

how to design, make, and install **ceramic tiles** and murals



design tips and how-to
instructions for handmade
ceramic tile projects

How to Design, Make, and Install Ceramic Tiles and Murals: Design Tips and How-To Instructions for Handmade Ceramic Tile Projects

Handmade ceramic tiles take advantage of all the complex possibilities of the ceramic process. Add the graphic potential of a picture plane, multiply that over any area you want, and the possibilities for ceramic tile projects become nearly limitless. And ceramic tile isn't just flat; handmade ceramic tiles can be relief surfaces that are quite complex—but you would be surprised to learn how easy it can be to make your own. In fact, you can make a ceramic tile mold that has a lot of relief so you can quickly reproduce a complex design without having to carve each tile individually.

It all starts with ceramic tile design—and good design starts at the end; considering the end result of a ceramic tile project before any tile is made will help you choose the clay and the tools to use. And the experts we've chosen to walk you through the process of making and installing your own handmade ceramic tiles have all the information you will need to stay on track. Whether you are making a small ceramic tile mosaic for a table top, or a complex ceramic tile mural for a large wall area, this handy guide will help you plan your ceramic tile project in no time flat. Here's what you'll get from our ceramic tile experts:

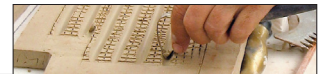
How to Make Ceramic Tiles Flat



by Laura Reutter

Getting tiles to dry flat is a challenge for any potter, but it doesn't have to be. Professional ceramic tile artist Laura Reutter provides a detailed step-by-step process that's guaranteed to be successful! Whether you're making one ceramic tile or enough for an entire ceramic tile mural, Laura explains the secrets to getting all your tiles flat.

Making a Ceramic Tile Fireplace Surround



by Stephani Stephenson

Ceramic tile artist Stephani Stephenson loves the Spanish and Mission revival styles along with Batchelder and Claycraft finishes. One of the projects she tackled was designing and making a ceramic tile fireplace surround in that early 20th century style. If you've ever wanted to tackle an impressive ceramic tile project, this is the one.

How to Make a Raised Ceramic Tile Design



by Thomas Gelsanliter

Making molds for tiles – especially those with intricate designs – can really save you time and effort. All you need is to come up with a great ceramic tile design and then follow these steps to make a mold of it. Presto! Your awesome ceramic tile design can be repeated over and over again.

How to Design, Make, and Install a Hanging Ceramic Tile Wall Mural



by Donna Rozman

Create a ceramic tile design based on simple experimentation with abstract shapes. Rozman shares a tile design transfer technique for quick repetition and production of your tile design, then walks you through the steps for applying glaze and colorants to ceramic tiles. She includes a glaze recipe for majolica tile decoration. Rozman finishes off by showing how to install and display a ceramic tile mural.

Blue Kashi Tiles



by Muhammad Hassan Kashigar

The effect created on building façades and the interiors of holy spaces using intricately painted ceramic tiles made in the kashi tradition in Pakistan is one of ornate beauty and grandeur. The production of kashi tiles is one of the oldest handicrafts in the province of Sindh, Pakistan. The word kashi means painting, and the tile tradition that carries this name originated in Iran and Iraq, which are the main centers of this traditional art. The artisans who make these tiles in the Sindh region are known as kashigars.

How to Make Ceramic Tiles Flat

by Laura Reutter

Keeping tiles flat while drying and firing has often been a source of frustration for clay artists. Over the years, I've read a great deal about sandwiching wet tiles between drywall (sheet rock), flipping them, stacking them, turning them, covering them or weighting them. Why spend countless hours fussing over tiles? It's inefficient and not cost-effective for a professional tilemaker to invest so much time and effort into each individual tile. I've developed a technique that greatly minimizes the amount of handling needed and is almost foolproof for making flat tiles.

The Clay

To begin making flat tiles, you need to use a heavily grogged clay formulated for sculpture or tile—not a plastic throwing clay. I use off-white stoneware from Seattle Pottery Supply called Crystal Stone that matures at cone 6. I tested dozens of clay bodies before I found this one, and of all the cone 6 clays that I tried, this had the least warping and shrinkage. Newcomb 6 is another clay that some tilemakers here in the Pacific Northwest use and it's available from the Clay Art Center in Tacoma, Washington. I'm sure other pottery suppliers offer similar clays—check your local supplier. The amount of moisture in the clay can also seriously affect the tile-mak-

Ravenstone Tiles by Laura Reutter are inspired by nature and the Arts & Crafts aesthetics.





ing process. I like my clay on the dry, stiff side as too much water makes it dry slowly and promotes warping. If your clay is too wet, wedge it well or place clay slabs onto a plaster bat or piece of drywall to help stiffen.

The Tools

The supplies you'll need are fairly basic:

- Several pieces of drywall small enough to easily handle, approximately 18–24 inches (make sure to seal all of the edges with duct tape to contain that nasty drywall dust)
- Heavy-duty rolling pin
- Wire tool
- Trimming knife
- A pattern slightly larger than the final size of tile you want (my clay shrinks about 10% so I make my pattern large enough to compensate for that)
- Carpenter's square (optional)
- Two pieces of dowel rod or wooden slats, which are the desired thickness of your tile
- Most importantly, a couple of rigid, wire metal shelf units or storage racks

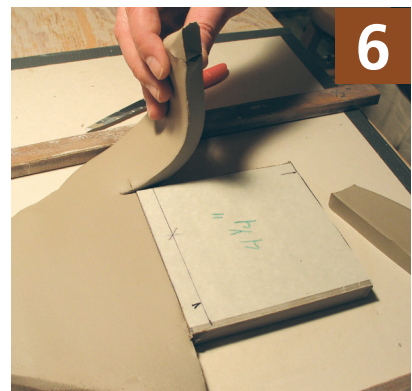
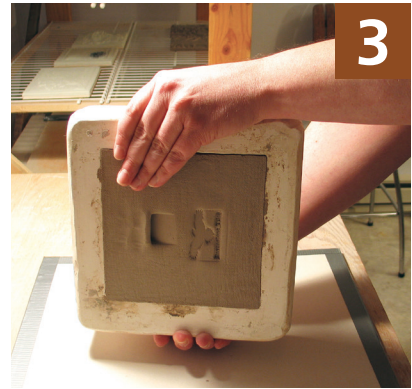
Note: The racks are used for drying wet tiles. The bars need to be fairly close together to support your tiles fully yet still allow air to circulate between them. Thrift, junk and salvage stores often have these used racks for sale at a fraction of the retail cost.

The Process

To begin, cut 1- to 2-inch-thick slabs off the bag of clay. Wedge the clay as needed, then roll the slab with a sturdy rolling pin in several directions to get the approximate thickness needed.

Most of my tiles are press molded in plaster molds. I take the rolled-out slab and work it into the mold, pressing the clay by hand (*figure 1*). I then roll firmly over the back of the mold with a heavy wooden rolling pin, pushing the clay down into all the recesses. I trim excess clay from the back of the mold using a monofilament wire tool (*figure 2*). After one to two hours, the tile is ready to release from the mold (*figure 3*). I remove it from the mold and place it onto a piece of drywall (*figure 4*). Once it hits the drywall it should not be lifted or moved, except to press it down gently and make sure the back is in contact with the drywall.

If you don't use molds for your tiles, just roll out clay slabs directly onto a piece of drywall using wooden spacers or dowels beneath the rolling pin for the desired thickness (*figure 5*). (I prefer ½-inch-thick tiles.) Once you have rolled out the clay slabs, don't move, lift or turn them. If you do move the clay, its "plastic memory" will kick in and it may warp, bend, or curl during drying and firing. Just trim the slabs in place, cutting them to the desired dimensions using a trimming knife and your pattern (*figure 6*). If you prefer, you can use a



carpenter's square to create square and rectangular tiles. Tip: Acetate, Mylar and corrugated plastic are good pattern materials. After trimming, it is very important to allow the wet tiles to sit on the drywall for 8 to 12 hours (overnight is usually good). Drywall sucks a lot of water out of the clay and the tiles will really stiffen up.

By the next day the tiles should be pretty close to leather hard and stiff enough to handle without flexing. Test a tile to see if it can be picked up safely. At this point, trim and smooth the edges (*figure 7*). This is not absolutely necessary, but tiles tend to have sharp edges that can cause harm once they are high fired. If you wish to incise or decorate the green tile in any way, now is the time to do it.

There is no need to score the backs of tiles unless you want to. Scoring has nothing to do with

the warping or drying process, but it helps the tile adhesive cling to the tile and hold it to the wall or floor during installation. I only score my tiles if I know the customer wants them for an installation.

Once the tile is trimmed, place it directly onto the rigid metal storage rack (*figure 8*). Because air circulates on all sides of the tile, it dries very evenly and no warping occurs. No flipping or covering is needed. No weighting or stacking is needed. While your tiles dry, avoid direct sources of warm air like a register vent or portable heater that might dry one area faster than another. You want even drying from top and bottom.

I keep tiles on the rack until they are completely dry and ready to bisque. At 55–60°F, my tiles take about a week to completely dry with no warping. If you want to hurry the drying, use a fan to



gently circulate the air in the room; this might dry the tiles in a few days. Drying will be slower in a cool, damp environment.

You should only handle your green tiles about three times: once to roll out and cut the clay; once to smooth the edges and place on a drying rack; and once to put it in a kiln for your bisque firing.

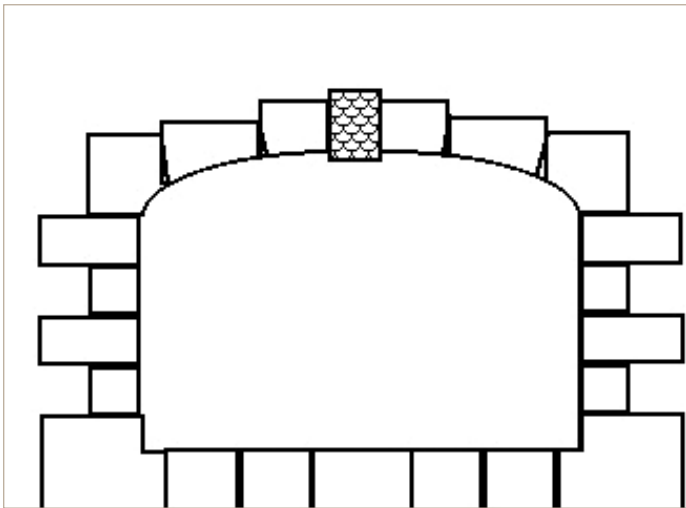
Firing

I use a programmable electric kiln for most of my work, and fire tiles flat on the kiln shelf both for bisque and glaze firing. I glaze fire to Cone 5 or 6 after bisque firing to Cone 05. During the bisque, I generally stack tiles two deep (figure 9). You might be able to stack them three deep if your tiles are on the thin side. Usually I don't make stacks higher than 1 inch. My kiln posts are 2 inches high to maximize the number of shelves I can get into the kiln. A slow preheat or warm-up is essential to allow all the moisture to escape the stacked tiles. I have made big and small tiles by the thousands using this process and, perhaps, have had a warped tile once in every hundred.

Construction Notes for a Drying Rack

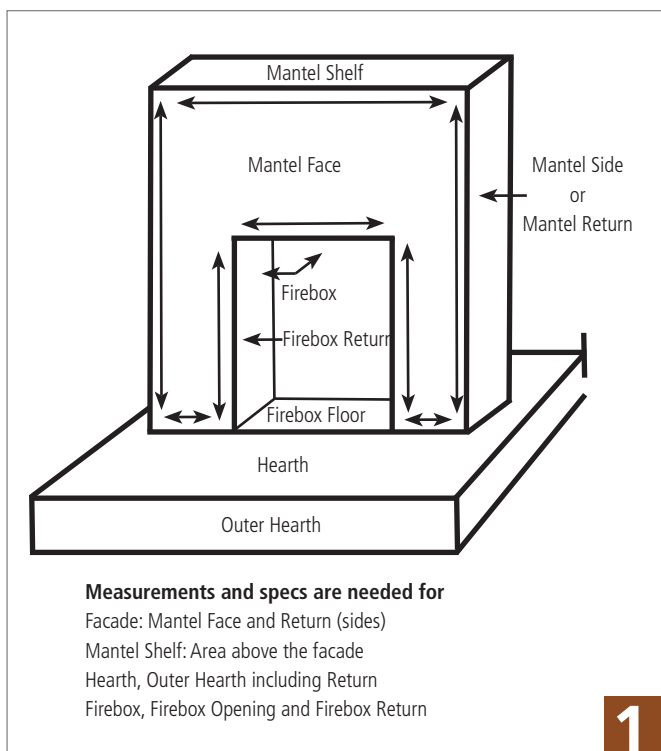
I built my tile-drying rack from shelf units made of rigid metal rod. Each shelf unit measures 12×36 inches. Two units are supported side by side on a wooden frame with legs that hold them in the air. The wooden support system is made from 2×4s and 1×2s that are screwed together. The total drying surface from these two racks is 24×36 inches long and holds quite a few tiles.

It is important to have the racks well off the ground to allow plenty of air to circulate. Because I make lots of tiles, I bought enough racks to have several levels available to dry tiles, all supported by the wooden frame. (You could also improvise or support the racks between two chairs if you don't want to build a permanent drying rack.)



Making a Ceramic Tile Fireplace Surround

by Stephani Stephenson



1

Over a decade ago, relief tile and architectural ceramics lured me down a clay-clad path. Since then, I've immersed myself in the history of tilemaking and now focus on Spanish and Mission revival styles along with traditional Batchelder and Claycraft finishes, while continuing my original work in tile, sculpture, and architectural ceramics. Last year I created a period fireplace surround for a 1920s California bungalow that was adapted from a Batchelder design the homeowner had seen and admired. (Ernest Batchelder was a tile designer and maker who worked in Southern California during the early part of the 20th century.)

There are a couple of methods for designing a fireplace surround, and you'll need complete measurements and specs for all parts of the fireplace (*figure 1*). For the surround I'm demonstrating here, all components were combined in the forming process so the tiles curve from one surface to the next, unlike typical tiled surrounds where the mantel face tile and firebox return are made separately then assembled on installation and the tiles meet at the edges.

Design and Template

I first plotted a general design and layout on the computer, adapting it to my measurements and enlarging everything by 9% to compensate for clay shrinkage (*figure 2*). I then sketched the design to scale on rosin paper, fine tuning the arch curve and angles of the cuts along the arch (*figure 3*). Once the design was finalized, I then traced half of the design onto heavy plastic sheeting (*figure 4*). This served as my template for both left and right sides of the surround.

Transferring the Design

For this surround, roll out a 1-inch thick slab of clay and transfer the pattern from plastic to clay with a water-based marker (*figure 5*). On my plastic template I had drawn a dotted line, 2¼ inches from the inner line of the arch. This line indicated how big the slabs would need to be to include enough clay for the firebox return along the arch. To make the 4×8 and 4×4 rectangular blocks for the lower surround, I rolled out oversized slabs that allowed for the firebox return and extra selvedge on all sides.

Forming the Return

To construct the straight blocks below the arch, I place a 2×4 next to a plaster block measuring 12×18×3 inches. The 2×4 can be clamped or nailed down, but in this case the weight of the plaster block kept it in place. Since the base of my draw tool was made from a piece of 2×2, the edge of the 2×4 was set the width of a 2×2 away from the edge of the table and the plaster block was set against the 2×4.

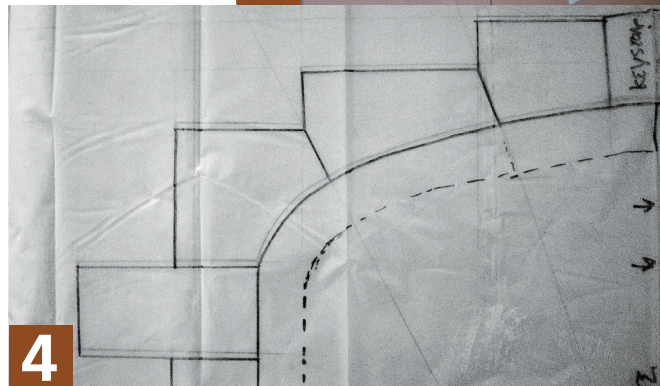
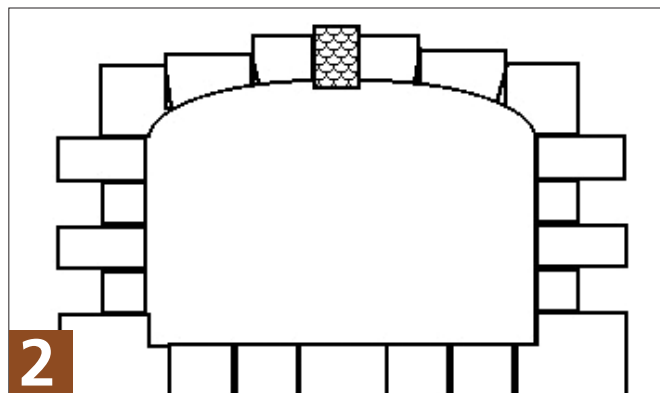
I then place each slab with the “return” edge down onto the 2×4 and against the plaster (*figure 6*). A length of 2×2 helps me hold the edge of the slab in place. Holding the 2×2, I slowly ease the rest of the slab down onto the plaster, then use a broad flat paddle to flatten it (*figure 7*).

A piece of good quality wooden lath is drawn over the surface in a ‘screeding’ motion to further compress and flatten the clay (*figure 8*).

Shaping the Return

To prepare the clay for shaping with a draw tool (see box), moisten and compress the curve (*figure 9*). Lightly position the 2×2 base of the draw tool against the 2×4, placing one hand on both the base and the table edge and the other hand on the metal template. Pull the draw tool down the length of the table, continuing to press it against the 2×4 as you pull it along.

When you pull a draw tool to shape clay, you can go in either direction. The first pull should be steady but light since the metal



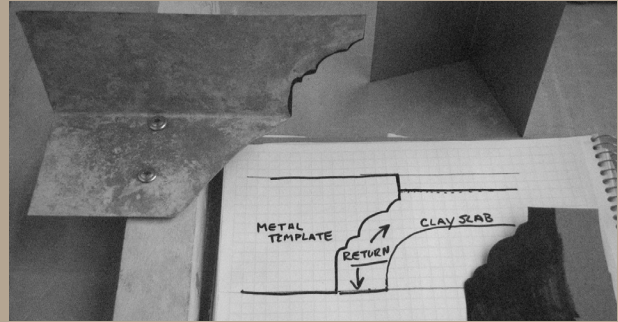
Tip: For a symmetrical design, draw or trace half of the design onto clear plastic with a permanent marker. Fold the plastic and trace the ‘half design’ onto the other half of the plastic. Unfold. On the reverse side of the plastic, retrace your lines with a water based marker. Place the plastic, right side up, onto moist clay. Rib or smooth the plastic onto the clay. Pull the plastic away to reveal your transferred design.



Tip:
Placing a piece of rosin paper between the clay and the paddle hides the paddle marks.



Tip:
When I pull a draw tool, I visualize my upper body as a fixed extension of the draw tool, using my legs to move me rather than flexing my arms to pull, inhaling before I start, exhaling slowly as I pulled (think tai chi—slow even steady pull).



Making a Simple Draw Tool

The sledge is a tool traditionally used to shape plaster or clay models for subsequent casting and reproduction of architectural trim. A draw tool is a variation of the sledge and is useful in making trim directly. Sledges and draw tools typically feature an interchangeable metal or wood template set into a heavy wooden framework.

Simple yet functional draw tools can be made from lightweight flashing, sold in rolls, or from straight or corner pieces of metal flashing. Both are readily available at your local hardware store. You can use 90° corner flashing alone or attached to a wooden base. Draw your template shape onto the metal. Lightweight flashing is easily cut with snips. Heavier flashing can be cut with a jeweler's saw, hacksaw or jigsaw. Use a blade designed for cutting metal. Paraffin drawn along the blade may help. Make your cut just inside the drawn line. Finish shaping and smoothing with a file, then wet sand.

template scrapes and removes clay as it's drawn along, and catches if too much clay piles up. Rewet the clay, make a second then a third pull, each time increasing pressure, deepening and defining the form. After the clay stiffens slightly on the plaster block, remove the 2x4, then compress and round the edge of the return.

Wobbles, gouges, and false moves are generally made at the beginning and the end of each pull. Leaving extra clay at both ends of the slab allows for these errors on 'landing' and 'takeoff', yet give a smooth 'flight' in between!

The ends are later cut away and discarded or recycled. To form the return on the arch or curved sections, transfer lines from the template onto a 2-inch thick piece of sheet foam and cut away the foam along the inner curve. Lay the arch slab onto the foam, letting the curved edge of the slab extend out 2¼ inches to form the return. Placing rosin paper between the foam and clay allows for easy repositioning over the foam. To form the return along the arch, I first place plastic food wrap over the slab, then use my palm, the fleshy part of my hand between thumb and forefinger and a soft rubber rib to ease the clay down over the foam, lightly compressing the clay, taking care not

to stretch or distort it. To shape the return, I remove the metal template from the wooden base and pull it along the curve, using the same pulling technique. Allow the clay to stiffen in place then trim and smooth the return edge.

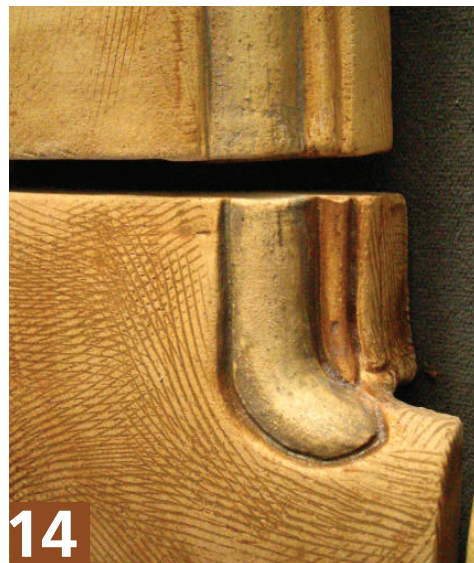
Cutting Tile Blocks

To cut the slabs into tile blocks, use the transfer lines as guides, but double check them with a square. Place plastic food wrap over the slab and impress lines with a metal straightedge. Cut the tile by pressing straight down with a broad stiff putty or spackling knife (*figure 11*). This will create 90° cuts with well-finished edges. Curved portions of the return can be cut in a similar fashion.

Finishing

Leave the pieces in place until leather hard (*figure 12*). The keystone is made at the same time, but isn't trimmed until all the other pieces are completed and laid out to dry to ensure that its size, side angles and return complemented the rest of the arch. Then, because I use a relatively smooth clay body, I hollow out the backs of the pieces at this stage (*figure 13*).

Bullnose tiles were needed for one base of the firebox, so that the firebox could be swept. Lower left and right corners of the surround needed to incorporate the transition from return trim to bullnose (*figure 14*). Additional shaping, smoothing and texturing with rasps was done at the leather-hard stage. Pieces were then dried and fired on edge, bisqued to cone 04, stained, then fired to cone 4. Hearth tiles were extruded, stained, and fired in a similar manner. The surround is currently awaiting installation (*figure 15*).



How to Make a Raised Ceramic Tile Design

by Thomas Gelsanliter

Ever since I began drawing, I've gravitated toward line drawing. The directness of the single line has always fit me well. Reflecting back on it now, it's not surprising that once I learned to make tile, I would be drawn to a technique that complemented my interests. I produce tiles using a centuries-old method of raised-line tile making called *Cuenca*. One of the tiles my wife, Sarah, and I make in our studio is called the *Flores* tile. It's inspired by Mexican hand-painted tiles that have a wealth of motifs and iterations. I visited the town of Cuernavaca, Mexico, and was inspired to make tiles emblematic of the work I saw there.

Drawing the Design

I begin by drafting a design on paper. The *Flores* design is based on a freehand sketch (1). To make the drawing usable with the Cuenca technique, I adapt and stylize the sketch by enlarging it and redrafting it on tracing paper (2). Knowing that the black line in the drawing will become the raised line in the final tile, I omit any shading or color from the drawing because added detail obscures the lines once they're transferred and carved into the plaster mold.

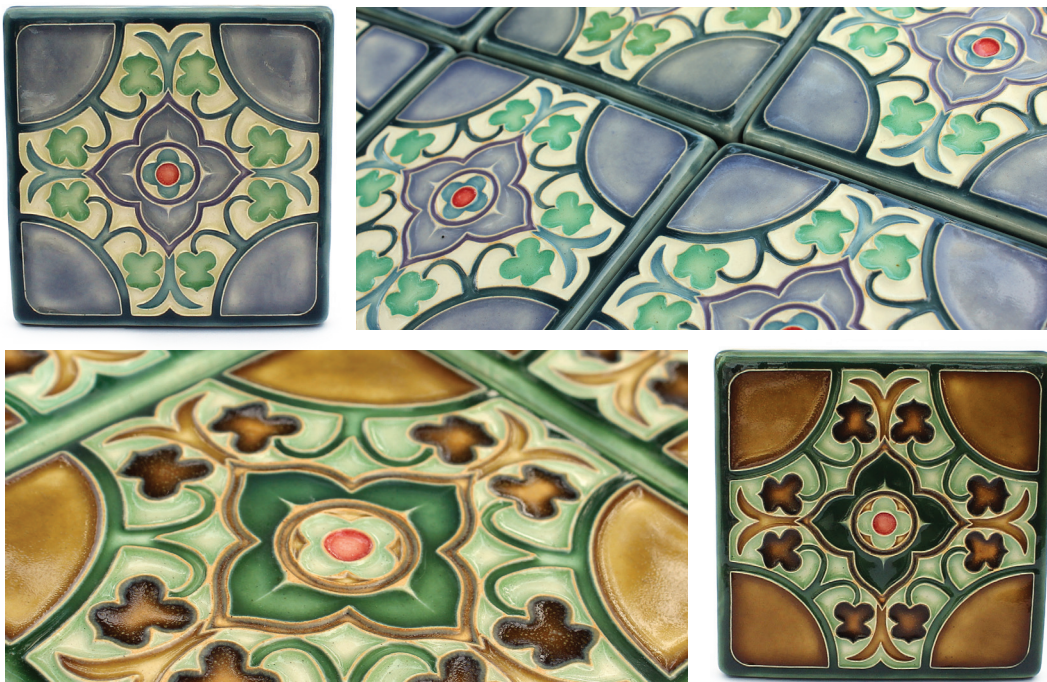
Rubber Mold Master

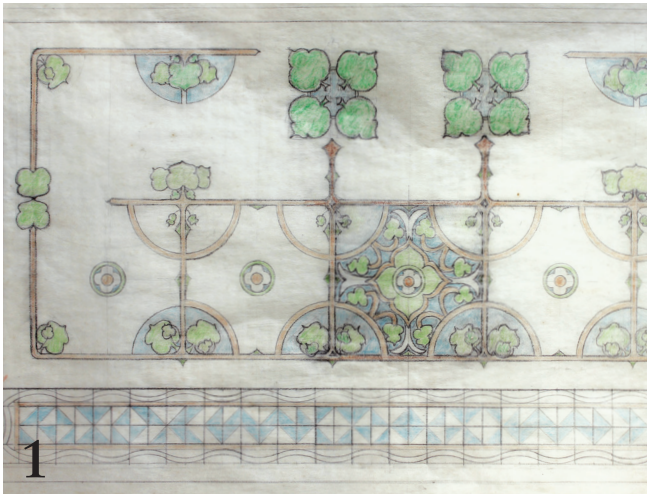
I prefer to create rubber master molds of my tile designs so I'm able to make multiple plaster molds and therefore larger pro-

duction runs of the same design. I start the process by pouring a 6×6-inch plaster slab, squaring it off using a tile saw, then smoothing its surface first with drywall sandpaper then with increasingly finer grits of wet/dry sandpaper (200–600 grit) (3). I use molding plaster, although #1 Pottery Plaster works fine as well.

Next, I make a rubber negative of the blank tile and then a rubber positive tile. During the first rubber pour, I keep at least a ½-inch rubber border around the perimeter of the tile to maintain overall stability. I use Polytek 74–40 room-temperature vulcanizing rubber (RTV). With a rubber tile in hand, I can now make a plaster mold of it (4). I always wash the rubber tile with Dawn dishwashing liquid before pouring the molding plaster. The dishwashing liquid leaves a very thin layer of soap on the rubber tile, making the surface slicker. This helps reduce any chance of air bubbles being trapped on the skin of the rubber tile. Once the plaster hardens, I allow at least two hours before de-molding. Experience has taught me that demolding a rubber master too soon after the plaster sets can delaminate some of the plaster onto the surface of the rubber tile. This can “rough up” the surface of the cavity into which the design will be carved.

Note: While I use plaster and rubber molds to create my tile blank, it's also possible to model a very smooth, blank tile out of clay and then pour a plaster mold of this. In either case,





1 The original hand-drawn sketch of the Flores tile pattern is used for inspiration.



2 Drafting the Flores tile using both plastic templates and freehand drawing.



3 Sanding the square plaster tile master with drywall sandpaper before switching to finer grits of wet/dry sandpaper.



4 Pouring the plaster negative cavity from the master rubber positive that was created first.

it's important to let the plaster mold sit at least one hour after de-molding, allowing the surface to dry out some before transferring the drawing to carve. Attempting the transfer of an image too soon after de-molding can result in a splotchy, less crisp image.

Transfer the Drawing

To transfer the drawing to a plaster mold of a square tile, the drawing needs to be sized to fit inside the mold and then photo copied. I like to make a few extra copies so I can color the drawing and begin to visualize how glaze will complement the design.

Place the design face down in the mold. Brush acetone over the paper to dissolve the ink and transfer the line drawing onto the plaster surface (5). I use a modified dental tool along with a plastic circular template to carve the plaster mold (see 6 inset). **Note:** Only carve the mold after the plaster has set, but before it has completely dried. A very dry mold may be brittle and therefore more difficult to carve. The first step in the carving process is to do a trace carving of the entire

design (6). Do a quick pressing with a small ball of clay to see if the character of the design is consistent with the drawing. After the clay test, go back and deepen the lines, checking for consistent line weight along the way (7). Once complete, let the plaster dry fully.

Next, hand press a tile so you can bisque fire it and color testing can begin. I like to run a test piece to make sure the lines are consistent and tall enough so the glazes don't run together. Later, I pour a final rubber master of the carved tile after seeing how the carving performs in a glaze kiln.

Hand Pressing

Hand pressing a Cuenca tile is a tricky process as it's important to apply enough even pressure to the entire surface in the mold cavity so all the carved lines have consistent height. First, make a square pancake of clay about $\frac{3}{8}$ inch thick. After placing the smoothest side of the pancake face down into the mold, begin in the center and press with both sets of fingertips, working your way to the top and bottom sides of the tile. Continue pressing to complete one side and then move



5
Brush acetone over the copied drawing to dissolve the ink and transfer the drawing to the mold.



6
Carve the tile with plastic templates and dental tools after the plaster has set but before it completely dries out.



7
Once an area has been initially carved, check the pattern by pressing a slug of clay into the mold then lifting it out.



8
Press a thin pancake of clay into the mold. Work from the center out to the top and bottom of the tile.

on to the other (8). Finally, fill the mold with clay then scrape away any excess clay, leaving the surface flat and level with the walls of the mold.

To demold the tile, simply take a slug of wet clay and push it at the perimeter of the pressed tile toward the center (9). Once all the clay has released from the sides of the mold, use the slug again to help stick and peel the soft clay tile from the mold (10).

Drying Tile

The sooner you can get the tile to rest in a place that allows it to dry on all six sides the better. We dry our tile on wire racks. When tile has to sit overnight, we place it on HardieBacker cement board (before edging), slide the boards into tall, rolling metal carts, then tent the whole cart with plastic, thereby slowing the drying process down. This helps inhibit the tile from warping. It also keeps us from handling the work too much during the wet stage. Once the edges are cleaned up, the tile is left to dry fully then bisque fired flat.

Bulb Glazing

Before applying the first glaze, generously spray the bisque-fired tile with water and wait until it's all absorbed. This is an important step as the water-saturated bisque allows for a smoother distribution of glaze as it's being applied. Fill a bulb syringe with a metal tip attached to the end of it with glaze. Test your glaze thickness to make sure the glaze comes out of the tip at a controllable rate and doesn't clog the tip, then squeeze the glaze to pool it into the confined areas delineated by the raised lines (11).

We use 2-ounce bulb syringes to apply glazes. They can be purchased from a pharmacy or ordered on the Internet. The metal tips are a separate piece that is attached by hand to the end of the bulb each time a new glaze is filled in the bulb. These tips, available from Axner Pottery Supply (www.axner.com), come in four sizes. The size of the tip corresponds to the number of rings inscribed around the bottom of the tip. A *one-tip* has one ring around the bottom and has the smallest diameter tip. A *four-tip* has four rings and has the largest opening, allowing more glaze



9 Fill in the rest of the mold with clay, scrape away excess clay, level the tile, then remove the tile with a slug of clay.



10 You can immediately release the tile from the mold by using a slug of clay then set it on a wire rack to dry.



11 Spray water on the bisque-fired tile so the glaze flows evenly, then use a filled bulb syringe to glaze in between the raised lines.



12 Once the bulb-syringe-applied glazes are fully dry, dip the edges on all sides in a tray of glaze prior to the final glaze firing.

to flow out more quickly when bulb glazing.

If you mistakenly apply a glaze to the top of a line or in the wrong area, use an X-Acto knife or a needle tool to scrape off the glaze. Then use a small dense sponge or a make-up sponge to remove all the glaze from the surface.

Once the entire surface has been bulb-glazed and it has fully dried, dip the edges in glaze and wipe away any excess drips with a dense sponge (12).

A Note About Waxing

I try to do as little waxing on my tile as is functionally possible. For the Flores tile and any other tile that doesn't require an edge-glazed condition, we dip only the bottom quarter of each side of the tile. For us, this is a material and labor saving practice. We use a soy-wax blend. Like any material, this kind of wax has its own intrinsic properties. We've had best results when the wax is applied to room-temperature ware and that the waxed pieces are glazed within a day or two of application. Handling the waxed edges can cause flaking of the wax after a few days.

Finishing Tile In The Kiln

Tiles larger than 6x6 inches are fired flat in both the bisque and glaze firings. All of our tiles are fired to cone 5-6 in electric kilns. We slow the glaze firing down during the last 60° of the cycle, hold at top temperature for 10 minutes, and fire down from the top temperature at 1° per minute for 25°. This allows for the glazes to mature and give us the glossy and satin look we want. If the raised lines of the tile have been carved evenly and are tall enough, color separation is confined and distinct. If not, this is an indication that the master mold needs fine tuning to deepen the lines. Once I'm happy with the final glaze, the rubber master tile is made and full-scale production can begin.

Thomas Gelsanliter and his wife, Sarah, own One Acre Ceramics, which they operate out of their studio in Milan, Michigan. Tom's prior experience included work as a mold maker, production manager, and project manager for the Association of Collegiate Schools of Architecture. His designs are influenced by travel, industrial plate ware, quilting, Arts and Crafts, and folk-art iconography. Check out more at www.oneacreceramics.com.

How to Design, Make and Install a Hanging Ceramic Tile Wall Mural

By Donna Rozman

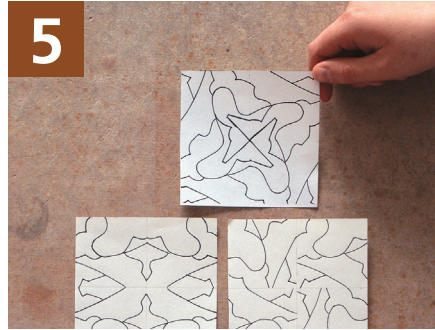
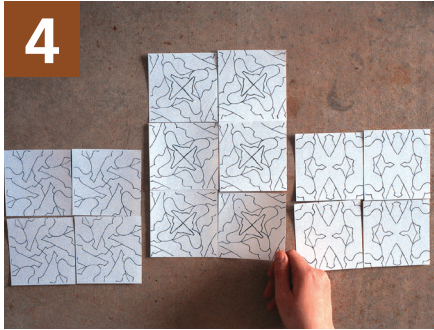
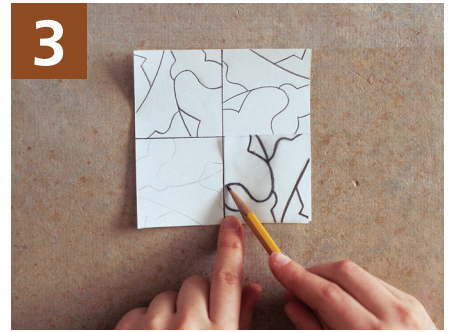


Top: Detail of *Enough Red-Violet*, 22 in. (56 cm) square, majolica, fired to cone 04.
Right: *Pinwheels*, 30 in. (76 cm) square, majolica, fired to cone 04.

Majolica is a folk pottery tradition that began in ninth-century Iraq as a means of imitating Chinese porcelain. Earthenware clay was coated with a tin-based glaze, which made it white and opaque. Then oxides were brushed on the unfired surface. Today, with the help of zirconium as the opacifier in the glaze, and the broader range of color available in commercial stains, you can really push the limits of traditional design.

Majolica glaze is rather unforgiving as it doesn't move in the firing. Drips, pinholes and other imperfections that occur during application will not repair themselves during the firing. This makes working on this flat tile project a wise choice for a classroom environment or a person new to this technique. Glaze is easily applied to the tiles and their flat surfaces are easy to paint. As colorants are applied to this raw glaze surface, they are absorbed quickly. This quality can make applying the colorants rather difficult, and some practice and experimentation is necessary. For this reason, I glaze extra tiles to use for mark-making practice and for testing absorption and consistency of the colorants. This also can be done on newspaper if no extra tiles are available.





Tile Design
TRANSFER TECHNIQUE

On the back side of your traced design, draw over the lines a couple of times with a soft lead pencil. Turn the design back over and place it where you want to transfer the design. Retrace the design so the lead from the reverse side will be transferred to the surface. This technique can be used to reverse an image as well.

Creating a Ceramic Tile Design

Select a random 2-inch square from any interesting line drawing to create a motif or you also can create your own pattern. Make a 2-inch-square paper window to explore possible abstract patterns (figure 1).

After you have decided on the design you want to use, trace it onto a 2-inch square of tracing paper with a soft (6B) pencil (figure 2).

Divide a 4-inch square of paper into fourths, creating four 2-inch squares. Use the tracing paper transfer technique to trace the motif into each square, rotating or reversing the image as desired (figure 3).

Copy the chosen design to visualize the effect when repeated. A copier can be used to reduce, enlarge or reverse designs as needed. Once you have chosen a final design pattern, the size and how many tiles you will need, you can begin planning the mural design (figures 4 and 5).

Glazing and Applying Colorant to Ceramic Tile

You can order a variety of bisque-fired tiles from your local tile or ceramics-supply store or make your own from a low-fire earthenware clay. I like to use commercial tiles for the body of the mural and make my own border and/or accent tiles (figure 6).

For best results, pour the glaze onto the tiles. Remember, majolica glaze does not run during firing so an even glaze surface is desired. Clean excess glaze from the backs of tiles with a sponge. Sides of the tile may remain covered in glaze (figure 7).



TIP: Watercolors, crayons or colored pencils can be used to color in the mural design on paper to help make color choices. When I am using a wide range of colors, I assign each color a number and trace a reduced image of the entire mural on paper. I then assign each space a number, lay out the tiles and simply paint by numbers.



TIP: To fill in a space with even color use a large brush and brush evenly in one direction with a thin coat of colorant. Allow to dry, and then apply a second coat with brushstrokes going in the opposite direction. Another method, which creates interesting results, is to let the brushstrokes be a part of the design.

TIP: Pencil marks will burn out during the firing so you can draw directly onto the glaze surface in pencil if you wish. Just be careful to apply light pressure so as not to scar the glaze surface.

Lay out the tiles and use the tracing-paper transfer technique (see page 10) to transfer the design to each tile (figure 8). This way, you can see the design and make any necessary changes needed to correct or improve the pattern.

Prepare majolica colorants (see recipe sidebar at the end of this article), then begin to paint the design on the surface of the glaze (figure 9). Handle tiles carefully to avoid scarring or chipping off the glaze. Practice on an extra tile to test fluidity of the colorant and quality of the brushstroke.

Lay out tiles on a large table in the manner in which they will be placed for the mural. Number and letter the tiles with an underglaze pencil or pen to eliminate solving a jigsaw puzzle after firing (figure 10). Fire tiles to cone 04 on a flat shelf in an electric kiln.

Mounting Ceramic Tiles to a Display Panel

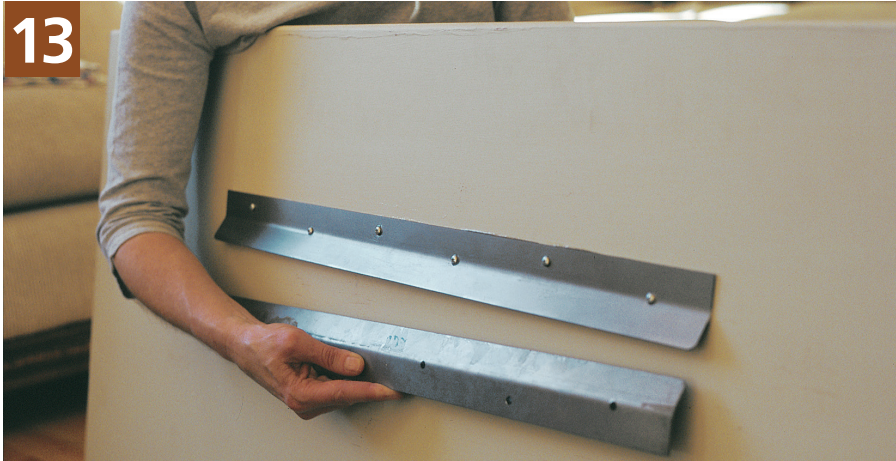
Cut the mounting panel to the finished size and clean up the edges (figure 11). Paint both sides of the board, choosing a color to accent or blend with your tiles—black is usually a good choice.

Make vertical, horizontal, and diagonal guidelines to assist in correct placement of tiles (figure 12). Arrange the tiles on your board according to the numbers on the back of the tiles.

NOTE: Since the tiles will be used on a mural and mounted indoors on a wall, I have chosen not to use grout. If you prefer to make your project waterproof, use commercial grout and follow the manufacturer's directions.



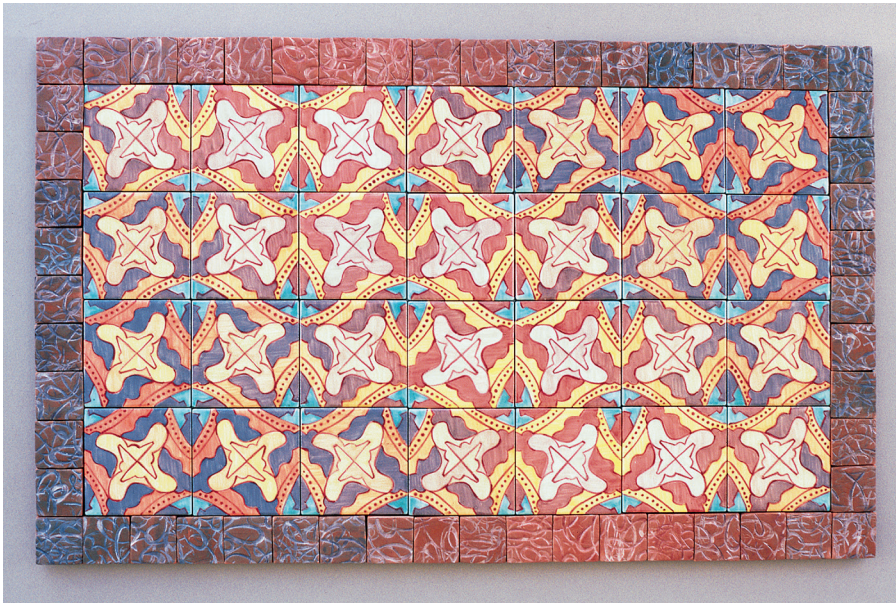
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To mount tiles, put adhesive on the back side using a notched trowel, scrape clean 1/8 inch from the edges and press into place. Secure one tile at a time, working from the center outward. Put a sticker on the same corner of each tile to keep them rotated correctly.

Hanging A Ceramic Tile Wall Mural

To hang a heavy tile mural, I use a system of two lengths of fabricated metal, bent to approximately 30 degrees, that slip into one another. One is mounted on the board and the other on the wall (figure 13). Pan head screws placed not more than 3 inches apart are used to attach the length of metal to the fiberboard. Longer screws are used to attach the other piece to the wall. Screw the wall-mounted piece into studs in the wall.



Color Me Happy, 34 in. (86 cm), commercial and handmade tiles, majolica, fired to cone 04.

GLAZE RECIPE

The majolica glaze recipe I use is a slight variation of Linda Arbuckle's majolica glaze.

Alternate Majolica

Cone 04

Ferro Frit 3124	65.6 %
Nepheline Syenite	5.6
Kona F-4 feldspar	15.1
EPK Kaolin	9.1
Tin Oxide	4.6
	100.0%
Add: Zircopax	8.1 %
Bentonite	1.5 %
CMC Gum	0.2 %
Sodium	
Hexametaphosphate	0.3 %

When the design requires leaving a lot of the white glaze showing, I add 2% rutile to soften the whiteness of the glaze for a creamier look. CMC Gum should be measured out, put in hot water and mixed in a blender, then added to the glaze. Sodium hexametaphosphate was the ingredient found in the retired version of Calgon and is a deflocculant.

COLORANTS

I use a variety of commercial stains mixed with frit and/or Gerstley borate for my colorants. I find the colors are brighter when mixed with 100% frit, but are less brushable and smudge easily. When mixed 100% with Gerstley borate, brushability improves but the colors are less brilliant. I have used a variety of ratios of frit to Gerstley borate to colorant with excellent results. For these tiles, I used the following recipe:

Ferro Frit 3124	1tsp
Gerstley Borate	1tsp
Stain	1/2tsp
Water	2tsp

TIP: Using small plastic cups, add all three dry ingredients, mix thoroughly, add water and mix again. Ice cube trays work well as inexpensive and convenient palettes.

Blue Kashi Tiles

by Paul Andrew Wandless

The effect created on building façades and the interiors of holy spaces using intricately painted ceramic tiles made in the kashi tradition in Pakistan is one of ornate beauty and grandeur.



1 The clay used to make kashi tiles is brought from the river basin. The tile makers screen the clay, then mix it with water. **2** Next, they lay it out in wooden molds to dry to a usable consistency prior to cutting into smaller slab shapes using a wooden frame (called a karab).

The production of kashi tiles is one of the oldest handicrafts in the province of Sindh, Pakistan. The word *kashi* means painting, and the tile tradition that carries this name originated in Iran and Iraq, which are the main centers of this traditional art. The artisans who make these tiles in the Sindh region are known as kashigars.

These tiles are named for the fired appearance, a glaze that produces a shiny, transparent, somewhat crystalline layer over colorful metallic pigment designs painted on white-slip-coated earthenware tiles. The basic job of kashi making resembles that of a traditional potter in terms of production processes.

The cities of Nasirpur and Hala in Sindh province are known as the centers of this craft, and the required high-quality clay, taken from river basins, is easily available in both cities. Of the two, Nasirpur has more history and expertise in this form of tile making, because it has been a trade hub for centuries. It was also easier to make and then transport the tiles from Nasirpur, because in addition to being a kashi tile and pottery center, it was also a large center of production for traditional handmade textiles goods. At its peak, historical Nasirpur extended three square miles in area.

Today, the textile handicrafts are almost extinct in Nasirpur, but there is still kashi work going on, although it is losing its previous prestige. In the past, kashi was an important and essential decorative element on mosques and shrines, but mod-

ern ceramic tiles have eclipsed this old tradition. It's a fact that the modern, manufactured ceramic tiles are more durable and perfect, but kashi tiles have more lusters and a greater variety of designs and patterns. When looked at from a distance, the handmade kashi tiles are more impressive and beautiful.

The process of traditional kashi tile making involved preparing and wedging the clay, making mosaic tiles, screen tiles, floral-pattern design tiles, mural tiles, and Islamic calligraphy tiles, then painting, glazing, and firing the ceramic tiles in both gas kilns and traditionally built kilns.

The whole process of making traditional kashi tiles takes almost 15 days for a local tile maker using only minimal tools.

Raw Materials

The basic materials used for making the tiles are local clay and water. Kashi tiles in Sindh are made of the best kind of clay that can be sourced from an old river basin. Two kinds of clay (white and red) are used in making different categories of tiles.

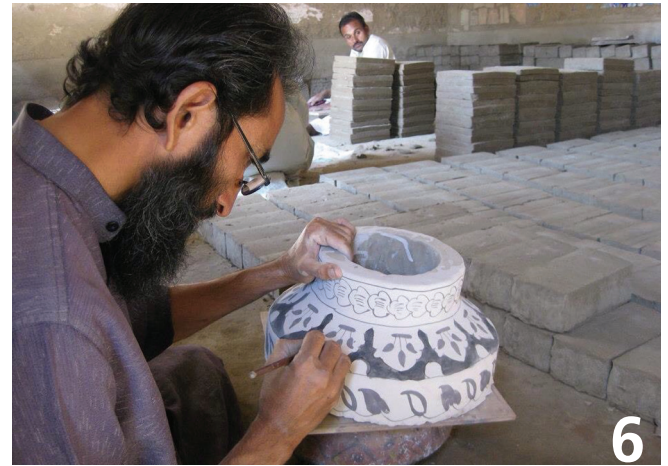
Both kinds of clay are mixed in equal amounts; however the red clay is comparatively harder than the white clay. The local people bring clay from a nearby village on donkey carts. The freight charges for the clay delivery are \$1.90.

Clay Preparation and Mixing

To clean and prepare the clay, the kashigars first firmly hit the clay with a piece of wood in order to make the clay even



3 The rough-cut tile is then pressed with a solid, round shaped terra-cotta mallet to flatten it. 4 When the tiles are leather hard, they are cut into different square and geometric shapes. Some of the tiles are made flat and then engraved and some, like the high-relief, three-dimensional forms, are made in a mold. 5 After applying a white engobe and drying the tiles outside for a few hours, designs are traced onto the tiles using perforated tracing paper and graphite or charcoal. 6 Cobalt oxide is used to create the outlines of the patterns, and then additional colors are added and sgraffito lines are carved through the white slip to reveal the clay beneath. 7 The liquid glaze is sprayed onto the tile surface to a thickness of 1 mm.



and break up the clumps of hard clay that are always present in it. Then they pass the clay through a *channa*, which is a wooden frame with a wire mesh or screen stretched over it. The *channa*'s wire mesh only allows clay of a certain size to pass through, so the resulting clay is very fine. In local terminology this refined clay is called *kbishka* and it is used while mixing the clay. The ratio of clay to water is 1:3, which means that about one pot (*garha*) of clay requires three to four *garha* of water. When the clay reaches the right consistency, the kashigars let it rest for roughly a day before using it for making tiles.

Raw Materials for Painting

The craftsmen use different materials and painting techniques on the tiles to create decorative motifs related to Sindhi culture. Raw materials include *sunebri*, which is sand collected from the riverbank, and *sutlej*, which is sand that is finely ground and mixed with water to form a golden paste. The *sutlej* is then applied to the tiles to create designs on the surfaces. Commercial color pigments are brought from Karachi. They are different colors i.e. neon green, neon pink, neon yellow, white, and black (usually primary and secondary colors are used. The blue color is used for outlining). The white slip used is clay that is brought from Sehwan Sharif City. After purifying this white engobe clay by straining it through a thin cloth and finely grinding and mixing it in water, it is applied directly to unfired red clay tiles. This gives a green and golden shine on the tiles. The *sutlej* paste and white slip are then fired on.

Two types of painted tiles are found in this area: one is multi-colored tiles, which are made using different stain





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and oxide colors and the other is thick, white-slip-painted red tiles. The multi-colored style tiles have two kinds: *kacha rang* and *pakka rang*. *Kacha rang* tiles include color applied to the tile after it is fired in the kiln. This color is not permanent or waterproof. The tiles painted with this technique are just for decoration. *Pakka rang* is a permanent decoration, and usually consists of blue-and-white painting, with colors outlined in black. The painting is then coated with glaze and fired. No over decoration is done on these tiles; this is something the kashi makers are very particular about.

Brushes

The raw material for the paint brushes used by kashigars to outline decorative elements on the tiles includes goat hair, thin round sticks or dowels, thread, and cotton. They tie the goat hair or cotton onto the end of the round stick and secure it with the thread. Brushes for other parts of the process are purchased from market, including various round brushes with soft hair.

Raw Materials for Glazing

Glazing the ceramics tiles not only gives them a shiny surface, but also seals the clay to prevent water from permeating the tile. Traditional tiles are made using different kinds of glaze, including lead glaze used for low-temperature processes (1562°F (850°C)), and other transparent glazes for tiles to be fired to higher temperatures—up to a maximum of 1832°F (1000°C).

Glazing that is done in Gujarat and Lalamusa cities uses glass and water as the two raw ingredients. The transparent glazes are made using materials including borax, red lead,

quartz, silica, and sand. These material are mixed together then transferred to a round-shaped clay bowl, then fired in a kiln to 1742°F (950°C). After firing, the glass frit is broken into smaller sized pieces then ground to make a powdered glaze, which is then mixed with water to form a paste. The paste is applied over the tiles and they are fired between 1562°F (850°C) to 1832°F (1000°C).

Firing

After the tiles are painted, they are left to dry completely before being loaded into the kiln and fired. The kilns used are roughly 10–12 feet high, and they can fire up to 300 tiles at one time. Each firing takes 14 hours and (2000 kg) of kari wood—a dry, hard, black wood, followed by cooling for 48 hours prior to opening and unloading the kiln.

Usage of Tiles

In Pakistan, people usually use both red- and white-clay kashi tiles for decorative purposes in public buildings, on the front elevation or façade, and interior walls. The tiles used in shrines for decoration include traditional floral patterns, Islamic calligraphy, and those with carved relief. Additional uses include covering the walls of houses, offices, and mosques for decoration.

Rural people used these decorative tiles for roof coverings. There is also an international interest, with decorative tiles being exported for display in exhibitions as well as traditional uses.

the author Muhammad Hassan Kashigar is head of the ceramics department at the Centre of Excellence in Arts and Design, Mehran University of Engineering and Technology, Jamshoro, Sindh, Pakistan.



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8 After glazing, the tiles are loaded in the kiln. Inside the kiln, 250 square feet of materials are loaded comfortably. 9 The traditional kiln is wood fired, and made by the tile maker by hand with mud. After loading, the kiln is fired for 14 hours to 1742°F (950°C) and then the temperature is brought lower. 10 After two days the tiles are cool enough to unload from the kiln. 11, 12 Finished, fired tiles applied to building façades.