This fourth edition of Electric Kiln Ceramics, Richard Zakin’s seminal work on understanding and using the electric kiln to its fullest potential, has been completely rewritten, reorganized, and expanded by Frederick Bartolovic. Handpicked by Zakin to carry the title forward, Bartolovic has added new sections with step-by-step instruction on forming and finishing pieces for electric firing, schedules for firing both manual and computerized kilns, and has lavishly illustrated the book with completely new images that highlight many of the most exciting results that are possible with electric firing. Electric Kiln Ceramics has become the path countless professionals and enthusiasts have followed to gain understanding and proficiency working with electric kilns in the ceramics studio. From Zakin embracing and promoting the electric kiln as a tool that yields exciting results to Bartolovic presenting it within the frame of contemporary practice, technology, and aesthetics, Electric Kiln Ceramics promises to continue inspiring and educating ceramic artists for generations to come.
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2.5 Applying Glazes

The ceramist who works in the electric kiln can create glaze imagery in a great variety of ways. Visual texture is the primary imagery tool for ceramists working in fuel-burning kilns.

Visual texture can be pleasing in the electric kiln but it is usually quite subtle and more sober in character. It is important to consider a great variety of image creation methods when working with the electric kiln. Combinations of engraved or relief imagery with glazes can be very rich. Another effective work strategy is combining application methods such as splashed, poured, and sprayed imagery. These too can help the ceramist create a rich surface.

Painted imagery works well in the electric kiln. It is likely to have a highly graphic character and it allows the creation of complex imagery, even highly delineated imagery, if the ceramist wishes.

Commercial Glazes

It has come to be a tradition that commercial glazes should be applied by brush and in three coats or more. It is usually recommended that they be applied using opposing brush strokes for each coat (horizontal first, vertical second, horizontal third). Such strategies most often result in even coverage and work well with a surface ornamented with drawn and painted imagery.

Other ceramists use commercial glazes to create a rich surface patina. The glazes are applied in the same manner as most studio-made glazes—dipping, spraying, splashing, and/or pouring. The ceramist often layers one glaze over another. Just as layering is a useful application strategy for creating rich surfaces with studio-prepared glazes, it is also useful for creating rich imagery using commercial glazes. When used in this way, the results do not seem all that different from studio-made glaze surfaces. They do differ in that the ceramist may exploit the broad color opportunities available far more readily with commercially prepared surfaces than with studio-made glazes.

Melissa Mytty, Coja, dimensions vary, porcelain, glaze, gold luster, cone 6 and cone 016, 2014. Stripes of glaze were applied to the polka dots so they would blend together in the kiln similar to a watercolor painting. Photo by Joseph Hu
**Firing Prepared Surfaces**

Many low-fire commercially prepared surfaces are at their best when fired to cone 06 or 05, while others work well at temperatures up to cone 02. Still others have a very wide firing range and will do well even at much higher temperatures, including cone 3 and cone 6. Some of these preparations require a very quick firing and cooling while others do well in a more normal firing.

Directions for appropriate firing temperatures and types of firing are listed in terse form on the container and in more detail in the manufacturer’s catalog.

**Toxicity**

To achieve desirable color and surface characteristics, some of these glazes contain toxic materials such as lead and cadmium (both materials were until recently considered indispensable to the ceramist working in the low-fire). Pieces glazed with preparations containing lead or cadmium should not be used as containers for food because of the acidic nature of many foods. These foods may leach the toxic materials from the glaze. As such, they present a clear danger, especially to young children. The manufacturers have been concerned about these problems for many years and where possible have emulated, as closely as they could, the preparations that contain toxic materials. These non-toxic versions allow the ceramist a measure of choice. Those preparations that contain toxic materials are clearly and carefully labeled on the container. Some manufacturers have a special line of glazes designated as non-toxic.

**Application Strategies for Commercial Low-Fire Glazes (Cone 05 or 04)**

Application strategies for commercial glazes can be quite different from those for studio-made glazes (and probably should be). As is the case with studio-made glazes, commercial glazes may be applied using dipping, splashing, and slip-trailing. Unlike studio-made glazes, the most popular application methods for prepared low-fire glazes are brushing and spraying (there is also a tradition of sponge application). These prepared glazes go through a very thorough grinding process and contain binders and additives intended to improve the way they look when applied with a brush or a spray gun. Therefore they lend themselves more easily to painted and sprayed applications than do studio made glazes.

Newcomers to the use of low-fire prepared glazes often believe they are supposed to keep one color separate from the next during the application process. This is not the case. The manufacturers of these glazes strongly recommend experimentation. These experiments include the application of one glaze on top of...
another with the expectation that the two glazes will react to each other in the fire to create interesting variegated effects. Manufacturers also recommend experiments where you mix together glazes within a series or firing range (one low-fire with another low-fire glaze).

Perhaps the most important characteristic of low-fire prepared glazes is their brilliant color. While you can choose to work with color that somewhat successfully imitates the more somber colors of the high fire and the reduction atmosphere, there is no point in such an exercise. There are strong arguments for suggesting that application strategies for prepared glazes should emphasize their unique character—brilliant color applied with a brush or a sprayer.

**Commercial Mid-Fire Glazes (Cone 5 or 6)**

In recent years a number of manufacturers have created prepared mid-fire glazes. These manufacturers are generally the same ones who manufacture low-fire glazes. They seem to be trying to emulate the success of their low-fire products.

Most of these mid-fire glazes are formulated for firing at cone 5 (2205°F) and cone 6 (2232°F) in the electric fire. They come in a wide range of colors and tend to be very reliable. These preparations have been formulated to make the most of the electric kiln. They seem to have gained a good deal of favor, especially among beginners and those who do not wish to make their glazes in their own studios.

The market for these products is significant because they fill a real need. If you are a beginner in ceramics you may think of the techniques of glaze making as mysterious and a bit threatening. You were probably introduced to ceramics in a class held at a local art center or in a high school or college. These classes were most likely led by a trained ceramist who chose a group of glaze recipes. Either the teacher or a special student made up the glazes (generally in large buckets) for communal student use. Therefore, you, like most of the students, learned little about how these recipes were chosen and how they were made up. Unless you volunteered to help, you did not learn how to choose a recipe, weigh the materials, add water, and sieve the results to make a useful glaze. When you want to take the next step and make the transition to work in your own studio, it is natural that you will want to find another source for prepared glazes.

For the former student making this transition, prepared glazes formulated for firing in the electric kiln can be invaluable. If you, like many beginners, were introduced to ceramics by working at a mid-fire temperature in an electric kiln, it is natural that you wish to continue this work in your own studio.
Glaze

Prepared mid-fire glazes make your life much simpler. Many of the decisions have been made for you. These glazes are often supplied in liquid form, in plastic containers, all ready for use. Others are supplied weighed and mixed in the form of a dry powder, ready for you to pass them through a sieve and mix them with water.

**Mid-Fire Glaze Character**

The companies that specialize in prepared glazes are only now beginning to give ceramists the broad range of choices available to those who work with prepared glazes in the low-fire. Therefore, the mid-fire glaze range can only provide limited access to many of the choices of materials and processes that are the hallmark of the ceramic medium. Mid-fire glazes seem to be primarily aimed at beginning ceramists who may become very frustrated if a glaze acts in a way that is unreliable, unpredictable, or requires much practice before it can be used successfully.

As a result, mid-fire prepared glazes do not aim for the ability to surprise or amaze the viewer. They are relatively free from the accidental peculiarities that some ceramists strongly dislike and others value as a source of individuality. Instead, these surfaces have been formulated to be highly durable and stable. These glazes have a much more practical identity than those for the low-fire. For now, the rich variety of florid glaze textures available from prepared glazes for the low-fire does not seem to be mirrored in mid-fire glazes. It may be that the companies that prepare these glazes will give them more of the personality of their low-fire equivalents. When studio ceramists who fire in the electric kiln are given access to a wide variety of rich mid-fire prepared glazes, it is conceivable that many will take up their use.

**Mid-Fire Glaze Types**

Standard smooth-surfaced glazes are made in a wide variety of colors. The color is bright and can be quite vivid. At present, color is the most notable aspect of these glazes.

Textured glazes are generally marked by low contrast flow patterns or fairly uniform specked textures.

**Using Commercial and Studio-Made Glazes on the Same Piece**

Combining prepared glazes and studio-made glazes on the same piece is a useful strategy. In this way you will have access to the stable, brilliantly colored prepared glazes as well as the complex, somewhat unpredictable surfaces of studio-made glazes. You can maintain, over the long term, the practice of mixing the two glaze types and enjoy the advantages of each type. On the other hand, you may see your use of these glazes as temporary. If you are using prepared mid-fire glazes, do you see yourself eventually moving on to studio-made glazes? If so, it can be very useful to begin by adding a few studio-made glazes to the group of prepared glazes you use in the normal course of your work. In this way you can manage the transition from glazes prepared by others to glazes you prepare in your own studio.

**Applying Studio-Made Surfaces**

Studio-made surfaces are generally applied by dipping, pouring, or spraying. This is a very important aspect of these surfaces and crucial to the way they look when they come from the firing. In the past, we have talked a great deal about ceramic recipes and often ignored the impact of application strategies on the character of the imagery. Even in the case of a piece with a very simple surface treatment, the recipe plays only a part in defining its character. This is especially true of work fired in the electric kiln. Electric-fired slip and glaze surfaces naturally tend to be restrained and do not dominate the character of the piece. One of the best characteristics of the electric fire is that its surfaces can be created in a great variety of ways. It is process friendly.
Our feelings about ceramic surfaces are influenced by a host of intangibles—our expectations, the traditions of the craft, and our understanding of the behavior of our materials and of our work strategies. The act of developing the surface of the piece requires that the ceramist orchestrate form, surface, materials, and processes to create a coherent whole. A ceramic surface is affected by the intention of the artist, by ideas of use and purpose, the clay body, the form type, and the slips and glazes applied.

We need to understand why the rich, fabric-like, poured application that works so well on a full-bodied vessel piece will probably look very wrong on a sculptural form. By the same token, we need to understand why the carefully painted, brush-applied, low-fire surface may not be appropriate on a form with a strong organic character but may be perfect on a form with a strongly geometric identity. We need to understand why a ceramist who works with complex forms gravitates to a simple dipping or spraying application and why the ceramist who wants to use complex multi-layered applications is likely to employ simple austere forms. If we understand these things we will understand why many ceramists see the process of creating the surface as so difficult to get right.

Jason Bige Burnett, Pussy Cat Party Dinner Plate, 9½ inches in diameter, Highwater Clay: Earthen Red, commercially colored slips, screen-printed transfers, underglaze, glaze, commercial colored glazes, and luster, cone 5, 05, and 015, 2014. Many layers had to be placed down on this plate to develop the rich patterned surface it achieves. One of its features is how both commercial glazes and studio glazes are being used in conjunction with one another. In this case the dots of bright colors are low-fire glazes applied after an initial glaze firing. Photo by Lindsay Rogers
Ceramists deal with these problems in different ways. Some wish to create very simple surfaces with the idea that a simple application is the most reliable. Some develop a script and stick with it so that it becomes second nature to them and more or less guarantees success. Some employ carefully worked out strategies for applying surfaces. They rely on a method to help them create their imagery. This lets them follow a well laid out course of action while retaining the ability to vary the details. Some reconstruct the look of pieces from the past, learning from the traditions of the craft. Some try many methods of dealing with the surface, moving from one to another, learning many of the languages of surface creation. Some take their imagery from other imagery used by the artists of our time, converting imagery from another medium, such as paint or bronze, to the medium of clay. And some try to develop applications that are new and have never been seen before.

When firing studio made surfaces in the electric firing, it is important to understand that finding a good recipe, or even a good group of recipes, is only part of what must be done. It is the way we conceive these surfaces and the way we apply them that will significantly shape the character of our pieces.
Shawn Spangler, Ewer and Jar, 16 inches tall, porcelain, wheel-thrown and assembled, scalloped ewer body, 2012. Photo by artist
**Dipping**

Of all the methods of application, dipping is the simplest and most direct. This method is easy to learn and requires very little in the way of special equipment. It encourages smooth surfaces that cover large areas of the piece. With all these advantages it is not surprising that it is the most commonly used glaze application method.

While it is possible to dip-apply glazes on greenware, the water in the mixture may cause the piece to crack or crumble. It is best, therefore, to use a bisque-fired piece for dipping.

1. Prepare a container of engobe or glaze.
2. Hold the piece in your hands, firmly grasping one section. Lower part of the piece into the container. Part of the piece will now be covered with a layer of the surface coating.
3. Allow the surface to dry.
4. Holding onto the section previously immersed, immerse the unglazed part of the piece.
5. Let the surface coating dry.
6. If you wish, you can apply other layers of glaze to finish the piece.
7. Clean the base of the piece.

There are some negative characteristics associated with this method. First, the process requires that a large amount of the recipe be mixed beforehand. Second, as you dip one part of the piece in the engobe or glaze, and then another section, you will leave a thick band of the material across its width. This band occurs where the

![Glaze application](image)

- **Sponge off your form to remove any dust that may have settled on it.** Wax resist was brushed onto the foot of this plate allowing for easier cleaning. Allow the wax to dry.
- **Stir up all of the glazes you are about to use.** If the glaze is not thoroughly mixed you may not get the true character of the glaze.
- **The bisqueware is lowered half way into the glaze.** Allow the dipped portion to dry.
- **Turn the plate grabbing the side you just dipped.** Dip the remaining exposed bisqueware into another glaze. Overlapping the glazes slightly will most likely give you a different effect.
- **If there is any glaze remaining on the foot make sure you wipe this off with a wet sponge.**
- **The band of overlapping glaze can change, depending on which glaze is dipped first and which is dipped second.**
dipped surface coatings overlap. The overlapped section may be of a different color and may be more opaque. The accomplished ceramist can learn to exploit this dark band as part of the glaze composition. Once you learn how to deal with this problem, this application method can be used to create highly satisfying imagery.

**Dipping with Tongs**

If you want a dip application without the overlap, you may use tongs. Tongs are plier-like devices that look like a set of metal claws. They allow you to dip entire pieces into the bucket in one step. Tongs are useful for applying the surface to small- and medium-sized pieces. Although they will leave tiny marks behind, these can be filled with a brush.

Before using tongs, practice and learn to use them correctly. After a time you will find that you can erase any evidence of their use.

1. Dip the piece into another glaze intended for the outside of the form.
2. Pour the glaze out as soon as the form has filled up. The longer you let the glaze sit in the form the thicker the glaze application will be.
3. Remove the piece after a couple seconds. If you leave the form in too long the glaze will get too thick.
4. Clean up the lip with a wet sponge, and any glaze that may have gotten on the outside of the form.
5. Dip the piece into another glaze intended for the outside of the form.
6. Firmly grasp the form with glazing tongs. If you apply too much pressure you could break the form.
7. Be sure to wipe the foot clean of all glaze to avoid sticking to the kiln shelf.
8. Dip the lip of the form into a third glaze to create even more activity on the form.
9. After rinsing off the form you intend to glaze, pour the glaze into the vessel form up to the top of the lip.
Dip and remove the piece smoothly and slowly to avoid drips and runs. If you apply too much pressure, the piece may break, so be careful to grip the tongs firmly but lightly.

1. Fire the piece to bisque.
2. Grasp the piece with the tongs and dip it in slip, engobe, or glaze.
3. Clean the bottom of the piece.

Unfortunately, pieces weighing over 10 pounds are difficult to dip with tongs. These pieces must be dipped by hand or you can use pouring or spray application methods.

**Pouring**

Pouring is a classic method for applying a ceramic surface. In this method you pour stain, slip, engobe, or glaze over the surface of the piece. This results in a surface modulated by variations in the thickness of the application. The results are characteristically soft and irregular and are marked by an often pleasing flowing imagery. This is a very straightforward method and it requires little in the way of special equipment.

1. Place a catch basin below the piece.
2. Place two sticks parallel to each other on top of the catch basin. Place the piece on these supports.
3. Fill a cup or a small bucket with the surface preparation and pour it over the piece.
4. Return the excess in the catch basin to its container.

**Brushing**

Those new to studio ceramics are often surprised that the brush is not used more often to apply studio-made ceramic surfaces. The experienced studio ceramist knows that studio preparations are rarely mixed finely enough to work nicely with the brush. The brush is a very useful tool for applying linear imagery when using studio prepared surfaces but generally a poor one for applying large unbroken areas of imagery. If you try to apply large unbroken areas of solid color, the result will not be the smooth unbroken surface that appeared before firing.

Some ceramists, in the spirit of accepting the inevitable, harness the texture possibilities of brush application. Other ceramists prefer to limit their use of brushes to the creation of linear imagery because this imagery changes much less in the fire.

**Using a Brush to Apply Linear Imagery**

1. Prepare a dark-colored stain, slip, or engobe.
2. Select a brush with flexible supple hair. Acrylic hair brushes can be quite appropriate for this work.
3. Dip the brush into the container and apply linear imagery to the surface of the piece.

**Using a Brush to Apply a Textured Surface**

1. Prepare a dark-colored stain, slip, engobe, or glaze.
2. Select a very stiff bristle brush (a well-used house painting brush can be quite appropriate for this work).
3. Dip the brush into the container and apply the surface material on the piece using broad motions to create a highly textured imagery.

**Brush Character**

There are many kinds of brushes and each type has a strong effect on the character of the imagery. The Chinese or Japanese bamboo brush gives a soft sinuous line. The Japanese hake, a flat soft-bristle brush, gives a much wider line that is beautiful when charged with either slip, engobe, or glaze, and when used in a dry-brush technique. Brushes with supple acrylic hair can be used to create thin, controlled linear imagery. House painting brushes produce interesting textured imagery. This is especially true of brushes that have not been carefully cleaned, whose bristles are stiff and wiry.
Because you cannot know how an application will turn out until you fire it, you should experiment with brush application to learn what strategies work for you.

**Spraying**

Spraying ceramic materials requires the dispersion of a liquid using forced air as the propellant. This is accomplished using a container of liquid stain, slip, engobe, or glaze that feeds into a spray gun connected to an air compressor. The liquid is drawn up into the gun and dispersed in a fairly narrow field on the piece.

Spraying is a very useful method for creating smoothly blended imagery. The transitions from one color and texture to the next look very different from those created using dipping or pouring. It is, therefore, especially useful in the electric kiln, which can often be characterized by harsh transitions. Another advantage of spray methods is that they can be used to apply a surface coating on very large pieces that cannot easily be dipped.

*Note: Always wear a good dust mask while spraying.*

Geocorpus Studios, *Rabbit Plate*, 13 inches in diameter, stoneware, cone 6, 2012. This plate was thrown on the wheel and then hand decorated using underglazes by Michelle Lyn Strader. After the sgraffito work was complete, the piece was bisqued, and glazing was completed through a spraying application to keep the clear glaze thin and even across the entire surface.
A spray application can be used as the sole method of finishing the piece or it can be used in conjunction with other application methods. Spray applications work very well as part of a multiple application strategy in which the overlapped imagery of dipping and pouring is combined with the soft imagery of a sprayed application. Spray application methods work well with greenware as well as bisque-fired pieces.

Spraying is not without a downside. It is noisy and time consuming. It requires expensive and sometimes finicky spray guns, compressors, and spray booths. The spray process must be mastered and it takes a good deal of practice to become proficient. A carelessly applied layer will puddle and drip, creating a messy surface. In spraying, it is difficult to gauge the thickness of a coating and there are few clues to indicate that an application is too thin or too thick. The surface of the unfired sprayed piece is often easily smudged, in which case the addition of a small amount of colloidal binder may be required to prevent smudging (a 2% addition is often recommended). Care is also required during kiln loading to avoid smudging.

Glazing a Piece Using a Sprayed Application
1. Place the bisque form on a banding wheel (a revolving stand) preferably inside a spray booth.
2. Prepare a glaze by transferring it to a spray gun container and adding enough water to make it the consistency of milk.
3. Use the sprayer to apply glaze over the entire surface of the piece. Keep turning the piece and keep the sprayer moving to allow the spray application to dry. In this way, no one area becomes so saturated that it will drip and smear. Paying special attention to the lips of pottery forms to ensure a heavy application in this crucial area of the piece.
4. Clean the base of the piece with a clean damp sponge.
5. Fire the piece to the desired final temperature.

External Mix Sprayers
Spray guns often become blocked by the coarse mixtures of studio made slips, engobes, and glazes. The external mix sprayer is a simple device that is inexpensive, highly immune to blockages (even when used to spray unscreened materials), and easily cleaned. Unlike most sprayers, in external mixers the air from the compressor and the liquid mix at a point midway between the air and glaze nozzles. This simple strategy ensures that few blockages occur. If there is a blockage, it will be in the feed tube connected to the glaze container and since this tube is open and straight, it can be cleaned easily. There are nozzles of various sizes made for this sprayer so it can be fitted with a large nozzle that can accommodate rough unscreened mixtures.

External mix sprayers can be used with almost any compressor because they require very little air: 25 psi (pounds per square inch) is sufficient.

Atomizers
Spraying may also be accomplished with an atomizer. This simple device that runs on the lung power of the ceramist. Hence, you will find that it is difficult to use the atomizer to cover large forms.

Spray Booths
Because spraying creates an atmosphere of dust, the ceramist should use a spray booth. Spray booths take the form of a rectangular box with one open side. At the top is an opening connected to an outlet to the open air with a fan to pull the dust. Spray booths for studio use are constructed to contain the dust and exhaust it to the open air (where it will become diluted as it passes into the atmosphere). In industry another type of spray booth is sometimes used. In this design the dust is collected in a flowing sheet of water. While this method costs more than a fan driven exhaust, it is less damaging to the environment.
Masking and Resist Materials

Masking and resist materials allow the ceramist to reserve areas of the surface of the piece so that they resist the application of a slip, engobe, or glaze. Various materials can serve as masks or resists.

Masking material is painted or pressed on the surface of the piece and when the slip, engobe, or glaze is applied, it covers both the surface of the piece and the masking material. When the masking material is removed, the surface preparation on the masking material is removed as well. The masking material must stick firmly to the surface of the piece and not loosen even if immersed in the liquid. Once it has served its masking purpose, it should be easy to remove and should leave no residue that might resist further applications.

The most popular masking material due to its low cost is masking tape. Liquid masking materials work very well and lend themselves to the creation of irregular-shaped masked areas not easily accomplished with masking tape. Ceramists use a number of liquid masking materials including liquid wax, latex, grease, resin, and frisket. These materials are supplied as viscous liquids that are painted on parts of the piece. They resist any slips and glazes applied over them. They are left on the piece and burn away during the firing, or in the case of latex can be peeled off and then additional glazing layers applied.

Slip-Trailing or Tracing

In slip-trailing or tracing the ceramist applies a thick line of slip, engobe, or glaze to the surface of the ware. This is done with an application device called a trailer or tracer. These usually rely in some way on air pressure. They are often flexible plastic bottles or rubber bulbs with a narrow nozzle at one end. The result is a raised linear design that covers parts of the piece.

Application Types

Some ceramic surface applications are very simple, composed of one or two surface types used in a very simple way. Others are quite complex. These may be composed of many surface types and may be applied using complex and varied application strategies.

Simple applications can be appealing in their directness. Their imagery is purposely limited, either because of necessity, convenience, or aesthetic choice. Simple applications are marked by limited value, color, and texture. These limitations may be helpful, however. They allow the ceramist to emphasize the importance of aspects of the piece other than the surface, such as form or ornament, and let them take first place.

At their best, complex applications are rich and involving. They are composed of many elements combined in an ensemble of great subtlety and complexity. The ceramist using this approach can cover the form with layers of imagery, some made in the clay (using excised and relief imagery), others applied to the surface of the piece (using stains, slips, engobes, and glazes). This kind of application can help the ceramist create imagery marked by variety, excitement, and complexity. The elaborate character of the imagery may serve as the central defining aspect of these pieces, becoming their focus and defining their nature.
Simple Glaze Applications

Many ceramists prefer simple, direct surface applications, perhaps because these can help give the work a reserved character and a calm and dignified presence.

Other ceramists use simple surface treatments because their work requires this sort of simple surface. If a piece is ornamented with complex clay imagery or if it is highly form-oriented, a simple application will be most appropriate. To cover up an effective form or ornament with additional layers of imagery would render the result confusing.

Still other ceramists simply don’t want to spend a lot of time working on the surface of any one piece. They know that the application procedure is much more likely to proceed smoothly if their application method is simple and straightforward.

Sandi Pierantozzi, covered jars, approximately 5 inches tall (each), slab-built porcelain, cone 6, 2014. Photo by artist

Judith Salomon, Two Bowls on Base with Spoon, 12 inches wide, slip cast, cone 5–6, 2014. There is an austerity to Salomon’s glazing methods which enhance her simple yet elegant forms. Photo by Daniel Fox
Surface types suited for simple applications include:
- those in which the ceramist applies a single color over the entire piece, then sprays a darker color over part of the piece
- surfaces that are unusual or very rich
- surfaces with a subtle pattern of visual texture

Useful methods for simple applications include:
- intaglio
- dipped or poured applications
- sprayed applications

If the visual artifacts (overlap lines) of dipped or poured glaze applications prove distracting, a sprayed application will likely be satisfactory.

*Note: Although these methods are simple, they take time to master. Before you try them on a piece you value, practice on test tiles or test pieces.*

**Complex Glaze Application Strategies**
Complex application strategies will typically require you to use a number of glazes together or perhaps employ a mixture of washes, slips, engobes, and glazes. You may find yourself also using a variety of application methods such as brushing, pouring, and spraying on the same piece. Such application strategies are especially useful to the ceramist who works in the electric kiln because they result in rich surfaces. While these combinations may seem overly complex at first, many ceramists find such strategies fascinating once they learn how to use them.

Many ceramists associate these application-centered procedures with the high- and mid-fire. These methods are also useful for the low-fire and bring great richness to this work.

**Multiple Glaze Layer Application**
1. Apply the base glaze using a dip application:
   - Dip half the piece (preferably bisqueware) in the base glaze and let the glaze dry.
   - Repeat with the other half of the piece.
2. Apply more layers:
   - Pour another glaze over the base glaze, covering only part of the surface.
   - Pour another very watery glaze over a different part of the surface.
   - Dip or spray a dark glaze over the lip of the piece.
3. Fire the piece.

**Resist Glazing**
This strategy allows you to reserve areas of the surface of the piece so they resist a slip or glaze layer.
1. Using a wide, soft bristle brush, apply a colored slip to a greenware piece.
2. Bisque fire the piece.
3. Paint a liquid wax mask over parts of the piece to reserve parts of the surface and reveal the color of the slip base. Let this dry.
4. Apply the base glaze using a dip application:
   - Dip half the piece in the base glaze and let the glaze dry.
   - Repeat with the other half of the piece.
5. Apply a poured application:
   - Fill a cup with glaze.
   - Suspend the piece over a glaze bucket (either hold it or set it on two sticks).
Lauren Mabry, *Curved Plane* (and detail), 60 inches wide, red earthenware, slips, glaze, 2012. Here is an excerpt of Mabry describing her application process: “I form the work by hand using dark red clay. Next, I prime the leathery surface with thick white slip as a base for layering more color. The simple structures are an ideal canvas, standing in contrast to the vibrant activity and depth of the surface. The absence of representation in my work allows the marks, brush strokes, and color to communicate. A mixture of emotions, from cheery to ominous, comes forth through drips, swipes, and splashes of color that vie for attention. I create energy through formal dualities. For example, aggressive and passive elements are adjacent to one another. Bold hues intermingle with quiet tints and shades. The surfaces sometimes look weathered and aged while at the same time appearing colorfully lush and wet. There is a sense of immediacy to the mark making, and at moments, a sense of play.” *Photo by artist*
Splash or pour the glaze over the piece, making sure the runoff flows back into the glaze bucket.
Leave some of the masked areas free of poured glaze.

6. Prepare the piece for firing:
   - If any glaze sticks to the resist, clean it with a sponge.
   - Clean the base.

7. Fire the piece.

**Combining a Dipped Base Glaze with Linear Brush-Applied Imagery**

1. Wax the base of a piece (preferably bisqueware).
2. Apply a base glaze using a dip application:
   - Holding the piece at the top, dip its bottom half in the glaze. Let the glaze dry.
   - Grasp the piece at the bottom, being careful not to smudge the glaze, and dip the top half in the glaze.
   - Wipe any wet glaze off the bottom of the piece.
3. Apply linear imagery with a brush:
   - Prepare a dark-colored stain or glaze.
   - Select a brush with fine soft hairs such as a Japanese brush.
   - Apply the stain or glaze to the surface of the dipped glaze.
4. Clean the base to finish the piece.
5. Fire the piece.

**Combining Brush-Applied Texture with Poured Imagery and Sprayed Clear Glaze**

1. Apply the textured imagery:
   - Prepare a dark-colored stain or glaze.
   - Select a very stiff bristle brush. (A used house painter’s brush will leave interesting streaked imagery on the surface of the piece.)
   - Apply the stain or glaze to the surface of the piece using broad motions to create highly textured imagery.
2. Start with a poured application:
   - Fill a cup with glaze.
   - Suspend the piece over a glaze bucket (either hold it or set it on two sticks).
   - Splash or pour the glaze over the piece, making sure the runoff flows back into the glaze bucket.
   - Leave some of the textured areas free of poured glaze.
3. Spray the transparent glaze:
   - Place the piece on a banding wheel.
   - Prepare a transparent glaze and transfer it to a small cup. Add enough water to make it the consistency of skim milk.
   - Use a sprayer to apply the glaze over the surface of the piece.
4. Clean the base to finish the piece.
5. Fire the piece.

**Combining Terra Sigillata and Glaze Applications**

Many contemporary ceramists have come to rely on terra sigillata fired at low-fire temperatures to create durable lustrous surfaces. In recent years a number of ceramists have noticed it can also be used at higher firing temperatures. At these temperatures the surface loses its lustrous sheen but becomes exceptionally durable.
These higher fired terra sigillatas are very effective when combined with glaze surfaces. Their smooth stony surfaces contrast nicely with the shiny or satin surfaces of glazes. This surface contrasts well with the
dip and splash applications that are most appropriate for glazes. Because terra sigillatas do not flow or spread in the firing like glazes do, they are particularly appropriate for brush application.

Applying the terra sigillata:
1. Use a brush to apply terra sigillata to sections of the greenware piece.
2. Optional: Engrave imagery on the surface of the terra sigillata with a needle or chisel-shaped tool.
3. Bisque fire the piece.
4. Apply glazes using pouring methods over parts of the piece. Leave some of the terra sigillata areas un-glazed.
5. Dip the lip into a dark glaze.
6. Clean the base to finish the piece.
7. Fire the piece.
   
   Note: Underglazes may also be used with this method, with similar results.

Combining Clay-Formed Imagery with Glazes
One of the most effective ways to ensure a rich glaze surface is to combine clay imagery with glaze imagery. This works well and encourages complexity and richness. It is especially effective because it allows you to combine two- and three-dimensional imagery. Furthermore, the glaze flow is influenced by the clay imagery in that glazes flow into and out of the relief, which encourages color and thickness variations.

Combining Engraved and Glazed Imagery
The two methods that follow are somewhat different versions of the same idea: the combining of engraved imagery and poured or dipped glaze applications. Engraved lines contrast well with the soft imagery of these glaze applications.
Engraving Into a Base Color
1. Engrave imagery on a greenware piece:
   - Apply a stain or slip using spray, brush, or pouring methods.
   - Use a needle or sgraffito tool to engrave imagery into the stained surface.
2. Bisque fire the piece.
3. Apply a splash application:
   - Fill a cup with glaze.
   - Suspend the piece over a glaze bucket (either hold it or set it on two sticks).
   - Splash or pour the glaze over the piece, making sure the runoff flows back into the glaze bucket.
4. Apply the dip application:
   - Wax the base of the piece.
   - Grasp the piece at the top and dip the bottom half in the glaze.
   - Wipe the glaze off the bottom of the piece.
   - Let the glaze dry.
   - Grasp the piece at the bottom, being careful not to smudge the glaze, and dip the top half in the glaze.
5. Dip the lip into a dark glaze.
6. Clean the glaze off the base of the piece to ready it for firing.
7. Fire the piece.

Intaglio Glazing
1. Engrave imagery on a greenware piece.
2. Bisque fire the piece.
3. Intaglio glazing:
   - Daub the glaze into the incised areas of the piece.
   - Wash off the excess glaze, leaving the glaze only in the interstices (corners and low places that catch the glaze).
   - You may fire the piece with no further application of glaze, or you may apply a stain or another glaze over the surface. A dark-colored intaglio glaze will come through light-colored glazes applied over it. The intaglio imagery shows up quite well and the effect can be quite pleasing.
4. Optional: Finish the piece by applying a light-colored dipped glaze:
   - Grasp the piece at the top and dip the bottom half in the light-colored glaze.
   - Let the glaze dry.
   - Grasp the piece at the bottom, being careful not to smudge the glaze already applied, and dip the top half in the light-colored glaze.
5. Clean the base of the piece to ready it for firing.
6. Fire the piece.

Combining Relief Imagery with Glazes
Relief imagery carved into the surface of the piece or added to the surface can create very rich surfaces. Here are two examples of this strategy.

Carved and Intaglio Glazed Imagery
1. Carve imagery into the surface of a cheese-hard piece (cheese-hard clay bodies have a consistency similar to cheddar cheese).
2. Bisque fire the piece.
3. Apply intaglio glaze to emphasize the carved imagery:
   • Use a sponge to apply a dark glaze over the surface of the piece.
   • Clean off most of the glaze, leaving it only in the interstices (the crevices and sunken areas that catch and hold the glaze).

4. Apply the base glaze:
   • Place the piece on a banding wheel in a spray booth.
   • Spray the glaze over the whole surface of the piece. Keep the sprayer moving to allow the glaze to dry before you apply another layer. This discourages drips and smears. The intaglio glaze will come through this layer to complete the imagery.

5. Spray the top of the piece:
   • Place the piece on a banding wheel.
   • Prepare a dark glaze and transfer it to a small cup. Add enough water to make it the consistency of milk.
   • Use a sprayer to apply the glaze at the top of the piece.

6. Fire the piece.

**Engraved, Stamped, and Sprigged Imagery with Intaglio Glazing**

1. Add sprigged imagery to the surface of the piece.
2. Stamp and engrave imagery into the surface.
3. Let the piece dry and fire it to bisque.
4. Add intaglio glazing:
   • Apply the glaze over the imagery.
   • Wipe the surface of the piece so the glaze stays only in its depressed areas and edges.

5. Apply a splash application:
   • Fill a cup with glaze.
   • Suspend the piece over a glaze bucket (either hold it or set it on two sticks).
   • Splash or pour the glaze over the piece, making sure the runoff flows back into the glaze bucket.

**Testing a Complex Glaze Application**

Just as a test tile is the best tool for testing the surface, color, and texture of a glaze, so too is it the best tool for testing a glaze application. It is especially useful for testing complex glaze applications. The test tile is a surrogate for a finished piece. If the application works with a glaze or a glaze combination on a tile, a similarly glazed piece should be satisfactory as well. To see what a glaze application will look like on your work, the test tile should be fairly large and the clay body color and texture should be the same as the clay body you normally use for your work.

For hand-built work: Only if you work with flat slabs should your test tiles be flat. If you usually work with curved surfaces, curve the test tile.

For wheel-formed work: If you usually use the wheel to make your forms, throw a large cylinder and cut it into three or four tiles. In this way your test tile will have the same throwing lines and form sense as your normal work.

For the test, make sure the tile is dust-free. If you prepare your work for glazing by first firing to bisque, fire the test to bisque. Use your normal glaze application and firing methods. In every way, try to make the tile a good surrogate for your normal work.
This fourth edition of Electric Kiln Ceramics, Richard Zakin’s seminal work on understanding and using the electric kiln to its fullest potential, has been completely rewritten, reorganized, and expanded by Frederick Bartolovic. Hand picked by Zakin to carry the title forward, Bartolovic has added new sections with step-by-step instruction on forming and finishing pieces for electric firing, schedules for firing both manual and computerized kilns, and has lavishly illustrated the book with completely new images that highlight many of the most exciting results that are possible with electric firing. Electric Kiln Ceramics has become the path countless professionals and enthusiasts have followed to gain understanding and proficiency working with electric kilns in the ceramics studio. From Zakin embracing and promoting the electric kiln as a tool that yields exciting results to Bartolovic presenting it within the frame of contemporary practice, technology, and aesthetics, Electric Kiln Ceramics promises to continue inspiring and educating ceramic artists for generations to come.