; Fa's Cone 6 Base glaze revised with 3% manganese dioxide and .5% cobalt carbonate; and MFE (Dan Turnidge Revised) glaze with 3% manganese dioxide and 1% cobalt carbonate.

My fascination with macrocrystalline glazes began as a graduate student. While visiting a local exhibition of an individual's collection, I discovered two small porcelain bottles by Herbert Sanders. The glazes appeared to have blue colored snowflakes frozen on a transparent sky of orange. From that initial encounter, macrocrystalline glazing has become a process that I've revisited many times over the years.

Sanders had published *Glazes for Special Effects* in 1974, which contained recipes for crystalline glazes. In 1976, I began experimenting with several recipes listed in the book, but since it was difficult to fire our electric kilns to the required cone 9–10 temperature range, I had little success. An article by David Snair in *Ceramics Monthly* provided additional glaze recipes and techniques for preparing the pots for firing. Though all the recipes were for cone 9, a comment in the article stated that firing to cone 6 would also produce crystals. I had some limited success with these glazes, but that comment stuck in my head.

Fast forward to 1994. Discussions of glazes with a group of my students lead to a question about crystalline glazes. This one question resulted in a semester-long series of glaze tests that resulted in few successes. It was the problem I had encountered years before, our electric kilns only reached cone 9–10 with much difficulty. The lack of success producing crystals by my students only strengthened my resolve to find a solution. It was then, that I recalled the Snair article and the comment about cone 6.

With additional information gathered through Internet searches and interlibrary loans, I discovered some artists experimenting with crystalline glazes at lower temperatures. Since we conducted our glaze firings to cone 6 at school, I decided to target this temperature for my testing. My initial

experiments involved firing cone 10 glaze recipes only to cone 6. These tests resulted in the discovery that crystalline glazes could be produced in this lower temperature range by simply introducing additional fluxes. The flux that seemed to produce the best results was lithium carbonate. Other materials that would function as a powerful flux were either soluble or contained additional silica and alumina, which are not desirable in crystalline glazes.

All of my experiments with crystalline glaze firings, up until fall 2006, have been done in a manually operated electric kiln. The kiln has infinite controls, so with careful monitoring, I was able to control the firing schedule fairly accurately. A digital pyrometer is an essential tool to closely track temperature changes, especially during long holding cycles. Acquisition of my first kiln with a programmable controller has allowed for more complicated, repeatable firing schedules. The ability to be able to alter temperature ramp speeds and specific temperature hold times have opened up new avenues of experimentation. I have also found that, for both types of kilns, a direct vent system is important for rapid cooling cycles and maintaining an oxidizing atmosphere.

Crystalline Technique

I've developed techniques through years of experimentation, adopting processes that worked, eliminating those that produced only limited success. Web searches and recent publications provide a variety of approaches to this very involved process, and each individual needs to conduct tests to find the process that makes the most sense for his or her particular circumstances.

Crystalline glazes produce the best results when applied to a smooth white clay body. Many artisans work with a porcelain clay body. Porcelain comes with its own set of issues and I have found a cone 10 porcelaneous stoneware clay—B-Mix or Bee-Mix—that works very well with my glazes. I chose to use a cone 10 clay to reduce the amount of alumina that might be picked up by the glaze.

A normal glaze has a mix of silica/flux/alumina in a ratio that provides a glassy surface and remains in place when melted on a vertical surface. A crystalline glaze contains little or no alumina, which would inhibit crystal growth. The glaze is comprised of silica, flux and a saturation of zinc oxide. This highly fluxed mix of materials leads to a very fluid glaze and steps must be taken to avoid destroying kiln shelves or the kiln.

Catch Basins and Pedestals

Every pot must have its own catch plate/basin to contain the glaze that runs off the pot. The catch plate need not be made from the same clay as the pot. The plate can be wheel thrown or hand built. Each pot must also have some type of pedestal device to facilitate re-

Crystalline glazes run off the pot so you need to raise the piece on a pedestal that sits in a catch basin. It's important to select a pedestal that closely matches the diameter of the foot. Preparing several sizes allows you to select one with the correct fit.

Apply three to four coats of glaze to achieve the desired thickness, brushing each layer in a different direction to ensure that brush strokes aren't visible and you have an even coating.

Pieces ready to load in the kiln. Each glazed pot is positioned on a pedestal that is placed in a catch basin.

After the firing, the fluid glaze will have run down over the pedestal and into the catch basin.

moval of the pot after firing. Some potters use insulating firebrick to create the pedestal. The brick must be at least a 2600K-type and coated with kiln wash. Another technique involves throwing the pedestal from the same clay body as the pot. After bisque firing, the pedestal is attached to the pot with a mix of white glue, which holds the pedestal in place before firing, and kaolin, which acts as a separating agent after firing. Striking with a sharp chisel or heating with a small torch just below the joint with the pot removes the pedestal. After encountering a number of problems with each of these

The pedestal and catch basin are removed by tapping with a small chisel along the line where the pedestal joins the pot.

Excess pedestal material and glaze are ground off the bottom using a bench grinder fitted with a silicon carbide grinding wheel.

methods, such as pots falling over or broken foot rings, I sought another solution. Ellie Blair, a fellow crystalline artist, provided this process to me—the pedestals are a mix of equal parts by volume: alumina, kaolin and sawdust. Add just enough water to bind the materials and form the mix into ¾-inch thick "biscuits" cut to the foot diameter of the bisque fired pot using round cookie cutters. I've found this material to stand up well to the melting glaze and soft enough to be easily knocked off with a chisel. Any remaining pedestal is easily ground away from the pot.

Glaze Application

Crystalline glazes may be applied like most other glaze, but since I don't have spray equipment or room in my studio to store large

I use a portable flat lap machine fitted with diamond grinding and smoothing disks to even out and smooth the bottom of the foot with 100 and 260 grit disks. Since water is used in this process, I do this in the studio, but still wear eye protection. Self-adhesive diamond disks or silicon carbide disks can be attached to plastic bats and the potters wheel used to grind and smooth the bottoms.

WARNING

Proper eye and respiratory protection must be worn during this process. Do all grinding outside the studio, if possible.

buckets of glaze, I apply crystalline glazes by brush. Most of the time I mix a few hundred grams at a time, which is sufficient to glaze two or three small pots. Since the crystalline glaze contains no added clay to keep the glaze in suspension, you don't want to add just water to wet the glaze. To wet the glaze, I use a CMC gum solution by adding about two heaping tablespoons of CMC powder to one quart of hot water. I let the powder soak into the water for at least 24 hours. The soaked gum is then stirred, resulting in a thin honey consistency. I add this to the dry glaze, stir and pass through 40 mesh, then 80 mesh sieves. The wetted glaze should have the consistency of thick honey.

Apply the glaze fairly thick. I apply one coat by brush horizontally around the pot. When that dries, I apply a second coat vertically, then a third coat in a diagonal direction to the upper ⅔ of the pot. Sometimes I'll apply a fourth coat to the top.

On the interior of vase/bottle forms and on the exterior of bowls, I use a cone 6 stoneware glaze. I selected a glaze that fits my clay body to create a watertight seal. With a crystalline glaze on just the interiors of bowls, I don't have be concerned with pedestals or catch plates.

Firing

Pots, with their pedestals and catch plates, are loosely loaded in the kiln. In my 4 cubic-foot-kiln, I will have at the most a dozen pots. Avoid using too much kiln furniture. It takes more energy and time to heat and cool kiln furniture than it does the pots. Always use witness cones in every firing. Even if you fire with a programmable kiln and don't look at the cones during the firing, they will be the best record of the firing. Keep meticulous notes of every firing. Keep a logbook of your firings and cross-reference each glaze to its firing. Fara Shimbo and Jon Singer gave the best advice during a presentation at the Lattice Structures Crystalline Glaze Symposium in fall 2005: When you're testing, change only one thing at a time. If you alter the glaze in any way, change only one amount or material at a time. Do not change anything else. If you alter the firing schedule, do not change the glaze until you see what change the firing has made.

Should the pot come out of the firing with few or no crystals, take heart and give it another chance. If the glaze has not filled the catch plate, simply apply another coat of the same glaze or a different glaze and fire it again. Should the catch plate be filled with glaze, it will be necessary to remove the pot from the pedestal, grind the foot even and create another pedestal and catch plate. I have refired some pots up to five times before I achieved results that were to my satisfaction.

Cleanup

After the firing, knock the pedestal loose with a small chisel or screwdriver. Strike the pedestal material, not the joint between the pots and pedestal. I use a bench grinder

fitted with a silicon carbide grinding wheel to remove any remaining pedestal material and glaze. I do all of my grinding outside and I always wear proper eye and respiratory protection. After coarse grinding, I use a portable flat lap fitted with diamond disks to even out and smooth the foot. Silicon carbide disks and diamond disks with self adhesive backing can be attached to plastic bats and used on the wheel to grind and smooth pot bottoms. Squirting or spraying with water while grinding will help keep down the dust.

Firing Schedule

Use one of the following firing schedules for cone 6 crystalline glazes. You will need to experiment to determine the best firing schedule for your kiln. The ability of the kiln to respond to rapid heating and cooling ramps is a critical factor in successful crystalline glazes. Kilns should be loaded loose, using as little kiln furniture as possible. Older, well-used elements may not be able to keep up with programmed demands of the kiln. I've found heavy duty elements begin to be unable to keep up with the programmed firing schedule after about forty crystalline firings.

Bottle, 7 inches in height, thrown B-Mix clay, with Fa's #5 (Revised) glaze with additions of 4% manganese dioxide and 1% cobalt carbonate.

For Manual Kilns with Infinite Control

- Low – ½ hour
- Medium – ½ hour
- High – cone 6 over
- Turn off kiln, cool to holding temperature (1850°F–1880°F)
- Turn on kiln to a medium setting and monitor closely.
- Try to maintain the holding temperature for 3–4 hours.

Each section of the kiln may need to have a different setting to maintain a constant temperature. For my kiln, a setting of #3 on the top and middle section, and "M" setting on the bottom section provided a fairly consistent reading.

For Programmable Kilns

Note: My kiln uses an "S" type platinum thermocouple with the thermocouple offset turned off. Each kiln may indicate a different temperature when cone 6 bends over. Use witness cones and closely monitor them until the correct peak temperature is determined.

- Increase temperature 350°F per hour to 700°F
- Increase temperature 750°F per hour to 2000°F
- Increase temperature 150°F per hour to 2210°F (this puts cone 6 over, cone 7 at 1 o'clock position)
- Hold at 2210ºF for 10 minutes
- Cool down 750°F per hour to 2000°F, hold for 1 hour
- Cool down 750°F per hour to 1900°F, hold for 3 hours
- Kiln off, vent off, total firing 9–9½ hours

Higher holding temperatures results in fewer but larger crystals with more ground (areas without crystals) exposed.

Crystalline Base Glazes

MFE (Dan Turnidge Revised)

Cone 6

Ferro Frit 3110	50.0 %
Silica (325 mesh)	22.5
Zinc Oxide	22.5
	95.0 %

Add: . . . . . Lithium Carbonate 1–5.0 %

Fa's Base (Revised)

Cone 6

Zinc Oxide	25.0 %
Dolomite	5.0
Ferro Frit 3110	51.0
Silica (325 mesh)	19.0
	100.0 %

Add: Lithium Carbonate . . . . . 2–4.0 %

Fa's #5 (Revised)

Cone 6

Zinc Oxide	27.0 %
Talc	5.0
Ferro Frit 3110	50.0
Spodumene	4.0
Silica (325 mesh)	14.0
	100.0 %

Add: Titanium Dioxide . . . . . 2.0 %

Colorants

Add the following colorants individually or in combination:

Cobalt Carbonate	0.25–3.0%
Copper Carbonate	0.5–6.0 %
Manganese Dioxide	0.5–3.0 %
Iron Oxide	0.5–3.0 %
Rutile	0.5–3.0 %
Nickel Oxide	0.25–3.0%