

Key Terms

sprigging
oxides
carbonates
flux
bisque ware
greenware



Fig. 5-1. This artist uses the pinching method to form her compositions. Some of her pieces are fired several times to accommodate different overglaze techniques.

Andrée Richmond, *Elephant and Tiger*, 2009. Cone 04 clay, glaze and underglazes, gold and white gold lusters. 13" x 11" x 6" (33 x 28 x 15 cm). Courtesy of the artist.

5 Surface Decoration

What makes a ceramic object beautiful or striking? Sometimes it is difficult to distinguish the effect of the object's shape or function from its surface appearance. Is it the deep and full body of a mug that we find so appealing, or is it the mug's warm and welcoming color? Would a sacred object made of clay appear so powerful and mysterious without ornamentation?

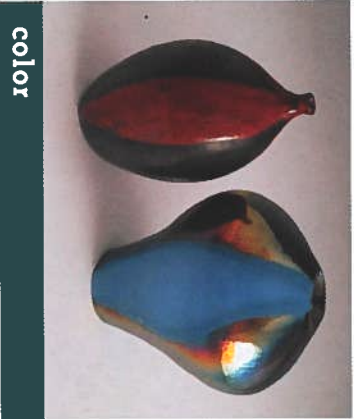
Since ancient times, potters have used a variety of techniques to decorate the surface of their clay pieces—from carving or incising grooves in moist clay to burnishing the surface of leather-hard clay, from painting with liquid slip of a different-colored clay to glazing or underglazing. Ideally, decisions made about surface decoration relate to a work's shape and form, and the whole piece is enhanced as a result.

In this chapter, you will:

- Discover ways to create texture and color on clay surfaces
- Explore glazes and underglazes
- Decorate a plate using incising techniques



texture



color



glaze

"I don't see the surface of my pots as canvases... to decorate, but rather as a skin that defines and communicates what is underneath."

Steven Branfman



Fig. 5-2. Notice where the artist used texture in this figurative sculpture.
Student work, Peter Beck, *Native American* (front view), 2008. Slab construction, high-fire stoneware.

Now that you know how to make several forms in clay, you are about to discover the vast range of treatments and techniques available for surface decoration. At times, the many options may feel overwhelming. Slow down and thoroughly acquaint yourself with a few tools, colorants, and glazes. Learn how to use tools to create different textures. Discover how *colorants*, such as slips or oxides, affect textures and glazes and how glazes respond to thick or thin applications. Keep an organized record of what you learn.

The techniques you choose for your work are likely to involve two significant categories of surface decoration: texture and color. As you study the works of other clay artists, consider how these two elements of design affect each ceramic piece.

Texture

Clay works inevitably include a textural aspect. Soft clay responds to a single touch that is recorded on its surface.

Clay surfaces have historically served as a means for artists to tell a story, display symbols of religious significance, or beautify a form with a realistic or abstract design. When working with clay, it is fulfilling to know that even one fingertip can leave a mark that is eternally unique—just as fingerprints on prehistoric ceramic pots are connected to a single person.

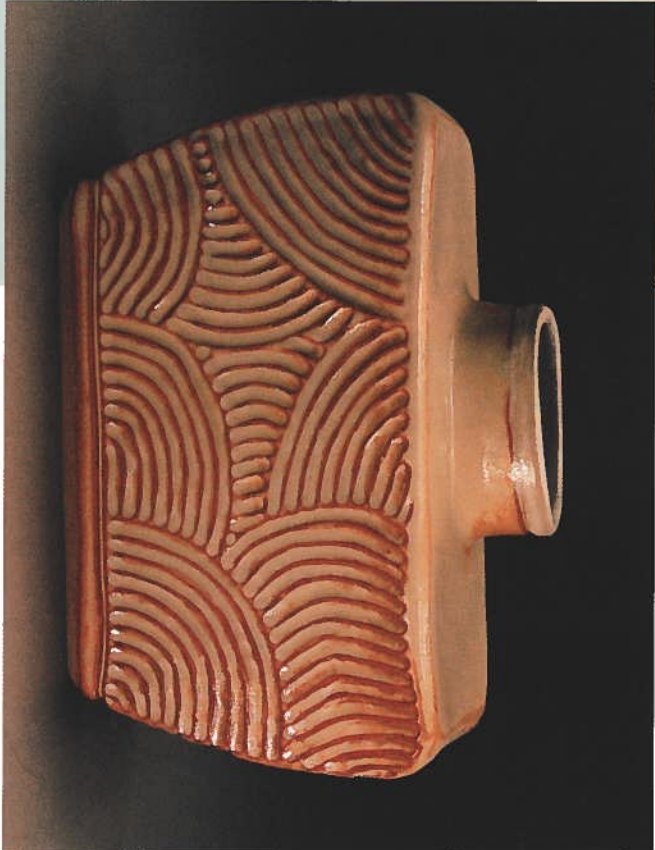


Fig. 5-3. The carved lines on the slab-built body create rhythm and unity. What contrasts are formed by this use of pattern?
Student work, Tana Bosshard, *Beach Wave Bottle*, 2009. Slab construction with subtractive design, high-fired porcelain.



Fig. 5-4. Impressing and texture tools.

You can add texture anytime before your piece is fired, when the clay is at the various stages in between soft and leather-hard. Impressing is best done when clay is soft. Incising and appliqué can be done at any time. Piercing, inlaying, and burnishing should be done when the clay is leather-hard.

Impressing

Press with a tool into a clay surface, and the texture, design, or mark left on the clay becomes a low relief of your tool. Tool possibilities include almost anything: a fingernail, button, stamping tool, textured wooden beater, string, rope, burlap, lace, and whatever your imagination leads you to.

You can make your own stamps out of clay by carving a design or image on a clay disc that you've fitted with a ridge or handle on the back. After they're fired, these stamps can be used to impress patterns on your other clay works.



Fig. 5-5. Bisque-fired clay stamps made by Doris Walenta. Stamps may also be carved from rubber or plaster, or cut into a sponge.

Note It You can achieve interesting effects when you press crumbled, dried, colored clays into surfaces of contrasting color. Or, press organic materials such as seeds, leaves, or sawdust into soft clay. They will burn away in the firing, leaving a recessed textural surface.

Experiment with different tools to make impressions on a clay slab. Oxide washes and colored slips (see page 147) can further accentuate the pattern after the clay has stiffened to leather-hard.

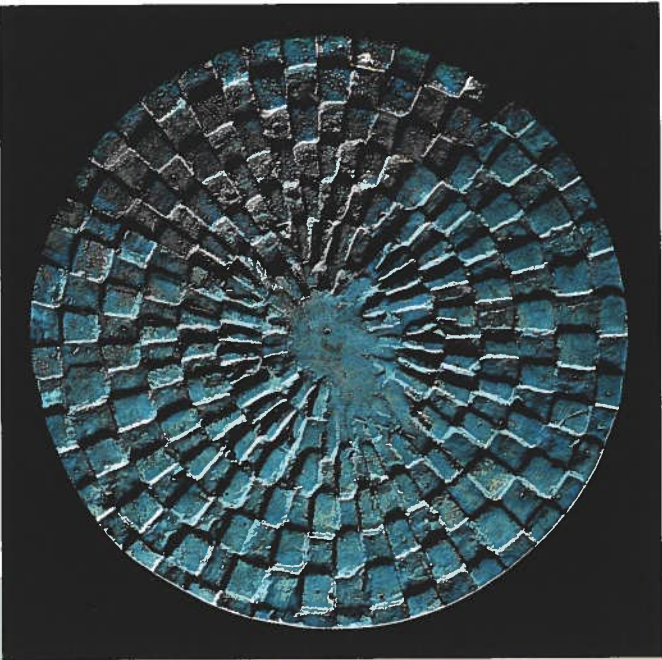


Fig. 5-6. The ancient Egyptians made some of their board games from clay. This one, which is known as *Mehen*, or the *Serpent Game*, was played with marbles or small clay figurines.
Egypt, Serpent Game, Old Kingdom, ca. 2649–2150 BCE. Faience. The Louvre, Paris. ©Gianni Dagli Orti/CORBIS.

Incising

Cutting into the surface of the clay is called *incising*. You can carve designs or even remove whole parts of the surface. Any device that cuts into the clay, from a wooden tool to a cheese cutter, is good for incising. Both hand-built and thrown forms lend themselves to this form of decoration.

Experiment by seeing how your incised marks change when you stretch or manipulate the clay. For instance, try throwing a thick cylinder. Incise a series of vertical marks around the walls, then press from the inside to make the form bulge out. How do the incised marks change?



You can make a carving tool by inserting a bent staple into an eraser.



Fig. 5-7. What tools do you think the artist might have used to add texture to the surface of this sculpture?
Student work, Zachary Peeler, *Self-Portrait*, 2005. Sculpture, high-fire stoneware.



Fig. 5-8. Notice how the artist used carved or incised lines to enhance the surface of this pot. How is the pointed lid balanced by the subtle curves on the body of the piece?
Student work, Vutthy Sok, *Carving Pot*, 2006. Wheel-thrown stoneware, fired to cone 10 reduction.



Fig. 5-9. Why might the decoration on this pot be considered a sprigged design?
Carol Pelligra, *Bamboo Jar*, 2008. Thrown and altered white cone 06 porcelain, carved with glazes, bamboo handle. Courtesy of the artist.

Appliqué

The technique of appliqué involves applying one piece of clay onto another. Appliqué pieces can be coils, cut-out pieces of clay, pads, or clay designs that are pressed on the soft walls or rim of a form. Add these to the surface of your piece by applying some pressure, smoothing the appliqué on, or beating it on with a paddle. Make sure to support the inside wall of any hollow form while you add the appliqué. If surfaces have dried somewhat, score and slip the pieces for better adhesion. (See page 55, “How to Join Two Pieces of Clay.”)

When the appliqué itself is a molded piece with a lot of detail, add it gently so that the delicate details remain intact. To do so, attach the appliqué with slip. This technique is known as **sprigging**.



Fig. 5-10. Appliqué is a method used to create texture by adding pieces of clay to the surface of a work. How would this pot be different without the added pieces?
Student work, Jacqueline Rosa, *Dolphin Vase*, 2009. Thrown red earthenware, cone 05, with appliqué and glaze.

Piercing

Piercing holes in clay is a decorative technique used to create dramatic effects by playing with light and the contrast between inside and outside surfaces. You can use knives, hollow cutting tubes of various shapes and sizes, needle tools, or anything that punctures the clay with a clean edge. The clay should be leather-hard. Be sure to support it carefully to prevent cracking.

Once you've completed the pierced design, smooth any projecting bits of clay on the inside surface with a fine piece of sandpaper or a dry sponge. You can also use the side of a needle tool to clean the corners of the "windows."

Note It When you glaze a pierced form, run a needle tool around each of the holes to clear out any glaze that may have collected there. This will prevent the glaze from pooling in the hole or running on the surface.

Burnishing

This ancient method of finishing an unglazed leather-hard pot involves rubbing its surface smooth with a stone or the back of a spoon. Burnishing has a practical use: the pressure of rubbing packs the clay particles together (making the pot more watertight) and produces a shiny finish. The burnishing operation takes time, but a light application of cooking or furniture oil on the surface of the pot speeds up the process. You can also burnish certain sections of a piece. Burnishing works best with clays that are fired at low temperatures in pit firings (see page 203) or other primitive firing environments. Otherwise the burnished/polished effect is lost due to vitrification or clay shrinkage.

Fig. 5-11. What techniques, beside piercing, does the artist use to emphasize the title of this sculpture?

Student work, Destiny Gregoire, *Effects of Pollution*, 2009. Slab-built, with copper oxide wash, cone 04 fired, copper wire.



Fig. 5-12. A steady hand is evident in the underglaze images that were painted on this plate. How did the artist use line to achieve a feeling of lightness and rhythm?

Student work, Sarah Herberger, *Hands on Me*, 2009. Slab-built, underglaze, cone 04 glaze.

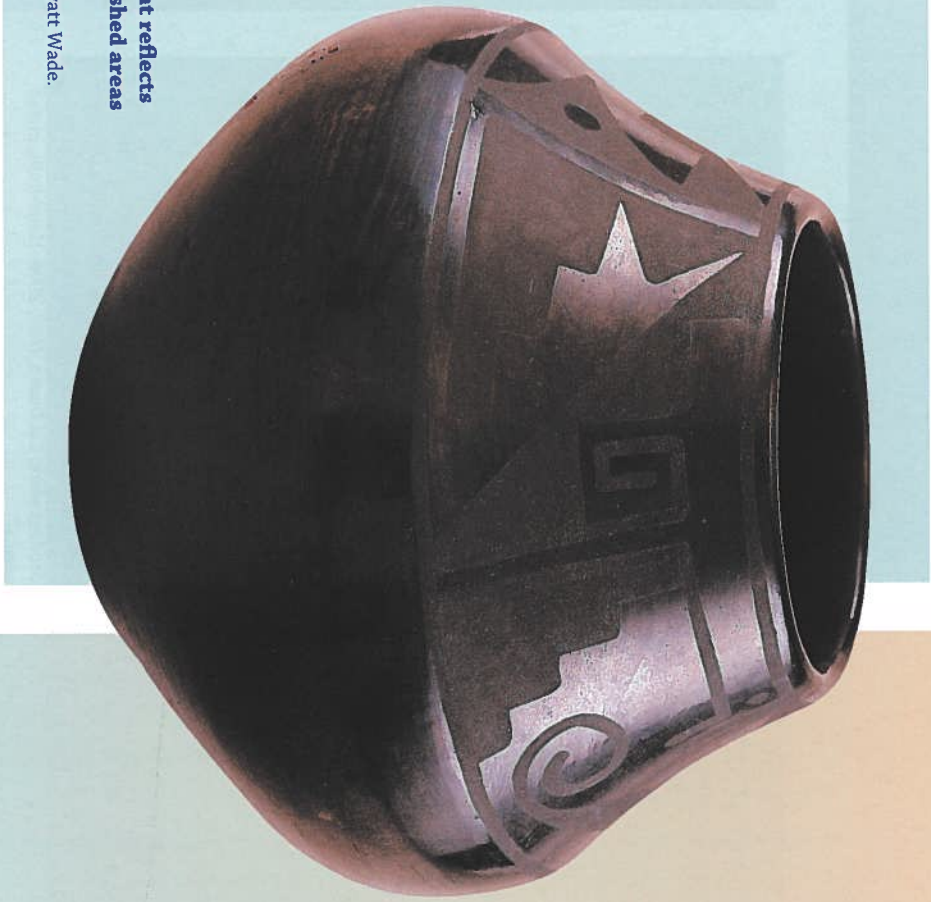
Elements of Design

Value

Value refers to how light or dark a color is. Each color, or hue, has a range of intensity between white and black with an unlimited number of values in between. Values may be gray (the absence of color), or tints and shades—a light or pale color is called a tint, and a dark color is a shade. The way we perceive value depends upon the amount of light absorbed or reflected by an object's surface. In ceramics, an unglazed or matte-glazed surface will absorb light so its value tends to remain stable. Burnished and gloss-glazed surfaces reflect light, so they appear to have multiple or changing values.

Fig. 5-13. Although this pot is all black, light reflects differently from its burnished and unburnished areas to create a contrast in value.

Maria Martinez, *Maria Bowl*. Courtesy of Erika and Wyatt Wade.



Color

Adding color to your ceramic work opens up enormous creative possibilities. Color can complete your original vision of a piece. Or you can add it even when the clay is dry and about to be fired for the first time. Experimenting with different ways to add color can produce unexpected effects that reveal an entirely new perspective. Keep in mind that the temperature and kiln atmosphere will also affect the outcome of different colorants.

Clays of different types have their own individual colors; you might decide to mix clays to create variations in color. Use **oxides** (natural earth minerals such as iron, cobalt, and copper) to produce varying hues of reds, blues, and greens, and earth tones like browns and yellows. Or paint your clay with underglazes. (See page 153.)



Fig. 5-14. This artist brushes white slip on a semi-dry, red clay body. He then paints his work with detailed botanical illustrations using white slip mixed with ceramic stains. **How does the use of color define this work?**
Tim Ludwig, *Watering Can with Crown Imperial*, 2007. Thrown earthenware, 22" (56 cm) h x 14" (36 cm) w x 4" (10 cm) d. Altered, stains with clay slip, fired to 1950°F. Photo: R. Smith.

Colored Clay

Create beautiful marbled or other dramatic effects by using clays of different colors in the same piece. The color of any ceramic piece depends on the clay it was made from and the temperature at which it was fired. For example, a piece made from a red clay body can become pink or reddish brown depending on the firing temperature. You can create an interesting contrast in colors by incorporating a layer of a white clay body.



Fig. 5-15. How do surface techniques, such as texture, incising, appliqué, and color, play a role in this sculpture's expressive qualities?
Student work, Cal Duran, *Here*, 2006. Hand-built, mixed media.



Fig. 5-16. Students working on clay building projects and design techniques.

Try It

The Japanese technique known as *neriage* incorporates clays of different colors in hand-built or thrown pieces. Try combining two different colored clays by wedging, twisting, or stretching to achieve a marbled effect. Use slices for a hand-building project, or form the clay into a ball for throwing a *neriage* form. For a thrown form, lightly sand or scrape the surface after the piece has dried to reveal and sharpen the colors.

Inlaying

You can fill impressed or incised marks with soft clay of a contrasting color or with a colored slip (see Mishima on page 159). This technique is called *inlaying*. The inlay is the clay filling.

Because the clay you use in the inlay will be moister than the surface clay, it will shrink more dramatically as it dries.

Fig. 5-17. This artist uses angles, curves, and inlays to infer movement in both the form and its surface. Explain the role of color and shape in this piece.

Aurore Chabot, *Tipping Points*, 2005. Earthenware with slips and stains, 12" x 13½" x 7" (30.5 x 34.3 x 17.8 cm). Courtesy of the artist.



For this reason, overfill the inlay areas and then scrape off any excess once the inlay has dried completely. To scrape the surface down to the design pattern, use a metal rib tool or old hacksaw blade. Take care not to apply too much pressure as you remove the excess. Go over the surface several times lightly rather than risk pulling the inlay out.

Blue-and-White Ware

Blue-and-white pottery has been much loved worldwide for centuries. The story of this ware involves the exchange of ideas and material among cultures over time.

The striking blue in blue-and-white ware is the result of cobalt, a ground-up mineral which is an ideal component for glazes. Potters used cobalt decoration as early as the eighth century CE in the Middle East and China. Middle Eastern cobalt was of higher quality than that found in China, and by the fourteenth century, the Chinese were importing pure cobalt from the Middle East. The resulting blue-and-white decorated porcelain, known as “Mohammedan Blue,” was considered to be as precious as gold.

By the fifteenth and sixteenth centuries, Chinese blue-and-white ware was in great demand throughout the Near and Middle East. Camels carried the pottery via the Silk Route through central Asia. Ships transported it to ports worldwide.

Popular in Europe, blue-and-white ware had its admirers in Asia, too. During the late sixteenth century, Korean potters who were brought to Japan began to experiment with the blue-and-white combination and the industry

expanded quickly. In the early seventeenth century, the Dutch East India Company requested that Japan produce blue-and-white ware for the European market. Japanese potters imported cobalt blue, copied Chinese designs, and made vast quantities of porcelain ware.

In southern Europe, faience and majolica (low-temperature glazes) evolved from techniques based on Islamic attempts to imitate Chinese wares.

The Arabs had carried these methods to Spain during the Moorish occupation from the ninth through thirteenth centuries. In turn, Spanish colonists brought the blue-and-white techniques to Mexico in the sixteenth century.

The superbly painted translucent porcelain ware from China was never equaled. European potters continued their efforts for a couple of centuries until their products satisfied local demand. Only then did blue-and-white imports from China taper off.

When the English began to make porcelain, they invented a design-transfer method that eliminated costly hand painting. In the late 1780s, a potter in Staffordshire (believed to be either Thomas Turner or Thomas Minton) created a pattern known as “Blue Willow” based on traditional Chinese design elements. It featured a willow tree, two birds, a fence, tea house, boat, and a bridge.

By the early 1800s, willow ware was transported on steamboats and carried in covered wagons. In the 1900s, it was manufactured in America, Japan, France, Germany, Holland, Poland, Spain, Finland, and Mexico. Although blue-and-white combinations inspired by Chinese imagery gradually faded in the latter part of the twentieth century, contemporary cobalt blue designs on a white background continue to dazzle the viewer.

Fig. 5-19. During the Great Depression in the early 1930s, Blue Willow plates were found in so many restaurants that a meal was often advertised as a “blue plate special.”

Bowl, ca. 1910. Blue-and-white glazes, 8¾" (22.2 cm) diameter. Courtesy of Myra Byrnes-O'Leary. Photo by Tom Fiorelli.

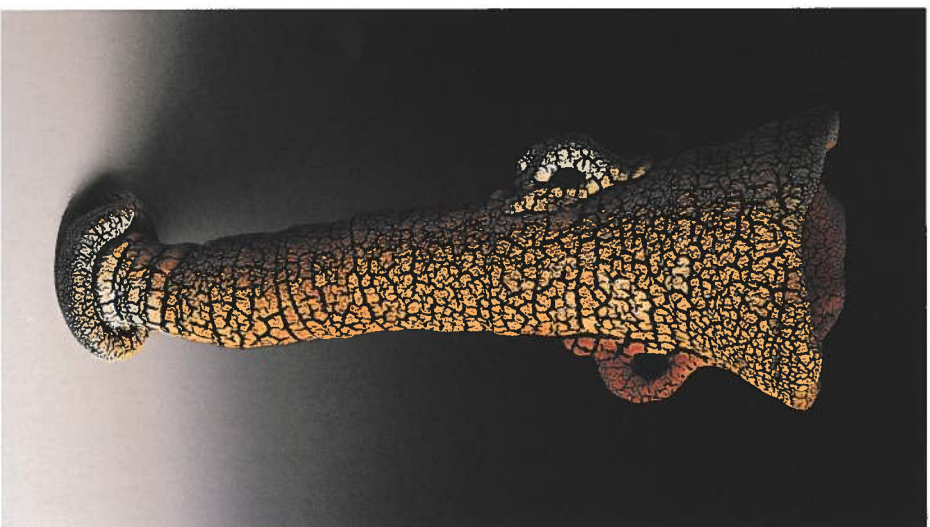


Fig. 5-18. One advantage of using a commercially made stain is that you can achieve color consistency from batch to batch. Why might this be important?

Randy O'Brien, *What Flowers?* Thrown and altered low-fire clay, volcanic ash crawl glaze with Mason stains, sprayed in multiple layers, 22" (55.9 cm) high. Courtesy of the artist.

Oxides and Carbonates

Anyone who explores color in ceramic art will also learn a bit about chemistry, for what gives clays, glazes, and underglazes their colors are minerals and metals.

When these substances are subjected to high temperatures, they change color.

Oxides and **carbonates** are basic metals combined with oxygen (oxide) or carbon (carbonate). Some common combinations are iron (black and red), cobalt (blue), chrome (green), rutile (yellow), manganese (black), and copper (green). These metals produce a variety of glaze colors when used alone or in combination with other colorants. They are also basic

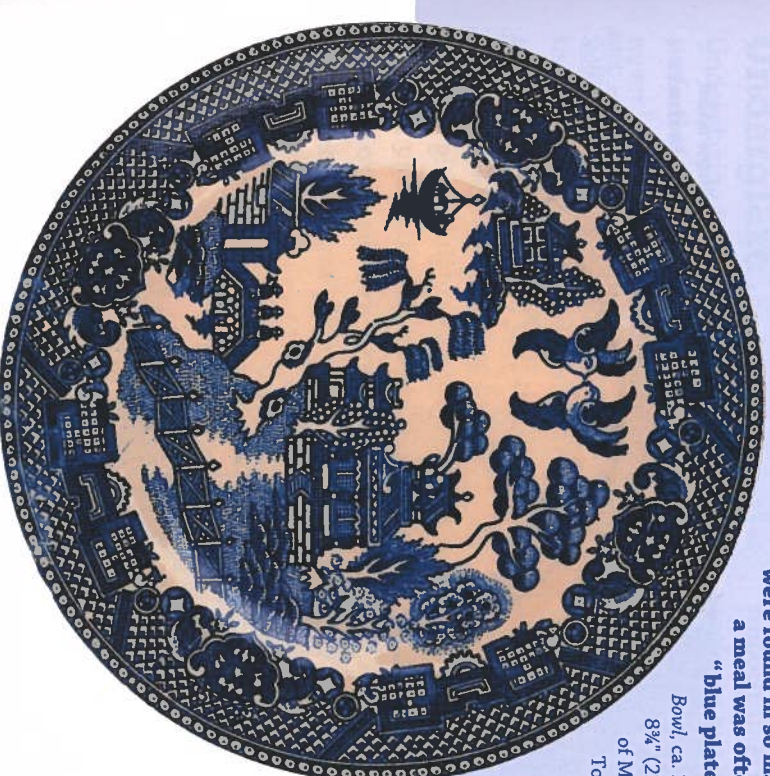




Fig. 5-20. The artist used cast and hand-built pieces on this work. Describe how the arrangement and color choices add unity.

Suzanne M. Comine, *Discomfort and Harmony*, 2005. Cast and hand-built objects, low-fire terra sigillata, smoke and glazes, 3" x 11" x 11" (8 x 28 x 28 cm). Courtesy of the artist.

Oxides and carbonates can be diluted with water and sponged or painted on bisqued surfaces. They can be applied under a glaze for muted color or over a glaze for more intense color.

Experiment by using oxides and carbonates alone or with other colorants. Sometimes, you can achieve more dramatic effects with a limited color palette. For instance, the simple glaze and oxide combination that constitutes the popular blue-and-white ware (see pages 150–151) has endured in many cultures through the ages.

Try It If your clay piece has any surface texture, try creating color contrasts that enhance the textural details. Simply apply a wash of an oxide or carbonate to the piece, then wipe the surface. The color will remain more concentrated in the recessed areas. Glaze the piece with transparent glaze and refire. Remember that colors are more intense when they are used with white or transparent glazes. (The darker the glaze, the more subtle the color contrast.)

Safety Note Wear latex or rubber

gloves when you sponge or rub an oxide or stain onto the surface of your piece.

Always wash your hands thoroughly after glazing.

Colored slips

A slip is a mix of extremely fine clay with water. Available in commercial preparations, a slip can be colored with oxides or other stains that can change your pot's color or add decorative interest. You can apply a slip with a brush, a dropper, or whatever tool your imagination conjures up. Apply slips to clay after it has dried,



Fig. 5-22. Explain the role of color and shape in this installation. Compare it with Fig. 5-21.

Tim B. Clark, *Proximity & Distance*, 2008. Earthenware, steel, 16" h x 72" w x 7" d (40.6 x 182.9 x 17.8 cm). Courtesy of the artist.

or when it is leather-hard. Some clay artists even apply slip to **bisque ware** (pieces that have already been fired once). You can make your own slip. See the Clay Studio Handbook, page 266, for a sample formula.

Note It The slip must fit the clay body. Before using slip, check to be sure it is the right kind of slip for the clay you are using.

Underglaze

Underglazing involves painting on the surface of **greenware** (pottery that has never been fired) or bisque ware. Some commercial underglazes are specifically made for bisque ware. The advantage of using underglazes is that they don't change substantially during firing, whereas glazes might—so, they are suited to all kinds of painterly effects, including fine-line or detail work. Try using them under a transparent glaze to bring out the colors' brilliance.



Fig. 5-23. Brushes for decorating and glazing.

Commercial underglazes come pre-mixed and are simple to use. They come in jars or sets that look like watercolor pans. Some are available as pencils. To make your own underglaze color, put a small amount of oxide or stain—about the size of a dime—on a plastic container lid. Add the same amount of **flux** (transparent glaze) and a few drops of the vehicle (equal parts glycerine and water). Mix it all with a spatula until your underglaze is smooth and creamy. The vehicle makes it easier to brush the mixture on the ware, while the flux helps the underglaze to fuse, or combine, with the ware when it is fired. When you decorate and fire your piece, the color will be sealed to the ware.

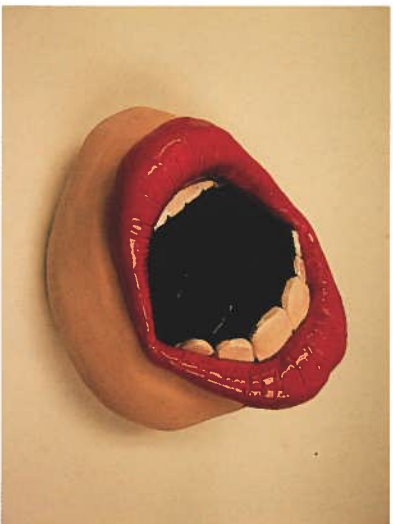


Fig. 5-24. What technique would you use to apply color on this piece?
Student work, Amy Barnhart, *Say Ahh*, 2009. Red earthenware, coil-built, low-fire glazes.

Techniques for Using Color

You can add color to your work using a number of techniques. If you are applying underglaze as your color, use the following techniques on bisque ware for easy water cleanup of errors. Stains or oxides tend to be absorbed by bisque ware, so you may wish to apply them to slightly damp greenware instead. If you want to make a change, the stain or oxide can be removed with a damp sponge. When applying oxides, slips, or underglazes to bisque ware, work quickly—the materials dry faster than if applied to greenware.

Sponging

Sponges vary from rough to smooth grain and give different textures and depth of color when daubed onto clay surfaces. Try making your own sponge designs.

- Cut several small pieces of foam, or use cosmetic sponges.
- Draw a simple design on each sponge. Cut around its shape with sharp scissors.
- Dip your sponges in colored slip, then press the designs lightly on leather-hard clay.
- Repeat, overlapping shapes and colors as desired.

This technique may also be used to sponge color over a base glaze.

Spattering

A toothbrush or a common household bristle brush can be used to generate a spattered background. Dip the brush in the underglaze, slip, or oxide, hold it above the clay surface, and use your (gloved) fingers to flick the bristles.

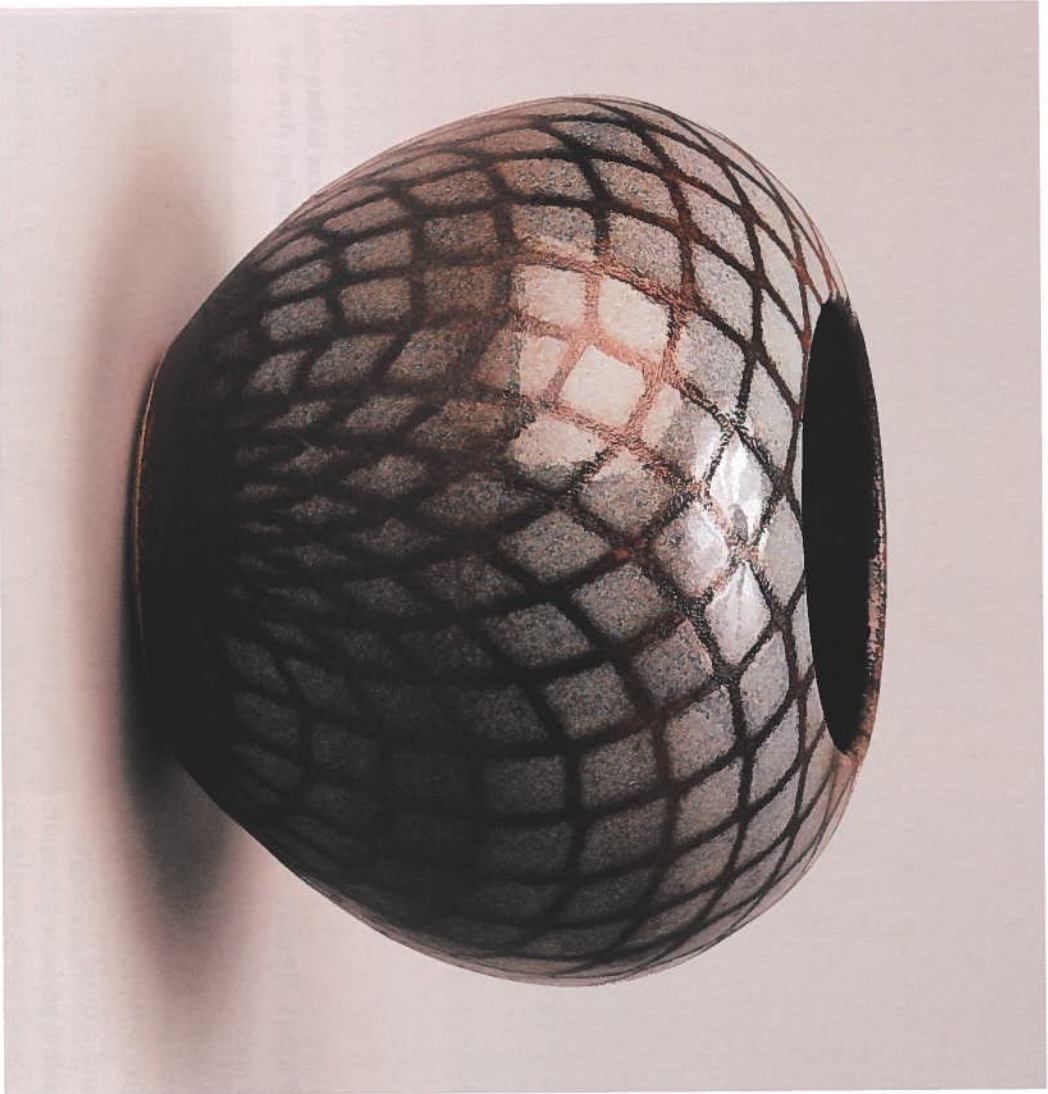


Fig. 5-26. Masking techniques used to produce an interesting surface design include tightly wrapping net around a piece before spraying it with glaze.

Student work, Eric Wohlstader, *Industrial*, 2008. Cone 10 stoneware, thrown.

Masking

Stencils can enclose or outline background shapes or foreground designs. Cut out a design from a piece of paper, lay the paper on the clay surface, and apply color through the opening using one of the methods you've learned (sponge, spatter, brush). Duplicate or overlap the design as many times as you wish, to create an interesting pattern. Masking tape cut into lines or shapes also makes an effective stencil.

Brushing
A paintbrush is good for blocking in areas of color or painting fine, delicate lines or strong gestures. Brushes can be used to finish details on top of a background, outline a design, or emphasize a certain aspect of the form. Artists usually choose among watercolor brushes, oriental brushes, or brushes with stiff bristles. See page 174 for a description of airbrush technique. You can even use the end of a brush handle to add dots of color.

Try It Practice working with different brush types and sizes. Begin with strong strokes and move on to delicate markings. Observe what happens when you change the speed of your strokes. Get to know the characteristic marks that each brush produces.



Fig. 5-25. Hamada believed in the timeless beauty that exists in simple handmade objects. The richness of his ideas can be seen in this bottle. How does the trailed white slip decoration balance the natural dignity of the form?
Shoji Hamada, *Square Vase*. Stoneware, glazed, 7 $\frac{3}{4}$ " x 4 $\frac{3}{4}$ " x 2 $\frac{3}{4}$ " (19.7 x 11 x 7 cm). Gift of David and Ann Shaner, Schein-Joseph International Museum of Ceramic Art, 1997.134. Photo by Brian Oglesbee.



Paper Resist

Paper resist is similar to masking. Cut shapes or patterns from damp paper and lay these shapes on the clay surface. Brush, spray, or sponge some color over and around the paper. After the slip has dried, peel the paper off to show the uncolored portion of the clay surface. Repeat this process to get various color tones and to complete a design.

Wax Resist

Wax resist is a versatile masking technique used on both leather-hard clay and bisque ware. You can use melted wax, commercial resist emulsions, or even white glue thinned with water. A few drops of food coloring added to the resist make it more visible after application.

Here are some wax resist methods:

- Paint a design with liquid wax (or other resist material) on leather-hard clay. When the wax is dry, wipe the piece with a wet sponge. The top layers of the unwaxed clay will melt away, leaving the waxed area intact as a raised design.

Fig. 5-27. Describe how the pieces in this series are alike in form and design. How are they different?

Student work, Anna Slowey, *Shino Leaf Wax Resist*, 2005. Wheel-thrown stoneware, wax resist, cone 10 reduction.

- Paint over a wax design with an oxide or underglaze. The waxed area will remain clear while the unwaxed area will hold color.
- Apply wax directly on bisque ware. When this is done, the wax application will resist any glaze that is applied. The wax melts away during firing, leaving raw fired clay as a contrast to the glazed area.
- Apply wax details over a glaze. Brush or dip another glaze over it, or carve away parts of the waxed area and apply glaze to the exposed surfaces.

Slip Trailing

This method of surface decoration involves squeezing a line of slip onto damp clay to produce a raised line. Slip trailing was common in the seventeenth and eighteenth centuries in Britain. Slip trailers can be made from pastry bags, mustard

Fig. 5-28. Jolene Zanghi slip trails a design onto her teapot. Slip that is used for decorating is a fine-grained slip, different than the clay-and-water mixture that is used for attaching two pieces of clay by the “score and slip” method.

Photo by Ann Perry.

dispensers, rubber syringes, or anything that produces a steady flow of slip. The slip must be well mixed and free of lumps.

You can make various sizes of lines and dots by using different-sized nozzles. Practice trailing slip designs on a clay slab before attempting to decorate a vessel or plate. If you make a mistake, a slip-trailed design is usually fairly easy to scrape off. Lines of slip applied to a wet surface can be feathered (by drawing a fine point across them) or combed to produce interesting effects.



Fig. 5-29. The title of this pot refers to a technique where a damp sponge is used to wipe raw clay away from decorative elements painted with wax. The result is a raised design on the surface.

Student work, Dominique Gaudyn, *Water Etched*, 2008. Wheel-thrown stoneware, cone 10 reduction



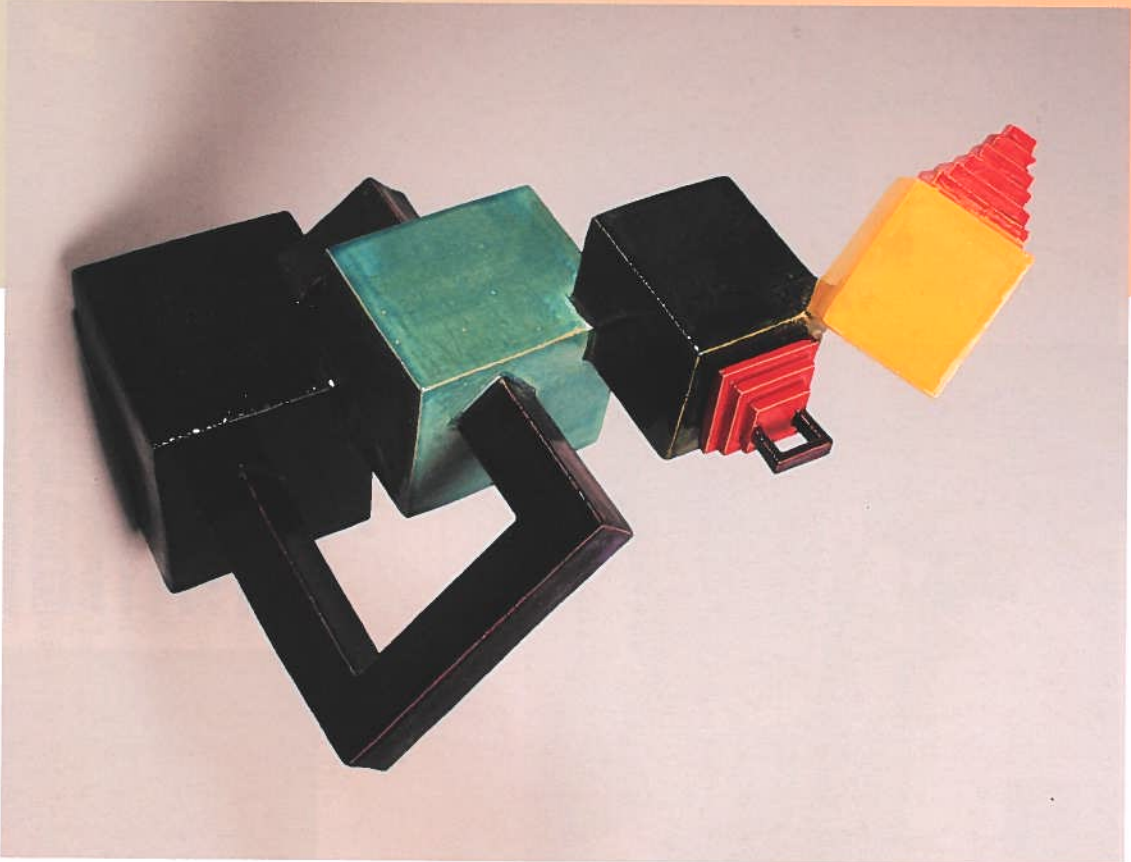


Fig. 5-30. How do color, shape, and line disguise the functional purpose of this imaginative teapot?
Student work, Peter Castaneda, *Cube Teapot*, 2006. Slab-built-extruded tube handle, low-fire glaze.

Sgraffito

The sgraffito (*sgrah FEE toe*) technique involves scratching designs in a colored slip to reveal the color of the clay body beneath. The quality of the line varies depending on whether the clay is damp or dry. Almost anything you can scratch with is a good tool for sgraffito—old pens, wooden modeling tools, manicuring tools, or trimming tools.



Fig. 5-31. Describe the decorative techniques used to enhance the surface of this bottle.
Student work, Dominique Gaudyn, *Incised*, 2008. Wheel-thrown stoneware, cone 10 reduction.

Mishima

In this method, a pattern or design is incised or carved into the surface of leather-hard ware. Slip is brushed onto the surface, filling the incised lines with contrasting color. When dry, the extra slip is scraped off so that only the incised lines show the added color. Mishima is similar to inlay (page 149), but requires that slip rather than clay be used for filling.

Fig. 5-32. This artist burnishes his terra sigillata-coated forms with the palms of his hands and fine plastic. He then applies colored slip with a fine brush and fires once. Can you see evidence of his Apache/Yaqui Indian heritage in the design?
Ricky Maldonado, *Bird Plate*, 1996, reworked 2000. Red earthenware with glaze decoration, 10.5" (26.67 cm). Courtesy of the artist. Photograph ©Image-ination.



Terra Sigillata

Terra sigillata means "sealed earth." In ancient Greece and Rome, this material was used before the invention of glaze. Terra sigillata is an exceptionally fine-grained clay suspension in water, similar to colored slip, that is best applied to greenware of low-firing clay. It can be sprayed, brushed, poured, or dipped. It can be colored with oxides or stains and has a natural sheen when fired cone 08 to cone 03.

Burnishing or polishing a work that incorporates terra sigillata can produce dramatic results, especially when contrasting colors are used. Some artists burnish the surface with a stone or other object prior to firing; others polish it with beeswax or tung oil after firing. Many variations of the technique are possible. Try a final sawdust or pit firing (after bisque firing) to achieve interesting effects.

Printing Techniques

There are many ways you can print on clay. You might work with a photograph or scanned image, or a design you draw on paper and then duplicate on a plate or mug. You can print just one ceramic piece, or create multiple pieces with the same design. Along with the methods described below, other printing methods such as silkscreening can be adapted for use on clay. New techniques also continue to be developed.

Transfer Printing

This print method was the basis for the proliferation of English blue-and-white ware during the 1800s (see pages 150–151). It is suited to mass production and requires specialized tools and equipment. A pattern or design is etched onto a copper plate, inked with a mixture of oil and color (underglaze, oxide, or stain) and transferred to a pottery tissue—a special type of paper—that is pressed against the plate’s surface. The paper is then placed onto bisque ware and soaked with water, which transfers the design to the piece. It becomes permanent when fired.

You may want to try a less complicated version of transfer printing. Press very thin damp paperclay sheets directly onto an inked plate. The printed sheets can be used in wall pieces, shaped over simple molds, or used in sculpture.



Fig. 5-33. Notice how the repetition of the bamboo decal unifies and balances the design of this series. Student work, Hy Sok, *Oval Bamboo Set*, 2007. Wheel-thrown stoneware, fired to cone 10 reduction, decal.

Fig. 5-34. A maebyong is a form that features a small mouth, expanding shoulders, and a body tapering to a cylindrical base. How does the quality of the inlay decoration and glaze balance the powerful form of this vase? Korean, Koryu, *Vase*, c. 1150. Porcelain. Courtesy of Davis Art Images.

Monoprints

A monoprint (single print) can be made in a variety of ways. Here are two options:

- Paint a design with underglaze, stains, or colored slips onto a damp canvas. Place a slab of damp white clay over the colored canvas and roll it lightly with a dowel or rolling pin to press it evenly onto the surface. When you pull the slab away, the clay will be printed with a mirror image of the design. A second slab can be printed from the same canvas; however, the colors will be more subtle.

Principles of Design

Pattern

What patterns do you see in Fig. 5-34? A visual pattern occurs when shapes, colors, and other elements are repeated at regular intervals. Patterns seen in nature include ocean waves, fish scales, flower petals, and tiger stripes. Artists plan patterns to organize and unify, and also to provide interest. The repeated unit in a planned pattern is called a *motif*. You can organize motifs into rows or grids, or use them to create a border. The motifs in nature’s patterns are a rich resource for designers and clay artists. How did nature inspire the artist who developed the pattern shown here?



- Use a photocopy to monoprint an image on a clay surface. This process can be fun because a print can be hidden from view only to mysteriously appear after the bisque firing. Copy an image but turn off the photocopy machine and remove the paper before it passes through heated rollers (otherwise the heat will permanently fix the toner to the surface of the paper). Place the paper, print-side down, on a damp slab of clay and carefully roll over it with a rolling pin. The image may or may not show up on the clay. After the piece has been bisqued, apply an underglaze

color to the surface, wipe it with a clean sponge and the print will appear! Finish the piece with a glaze and final firing.

Photo Emulsions

In this darkroom procedure, the artist applies a photo emulsion to the surface of glazed and fired clay. When the emulsion is dry, a negative is placed over it and the piece is exposed to light. The “print” is developed according to photographic processing techniques using a developer and stop bath. This technique results in a delicate, fragile surface, so it is used mainly on nonfunctional pieces and sculpture.



Safety Note Use gloves and tongs to protect skin from contact with photo processing chemicals and follow proper darkroom ventilation procedures.

Computer-generated Decal Transfers

- Produce an image on a computer using paint or draw software, or scan your own artwork. Contour drawings with ink work well.
- Using a laser printer, print the image on decal paper. (Use manual feed.)
- Spray clear acrylic protective coating on the printed decal paper.
- Paint a covercoat over the entire image with a foam brush.
- Leave to dry for twenty-four hours.
- Soak the printed decal in water for one minute. The image will adhere to the cover coat and will separate from the paper.
- Lift the image and place it on a glazed tile.
- With your fingers, gently push out any air bubbles trapped under the image.
- Allow tile to dry for thirty minutes.
- Fire to cone 012–08.

Safety Note Acrylic spray and covercoat materials can irritate eyes and skin. Wear goggles and gloves for protection and work in a well-ventilated area.

Fig. 5–35. Notice how well its title fits this slab-built piece.

Student work, Lauren Kidd, *At the Movies*, 2006. Slab construction with cast objects, photo-silkscreen, low-fire earthenware.



Fig. 5–36. What common elements make these cups a series? Student work, Vutthy Sok, *Angkor*, 2004. Wheel-thrown stoneware, cone 10 reduction.

Glazes

A glaze has the same characteristics as glass when it melts and fuses onto a clay surface. It waterproofs the clay, gives it a hard, smooth coating, and adds color and textural effects. Glazes are composed of powdered minerals that interact when mixed together and melted under ideal temperatures specific to each glaze.

All glazes are made from three basic ingredients:

- 1 **Silica**—the glass former. Silica is found naturally in sand and flint. Quartz, a form of pure silica, is what sparkles in sand grains. When silica is heated to 3119°F (1700°C) it melts, forming glass as it cools. Most clays cannot withstand such high temperatures, so a flux (an ingredient to lower the melting point of silica) is added to the mix.

- 2 **Flux**—the temperature reducer. A flux is a mineral component that helps the glaze to melt. Many fluxes exist, each with its own particular quality; they can produce matte or shiny finishes depending on the percentages added to a glaze. Low-temperature glazes require stronger fluxes, such as lead or calcium-borate frits. Stoneware or high-temperature glazes use less powerful fluxes like whitening, dolomite, and magnesium carbonate.
- 3 **Alumina**—the stabilizer. Alumina is added to the mix to keep a glaze from running off the pot when it reaches its melting temperature. Alumina gives the glaze stability and sticking power and is found in feldspars, lithium compounds, and powdered clay.

Note It A glaze adds strength to a pot and is a necessary hygienic finish for functional ware. If left unglazed, the walls of low-fired ware absorb liquids and bits of food, creating a perfect environment for bacterial growth. Glazing seals the pores, makes the pot safe for eating, and facilitates cleaning.

Types of Glazes

Potters choose glazes that are suited to the type of clay used and the temperature needed to fire it. A clay that is best fired at relatively low temperatures should

be matched with a glaze that fires in the same temperature range. Most schools and studios have prepared glaze formulations that are well matched for the clay you use. When working with any glaze, be sure to note the temperature it needs to be fired at. This information is available in the Clay Studio Handbook, page 267, and on glaze packaging.

Low-Fire: The First Glazes

The original glazes were low-fire—that is, they melt at relatively low temperatures. Some of these ancient glaze types are still used, but because of their toxic ingredients, only experienced potters should use them.

Alkaline glazes were the first types of glazes. Developed by the ancient Egyptians, these glazes employ soda, borax, and potassium—common minerals in Egypt and the Near East—as fluxes. When oxides are added, alkaline glazes produce brilliant colors; but they are difficult to fit to the clay body. They are used mainly on nonfunctional decorative ware because of their tendency to develop cracks or surface scratches.

Safety Note When a glaze has not matured properly, it can release metallic compounds into acidic foods. This action, referred to as *leaching*, can be toxic when glazes contain lead, barium, chrome, manganese, or copper. Eating tomato sauce out of a lead-glazed dish, for example, may cause a person to develop lead poisoning.

Other ingredients used in early glazes were lead and tin. These low-fire glazes tend to flow well, have a wide range of colors, and are usually glossy. A lead base

Fig. 5-37. Thrown and altered discs form the body of this sculpture. Why would low-fire glazes be used in this composition?

Student work, Amanda Fry, *Bouquet*, 2006. Wheel-thrown discs, hand layered, low-fire glazes.



produces a transparent glaze that can be colored with various oxides and carbonates. Adding tin oxide changes the glaze from clear to opaque and from transparent to white. Adding colorants to the lead/tin mix produces opaque colored glazes. When it was discovered that lead is poisonous, however, glazes using safer fluxing agents, such as zinc oxide and colemanite, were developed.

Raku glazes are applied to bisqued pieces that are raku-fired: quickly brought up to temperature, then removed from the kiln as soon as the glaze has melted and placed in an oxygen-reducing atmosphere with organic material. See page 207 for more about raku firing. These low-temperature glazes produce unusual and interesting surfaces under reduction. Some beautiful effects produced by raku glazes include crackle, metallic, shiny, and matte surfaces.

Note It The raku work shown in this book and used widely in North America was established and popularized in the 1960s by Paul Soldner and others. Soldner developed a unique method of raku firing based on techniques that originated in sixteenth-century Japan.

High-Fire: Later Discoveries

High-fire glazes (glazes that must be fired at high temperatures) are used on stoneware and porcelain clay bodies. They fuse or join with the clay to create a strong,

Fig. 5-38. How might the artist have applied glaze to this piece?

Suzanne M. Comine, *Turquoise Oval*, 2007. Thrown, altered with slip decoration, using porcelain, fired to cone 10 reduction. Courtesy of the artist.

impervious surface. The first high-fire glazes were developed in China around 2000 BCE.

Ash glazes originated in China and Japan. These early stoneware glazes were discovered accidentally when wood ash landed on the ware during firing. Ashes contain a variety of glaze-forming materials and colorants. Organic sources such as wood, grasses, and seeds have different chemical components, and their ashes produce unique qualities in a glaze. An ash glaze can be used alone or in combination with other high-fire glazes. Ashes should be soaked in water and sieved before being added to the glaze mixture.



Fig. 5-39. Early alkaline glazes were stabilized by adding a thick paste of slip to prevent the glaze from running and smudging when fired. Kashan, in present-day Iran, was a commercial center for some of the most advanced pottery of medieval times.

Persian, Jar, 13th century, 12 1/2" (22.3 cm) high, 6 1/4" (16 cm) diameter. Brooklyn Museum of Art. Gift of Horace Havemeyer, 42.212.41



Fig. 5–40. How is this work’s *trompe l’oeil* effect enhanced by color and surface texture? What techniques for using color lend themselves to this type of design?

Student work, Stephanie Villalvalzo, *Ceramic Bag*, 2008. Slab-built, press molded tools.

a substance is added to the kiln resulting in a vapor that coats the ware. For those who enjoy experimenting, soda firings offer the excitement of the unknown.

Slip glazes are simply clay slips that can produce a glaze. Some highly plastic clays contain enough flux to form a glaze alone or with few additives. The presence of powdered clay in a glaze helps suspend the materials in the mix and strengthens the raw glaze on the pot. Slip glazes give a smooth matte surface and are typically applied to high-fire ware.

Crystalline glazes are most often used with porcelain or low-fire white earthenware, and contain materials such as zinc, titanium, and lithium that form crystals



Fig. 5–41. This salt-glazed pitcher with a hinged pewter lid is typical of utilitarian stoneware produced in Germany during the 18th century. A wash of cobalt oxide provides background color for the deeply incised design.

Unknown artist. 14" (35.5 cm) high. Private collection. Photo by Maureen Mackey.

under certain heating and cooling conditions. White porcelain best shows off the crystalline glaze’s stunning effects. While high temperatures facilitate crystal growth in a glaze, lithium has the capacity to stimulate crystal growth in a low-temperature glaze.

Note 1* The degree of glossiness is an important quality to consider in the final design of an object. Some glazes are shiny, others have surfaces that range from satiny to a dry smooth surface. To achieve a matte (nonshiny) surface, add clay to the glaze mix or underfire a glossy glaze. The surface quality of a pot can determine whether a glossy or matte glaze will enhance work already established in the clay—for instance, detailed and intricate work may be lost in a glossy surface.



Fig. 5–42. Suggested movement, created by poured, brushed, and sprayed glaze application, enlivens the surface of this bottle.

Student work, Eric Wohlsradter, *Antigone*, 2008. Cone 10 stoneware, thrown, with added handles.



Fig. 5–43. How does glaze color and application complement this work?

Student work, Ashley Bishop, *Snail/House Sculpture*, 2009. Cone 04 glaze, slab-built over armature with wheel-thrown parts.

Overglazes and Paints

Once a ceramic piece has been glazed and fired you can decorate it more by applying an overglaze. The overglaze colors are bright and include reds, golds, lusters, enamels, and china paints. These are low-temperature glazes, but the low-temperature firing does not change the original glaze, which has already been fired to maturity. Low-temperature overglaze firings can be repeated as often as needed.

The glaze colors are usually applied and fired, then additional layers of colors are applied to enrich surface decorations. When layering overglazes, apply the highest-firing glaze first and fire it. Then apply the glaze with the next-highest firing temperature, and so on.

Types of overglaze include:
China paints and enamels are versatile and have a wide color spectrum. They have a matte or glossy finish and are either transparent or opaque. (See Fig. 5–46.)

Lusters are usually translucent, allowing the color of the glaze they cover to shine through and adding a distinctive sheen to the surface of a piece.

Metallic lusters (in shades of gold, platinum, and copper) are opaque and are used to embellish or complement the glazed surface. These fire around cone 018 (1323°F).

Safety Note Kilns should be properly vented when firing china paints and lusters. Fumes are toxic.

Majolica (*mah-YO-lee-ca*) is a method of overglaze decoration that involves painting a colored glaze on top of a base coat before the piece has been fired. Majolica features an opaque tin-based glaze that is usually white or cream-colored. Majolica ware can be fired from low to mid-range levels depending upon the clay body and glazes used.

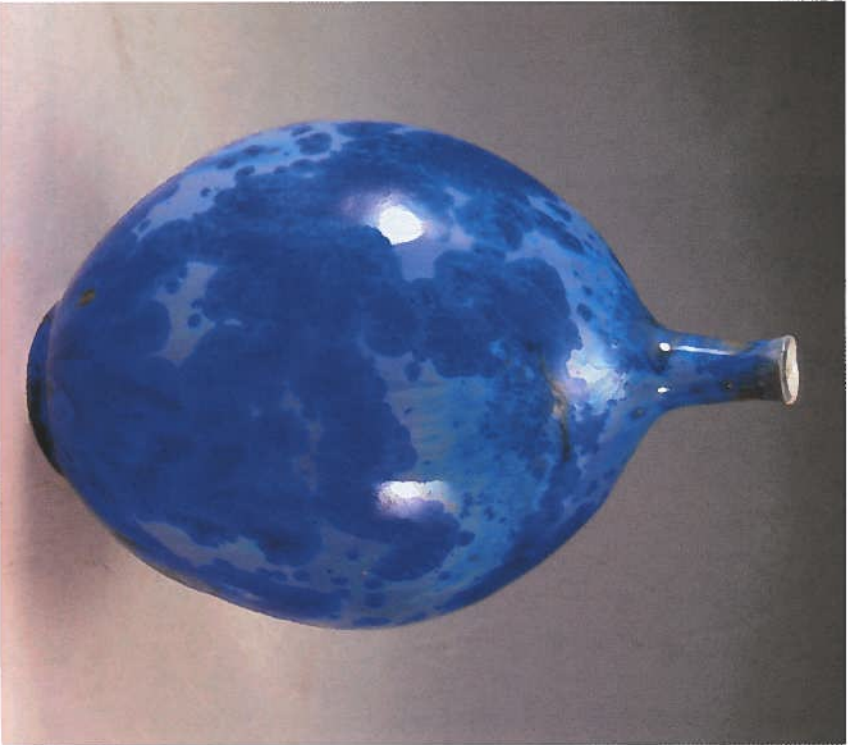


Fig. 5–44. Describe how the crystalline features of this glaze add to the rhythm, movement and energy of this work.
Student work, Hy Sok, *Blue Crystal*, 2008. Wheel-thrown stoneware, fired in electric kiln.



Fig. 5–45. Imagine the steps the artist might have taken to plan the design elements and hand-paint them onto the surface of this piece. How important is precision in this work?
Unknown artist, *Majolica Platter*. 12" (30.5 cm) diameter. Photo by Kristina Mackey.

Paint has been part of the ceramic tradition since ancient times. Oils, acrylics, enamels, wood stains, and fabric paints can be used on bisque ware and sealed with a sealer, such as a clear shellac. They function well as a surface treatment that can be totally controlled, and they supply a dramatic and colorful covering to the form.

Safety Note Paints are toxic if ingested and should never be used on pottery that will come in contact with food or drink.

Try It To apply an overglaze, make sure the surface of the piece is smooth and clean. Let the base glaze dry thoroughly. Spray the base glaze with any type of hairspray or a solution of CMC gum mixed with water, then paint over it with the colored overglaze.

Fig. 5–46. The design of this baluster jar was based on Chinese porcelain ware. A popular style, it was widely exported to the West and later copied by English, Dutch, and German potters.
Japanese, *Jar*, Edo period, late 17th century. Porcelain, 16" (40.4 cm) high, 12½" (31 cm) diameter. Freer Gallery of Art, Smithsonian Institution, Washington, D.C.; Purchase, F1956.13.



Applying Glazes

Before glazing a bisqued pot, remove any dust particles or other impurities from the surface. Wipe it with a damp sponge or rinse it quickly under the tap. Paint wax on the areas that you want to remain glaze-free, such as the foot, and let the wax dry before applying a glaze.



Painting wax on foot.

A bisqued pot is porous and quickly absorbs moisture from the glaze. Test the glaze thickness by scratching through it with your thumbnail or a pin. If the glaze is too thin (less substantial than a card), apply another layer; if it is too thick (more substantial than a card), wash it off and reapply when your piece is no longer damp. Glaze that is too thick in some areas can be tapered and thinned by rubbing it lightly with your (gloved) fingers or a paper towel.

Note It Before every application, make sure that the glaze is thoroughly mixed and free of lumps.

Dipping

Dipping is the easiest way to glaze a bisqued pot and is the best method for bowl shapes and cylindrical forms. To glaze by dipping:



Hand dipping.

- Stir the glaze and put it in a large container. It should be the consistency of tomato juice or cream, not as thin as water or as thick as gravy.
- Grasp your piece with two gloved fingers, or glazing tongs, and dip it in and out of the glaze with a single motion.
- Twist and shake it to help spread the glaze, and drain off any excess.
- Use a brush to touch up the finger or tong marks and wipe the bottom (foot), clean with a damp sponge.
- Test for the correct thickness and adjust if necessary.
- Taper or thin the glaze near the foot by wiping some off with a sponge.

Safety Note Wear a mask or respirator when you:

- measure and blend dry chemicals.
- apply glazes with an airbrush.
- clean up spilled chemicals.

Wear latex or rubber gloves when you:

- mix glazes.
- dip a piece in glaze solution.
- sponge or rub an oxide or stain onto your piece.

Always wash your hands thoroughly with soap and water after glazing. Do not eat in the studio.

Fig. 5-47. Which techniques were used to apply glazes to this piece?

Student work, Nicki Brewer, *Henry*, 2009. White earthenware, built using coils and pinch-pot techniques.

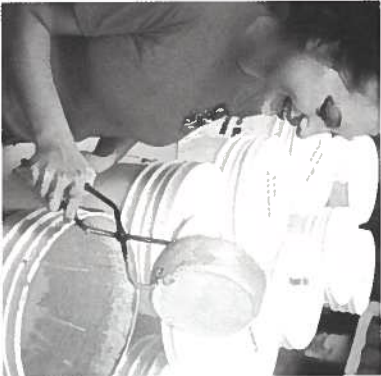


Fig. 5-48. A good coat of glaze on the pot's surface should be about as thick as a postcard.

Pouring

Pouring works best on larger pieces, forms with narrow necks, and plates.



- Pour the glaze inside and tip with a swirling motion to cover the work's interior surface.
- Pour out any leftover glaze while rotating the piece, and shake any drops from the rim.

Pouring glaze.

To glaze the outside surface:

- Invert the piece on a grate inside a bowl or container large enough to catch the poured glaze.
- Place the bowl on a turntable or wheel and rotate it slowly while pouring glaze on the pot.
- Shake the drops of glaze from the rim and remove any glaze drips with your gloved finger or a dry paper towel when the glaze is dry. Touch up any damaged areas using a brush filled with the same glaze.
- Clean the base with a damp sponge. Thin out the glaze around the base to prevent it from sticking to the shelf when fired.



Cleaning glaze from base.



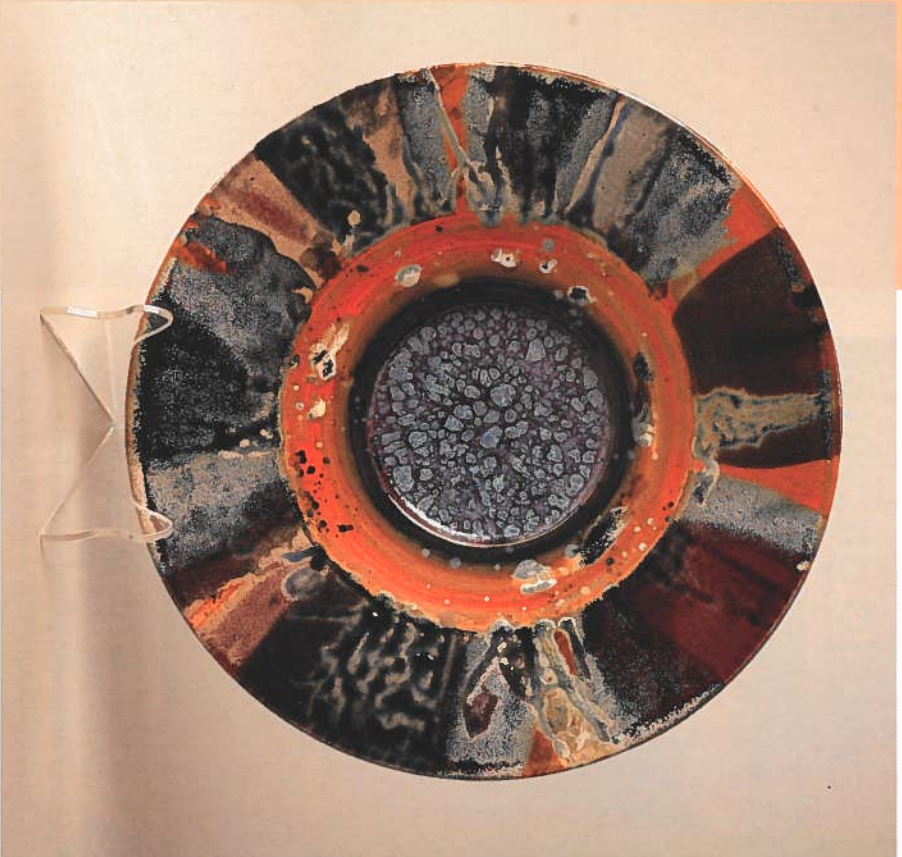
Fig. 5-49. Notice how the lid, neck, shoulder, body, and foot sections of this work are defined by glaze color and application.

Joan Pevarnik, *Blue Jar*, 2006. Stoneware thrown in two pieces, joined and lid added. 24" (66 cm) tall. Cobalt blue glaze with rutile glaze overlay, fired to cone 10. Courtesy of the artist.



Fig. 5-50. How do the poured glazes on the surfaces of these pieces create the illusion of a vase-within-a-vase?

Student work, Dominique Gaudyn, *Poured Raku*, 2008. Wheel-thrown stoneware, raku-fired.



Brushing

In this method, you use a soft paintbrush to apply glaze. Brush at least three layers of glaze onto the surface in different directions. Don't let the coat of glaze dry out before you brush on the next layer. Because you can't allow the glaze to dry between layers, brushing is only practical for small pieces. Brushing works best on low-fire ware and raku.

Spraying

Sprayed glazes result in a look that is different from all other glazing techniques. Use a spray gun or airbrush to apply a base glaze, layer a contrasting color, or spray within, or over, masked areas for

Fig. 5-51. The glaze on this platter suggests energy radiating from the center. What glaze application techniques do you think the artist used?

Bill Kysor, *Platter*, 2007. Stoneware, poured, brushed and sprayed glazes, 15" x 15" x 3" (38.1 x 38.1 x 7.6 cm). Courtesy of the artist.



Fig. 5-52. The simplicity of form and flawless surface of this bowl are enhanced by the sprayed glaze application.

Keith Brockie, *Electric Blue Bowl*, 2008. Wheel-thrown, cone 05 sprayed glazes. Courtesy of the artist.

Fig. 5-53. Whether you use the pouring or dipping method to glaze your piece, always glaze the interior first.
Student work, Andrea Schweitzer, *Sweets*, 2008. Porcelain.

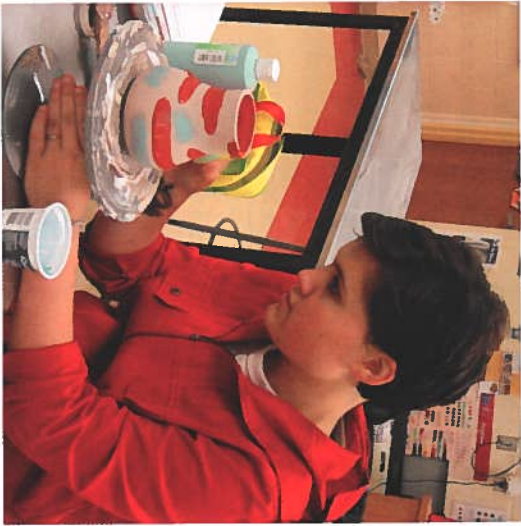


Fig. 5-54. When applying glaze with a brush you will get an even cover if you paint the first coat in a horizontal direction; the second vertical; and use horizontal strokes again for the third coat.

decorative effects. Spray guns are best for covering large areas or applying a base coat. Airbrushes are the tool of choice for more detailed work.

Prepare your piece for glazing (clean it; wax the foot) and stand it on a turntable inside the booth. To apply glaze, turn the piece as you move the spray gun back and forth in a sweeping motion. Spraying at an angle can heighten the visual effects of textured surfaces. Different colors can also be layered or sprayed from opposite directions to obtain gradations of contrasting colors. Spray two or three light coats of color on your piece rather than one heavy layer.

Safety Note Wear a mask or respirator over your nose and mouth to prevent inhalation of glaze vapors. Spray only in a booth with a vented exhaust system. Do not spray oxides. Wear a mask and rubber gloves when spraying glazes and cleaning spray booth.

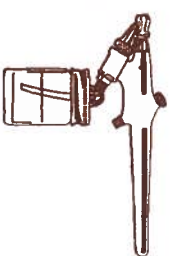
Spray Glazes

To obtain the most even glaze coat, work in a studio equipped with a spray booth, an exhaust fan, and vent to accompany a spray gun and compressor. Note, however, that spraying wastes glaze.

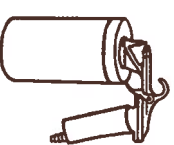


Fig. 5-55. Placing your work on a turntable helps you to achieve an even glaze coat as you rotate and spray the piece.
Cassie Gonzales.
Photo by Maureen Mackey.

3 Load the spray gun or airbrush reservoir about half full of glaze and dilute it with water by adding water until it is full and mixing together with the glaze to get an even application. Masking and surface designs in contrasting colors can be applied either under or over the base glaze. Work on the inside surface of your piece first. Turn it over to finish the outside. Test for correct thickness. (See page 170 “Applying Glazes.”) If the glaze spatters or clogs, cover the nozzle with your finger to force air into the reservoir, or adjust the regulator to a higher pressure.



Airbrush.



Spray gun.

1 Practice spraying water on paper to get a feel for how the spray gun or airbrush works. Tape a piece of absorbent colored paper (construction paper works well) to the inside back of the spray booth and test a series of sprays with each tool. Begin spraying at the top of the paper and move slowly down across the surface while holding the gun about 12" (30.5 cm) away. Move in closer and continue spraying. The object is to visibly wet the surface. You are too close when the spray begins to run down. Experiment with pressure settings to discover which works best.

2 If using an airbrush, alter the width of the nozzle to achieve a spatter effect. Practice spraying freehand dots and lines. Cut shapes from a piece of paper, flexible cardboard, thin plastic, or acetate to make a template. Become familiar with airbrushing over templates and masks to discover the qualities of each.

4 When you finish spraying, detach the reservoir and return leftover glaze to its container. Point the tip of the airbrush or gun into a sponge and spray until there is no color left in the spray. Submerge the nozzle of the brush or gun into a container of water and spray underwater until no color enters the water. Finally, spray out any water left in the tool. (Check the airbrush cleaning directions for additional steps.) Wipe the spray booth clean.

Glazing Problems and Solutions

Glazes do not always turn out as you might wish. They can be disappointing, spectacular, or somewhere in between. Record glazing details about each of your pieces in your notebook. The information will be invaluable as you attempt to determine why some glazes fail and some work well. You can also prepare and fire test tiles, a useful way to experiment with glaze effects. Document carefully by marking the back of each tile and keeping a written log or setting up a database.

Some glaze defects you might encounter are:

Crawling

This occurs when the glaze coat has separated to expose the clay body beneath.



The bare spots can be the result of several

problems:

- 1** dirt on the pot's surface, under the glaze
 - 2** glaze that is too thickly applied
 - 3** an underfired piece, or
 - 4** a glaze formula that needs adjusting.
- It is possible to reglaze and refire a piece with a crawling glaze defect.

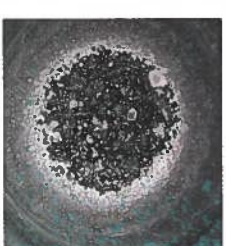
Crazing

When the shrinkage rates of the clay body and glaze differ, tiny cracks, or crazing, appear on the surface—sometimes as soon as the piece is removed from the kiln, other times weeks later. Some potters appreciate the crackle pattern and work with it. Others track down the cause, which may be in the glaze or clay body, and work to eliminate it. Chinese crackle glazes were developed to intensify the characteristics of crazing.



Blistering

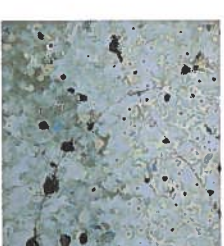
Blisters and craters are the result of escaping gases that occur when the glaze firing is too fast or the coat of glaze is too thick. Sometimes refiring the piece will smooth out the blistering.



Pinholes

These usually result from air holes in the clay. For example, the bisque ware may be too porous and vapor trapped in the

pores breaks through the surface of the glaze during the firing. Sometimes pinholes are caused by rapid firing or rapid cooling. Firing the bisque to a higher temperature and lengthening the glaze firing could remedy this defect.



Running

When a glaze runs and pools on the kiln shelf, the glaze was probably overfired or there was too much flux in the glaze.



Reducing the flux and increasing the alumina in the glaze should eliminate running. When glaze runs, pieces often fuse to the shelf. Break the piece off and chip or sand away any remaining fragments.

Rough Surface

A rough surface will occur if the glaze was applied too thinly.



For information about repairing cracks and breaks, see the Clay Studio Handbook on page 264.

Student Gallery

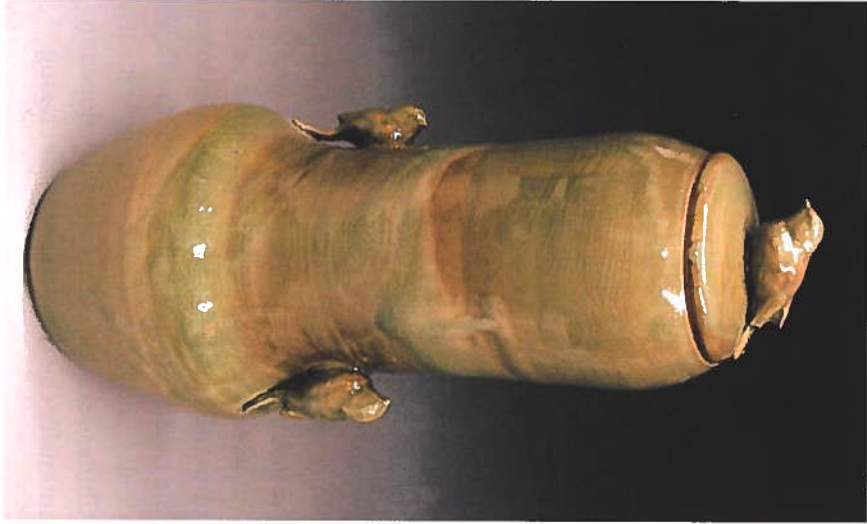
Student work, Elliot Chang-Tung, *Peeping Tom*, 2009. Clay, raku-fired, rg22 glaze.



Student work, Anna Slowey, *Orbte Shino Was Resist Teabowls*, 2005. Wheel-thrown stoneware, cone 10 reduction.



Student work, Adrienne Anderson, *A Round of Tea*, 2009. Thrown and altered porcelain, cone 05 oxidation.



Student work, Hy Sok, *Crystalline Bottle*, 2008. Wheel-thrown stoneware, fired in electric kiln.



Student work, Sara McGuire, *Falling Leaves*, 2008. Slab-built earthenware with stains and sprayed glaze, cone 05 electric.