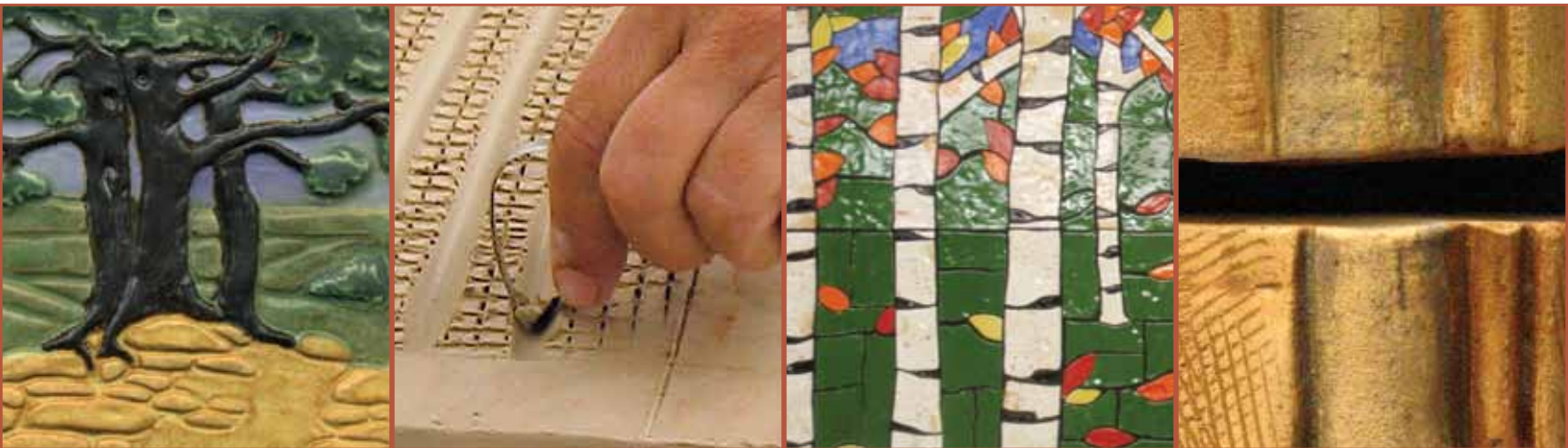


# how to design, make, and install ceramic tiles and murals

| Third Edition |



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



This special report is brought to you with the support of Smith-Sharpe Fire Brick Supply

# 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, ***How to Design, Make, and Install Ceramic Tiles and Murals: Design Tips and How-To Instructions for Handmade Ceramic Tile Projects*** will help you plan your ceramic tile project in no time flat.

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 Create a Mosaic Tile Table



by Clay Cunningham

This tile project is perfect for a class or an individual, for indoor or outdoor tables that could use a little livening up. What better way to bring back the usefulness of a piece of furniture than to create your own ceramic mosaic design and make a table your own through tile.

## How to Make Molds for Ceramic Tile Murals



by Gary Carlos

If you need a lot of tiles, a ceramic tile mold can save you a lot of time and effort. Carlos demonstrates how to make a basic ceramic tile mold for impressing a design into ceramic tiles. Want to get a little deeper? Carlos also shows you how to make and use a cavity mold designed for ceramic tile relief.

## 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.

# 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.

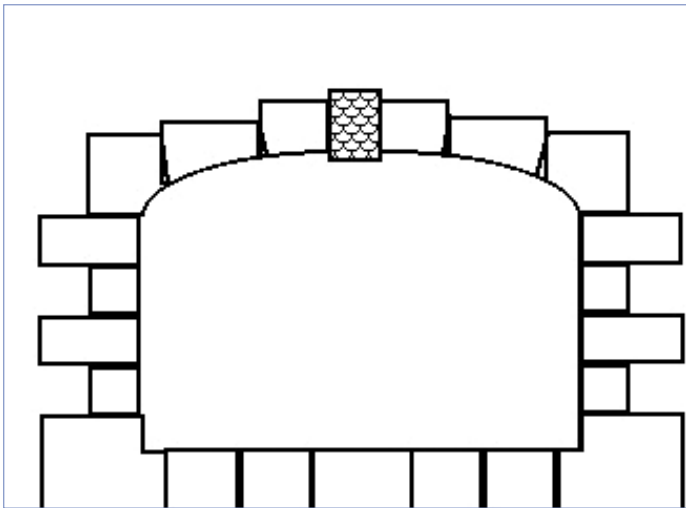
## Firing

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

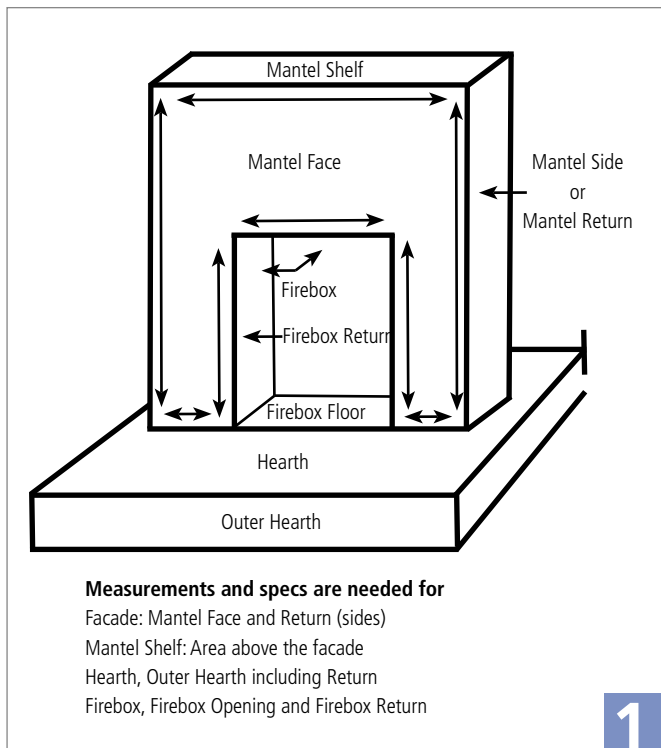
I built my tile-drying rack from shelf units made of rigid metal rod. Each shelf unit measures 12×36 inches. Two units are supported side by side on a wooden frame with legs that hold them in the air. The wooden support system is made from 2×4s and 1×2s that are screwed together. The total drying surface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

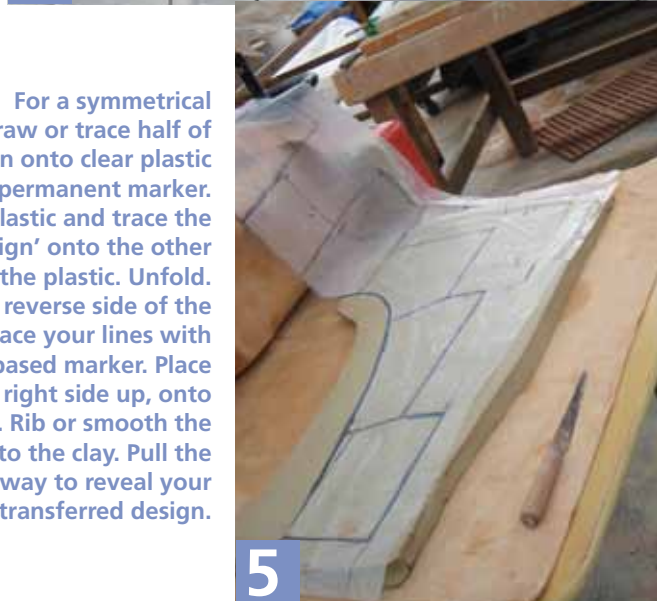
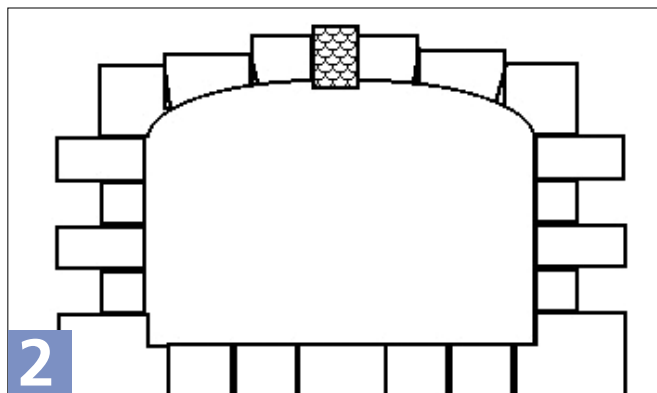
I then place each slab with the “return” edge down onto the 2×4 and against the plaster (*figure 6*). A length of 2×2 helps me hold the edge of the slab in place. Holding the 2×2, I slowly ease the rest of the slab down onto the plaster, then use a broad flat paddle to flatten it (*figure 7*).

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.





6

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



7

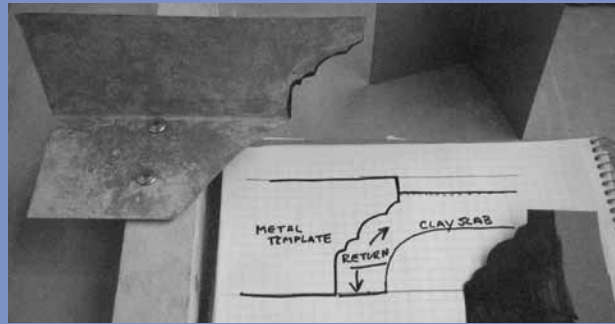


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**Tip:**  
When I pull a draw tool, I visualize my upper body as a fixed extension of the draw tool, using my legs to move me rather than flexing my arms to pull, inhaling before I start, exhaling slowly as I pulled (think tai chi—slow even steady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



9



## 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. Re-wet 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*).



# Creating a Mosaic Table

by Clay Cunningham



The author and his wife, Breanne, at their mosaic table.

I recently returned from a vacation to discover that a spring storm had destroyed the glass top of my patio table. I was faced with two options—order a new manufactured tabletop or put my talents to work by designing and building a new one out of clay. With my summer schedule open, my wife and I started our mosaic table. This is a great project for use in any outdoor setting.

## Creating the Design

Begin by purchasing a  $\frac{5}{8}$ -inch thick sheet of exterior plywood. Cut the plywood to the shape of the table frame with a hand-held jigsaw. You can also use a hole saw to cut a hole in the middle for an umbrella to fit through. Once the plywood is ready, start designing the mosaic.

Lay the plywood on the floor, cover it with large sheets of drawing paper (24 × 36) and lightly tape them together to hold their position. Cut the paper to the shape of the tabletop and sketch a design in pencil (*figure 1*). We decided on an image of aspen trees with beautiful red and yellow fall leaves, but any image is possible with this technique. There are a few considerations when designing a mosaic. First, large clay tiles tend to warp, which leads to an uneven top, so keep individual pieces small—less than eight inches on a tile's longest dimension. Second, the tiles fit together like a puzzle, but an excess of undulations causes trouble. It's best not to have pieces lock into one another. Finally, including a border will not only visually 'frame' your design, but also ensure a nice, even edge to the entire table.

Finalize the image in pen and remove the tape

carefully. Number the individual sheets to help keep track of their position. Also indicate the four quadrants of the plywood sheet as well.

## Get Out the Clay

Roll out a large  $\frac{1}{4}$ -inch thick slab of clay (we used white earthenware). This will be thick enough for strength yet not so thick that it makes the tabletop excessively heavy. Now lay one quadrant of the paper out onto the clay and cut the edges to match the drawing. To 'trace' the image onto the clay, use a needle tool to do what I call the dot-to-dot technique. Simply follow along the drawing, lightly piercing through the paper with the needle tool until the entire drawing is perforated (*figure 2*). It's important not to press down on the needle tool too hard. If you do, you'll stab into the clay, which distorts the drawing and makes for rough, gouged edges. Remove the paper to reveal the dot-to-dot drawing on the clay. Continue this same technique with the other three quadrants.

Allow the clay to dry to an early leather-hard state then cut along the dotted lines with a fettling knife (*figure 3*). Check the cut pieces with the original paper design for overall consistency. After drying a bit more, smooth the tiles out along the edges and round off any sharp points. If the edges and points are not smoothed, they may turn into sharp areas poking out on your tabletop.

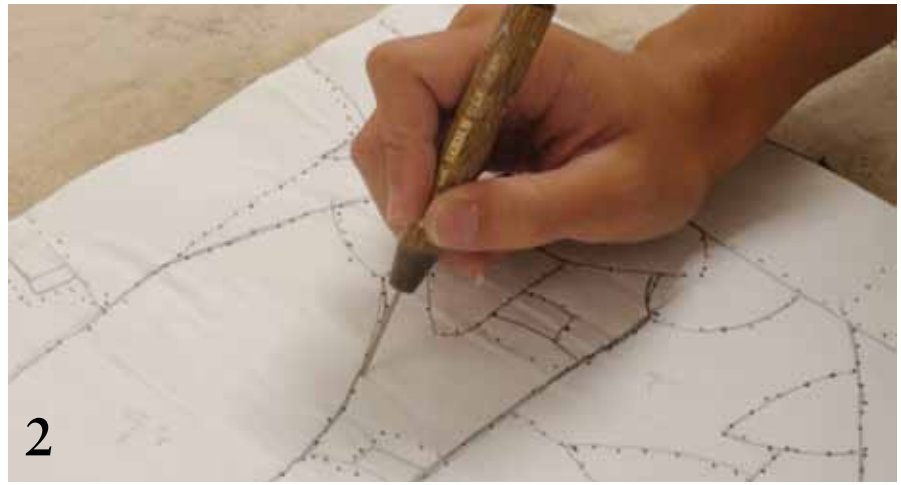
To prevent warping in the tiles, carefully flip and gently compressed each one numerous times over the course of a few days or dry them on an open wire rack. While the tiles are upside down, incise

## Supplies

- Drawing Paper
- Plywood Table Top
- Respirator
- Jiffy Mixer
- Grout
- Tile Adhesive
- Trowel
- Scraper
- Buckets
- Wet sponge
- Gloves
- Needle Tool and Stiff Flexible Rib



**1**  
Lay large sheets of drawing paper onto the table top and cut to fit.



**2**  
Use the "dot-to-dot" technique to trace the image onto the clay slab. Gently press the needle tool through the paper so it leaves an impression in the clay.

small grooves into the back of the tiles with an old pen. This groove allows the tile glue to grip and hold onto the tile. Do not use a needle tool to create the grooves as it will make a line that is too thin to allow the glue to fill the groove. When flipping the tiles, keep the them close together and in their correct position.

## Glazing and Firing

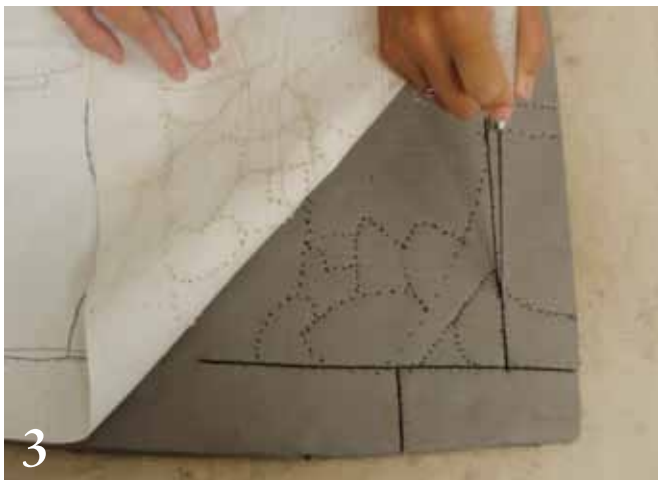
Meticulous note taking is important when moving the tiles to the kiln shelf. Make detailed drawings of which clay quadrants are on which shelves and where the shelves are placed in the kiln. Without these notes, it's easy to get confused. Space the tiles out a bit to allow enough room to add underglaze to them without accidentally getting the wrong color on a tile. Though you could add the underglaze to the tiles before placing them on the kiln shelf, placing them first avoids over handling of the underglazed pieces. With a wide hakeme brush, apply underglazes in a thick, opaque coat onto the tiles (*figure 4*). After the underglaze is completely dry, apply a thin coat of a clear glaze and load them into the kiln. You can bisque fire the tiles before glazing them if you wish,

but I wanted to eliminate as many unnecessary steps as possible. Fire them slowly to the appropriate cone.

## Prepping and Setting the Table

Brush three coats of weatherproofing water sealant onto the plywood tabletop to ensure its longevity. Gather the tile glue, grout, and trowels for creating your mosaic. All of these supplies came to less than \$50 (including the plywood) and can be purchased at your local home center.

Now it's time to construct your mosaic. Begin by laying the tiles out onto the plywood, allowing an even amount of space between each tile. Because the clay has a shrinkage rate of around 10%, the mosaic will perfectly fit your tabletop and allow just enough room between the tiles for the grout. Once the tiles are situated, they're ready to be glued down. Flip each tile over, coat with a liberal dollop of tile glue (*figure 5*), and immediately place into position, paying careful attention to retain an equal amount of space between all of the tiles. Continue this process until every tile is glued and placed. I recommend going back over each tile and giving it a little wiggle to ensure that none are missed. Trust me, you'll find one.



**3**  
Once the entire image has been traced, begin cutting the tiles.



**4**  
As you move the tiles onto the kiln shelves, coat each tile with underglaze. I use Amaco Velvet Underglazes.



5 Smooth the glue to a thickness of 1/8 inch on the back of each tile.



6 Pack the grout down between the tiles and spread it to fill each gap.



7 Scrape away all the grout that's not in the gaps between the tiles.

#### CLAY'S WHITE EARTHENWARE

Cone 04

Talc . . . . .	50 %
Custer Feldspar . . . . .	25
OM4 Ball Clay . . . . .	25
Total	100 %

#### CARLY'S CLEAR GLAZE

Cone 04

Pemco 626 Frit . . . . .	25 %
Gerstley Borate . . . . .	35
Spodumene . . . . .	20
EPK Kaolin . . . . .	20
Total	100 %

Add:  
Handful of Epsom Salt



The completed mosaic ready to be placed onto the table frame.

Allow the glue to dry overnight and add the grout the next morning. The grout does two things—first, it adds a stained-glass effect with all of the tiles separated by a single, unifying color and second, it keeps water and other materials from getting between the tiles and rotting the wood underneath. Note: If any water freezes between the tiles, it will expand and break the mosaic.

Grout comes in an unending variety of colors so choose the best color for your design. A black grout helps colorful tiles ‘pop’ out at the viewer. Mix the grout per the instructions on the package to a smooth, thick concrete consistency and immediately trowel

directly onto the mosaic. It's important to get the grout down into every nook and cranny between the tiles (*figure 6*). With one motion, press the grout down into the empty spaces. With the next motion, scrape it off of the top surface. Continue until the entire tabletop is coated with grout, including the edge of the table where the tile and plywood meet.

Though the table will look like a mess, cleaning it off is a snap. As the grout begins to dull in color, use a soft rubber rib to scrape it away from the top (*figure 7*). The scraping removes all but a fine film on top of the tiles which can be easily wiped away. Remember, it's always important to wear a respirator or dust mask whenever handling dry materials. Last, a light sponging with a thoroughly rung out damp sponge brightens

all of the colors and a dry towel removes any remaining film. The entire grouting process can be completed in less than an hour.

The only thing left to do is secure the tabletop to the table frame. Cut out small blocks of wood and insert wood screws into them. These serve as the brackets that lock the tabletop into place, yet allow it to be removed if needed. From under the table, place each bracket a few millimeters away from the table frame, one in each quadrant, and screw them into the underside of the tabletop. And with that, the table is complete. ■

*Clay Cunningham is a ceramic artist and instructor, currently teaching at Lewis Central High School in Council Bluffs, Iowa. To see more of his work, or for contact information, visit [www.claycunningham.org](http://www.claycunningham.org).*

# How to Make Molds for Ceramic Tile Murals

by Gary Carlos

After college, and while working part-time for a small slip-casting studio, I began to explore a career in art education. This exploration led me to San Francisco's vibrant mural community. Crafting a work that will hold up in the face of extreme weather conditions and graffiti is of great concern to mural painters. Many muralists have rediscovered that ceramic tile has always been an attractive, alternative medium to paint.

With a background in both painting and ceramics, in addition to my interest in public art, working in tile seemed like a natural progression for me. I find it extremely satisfying to bring work out of the studio and into public spaces, where it can become a living part of the community.

As my interest in tile grew, a colleague told me about the historic Moravian Pottery and Tile Works in Pennsylvania. Within weeks I was on a plane to attend one of their 3-day workshops. In that short time, I learned many of the simple techniques tile makers have used for centuries. In the years since, I have found my own way of using tile to explore a variety of themes in my work. I hope this brief introduction to tile making allows you to discover some new possibilities in your own work as well.

## Making a Basic Ceramic Tile Mold

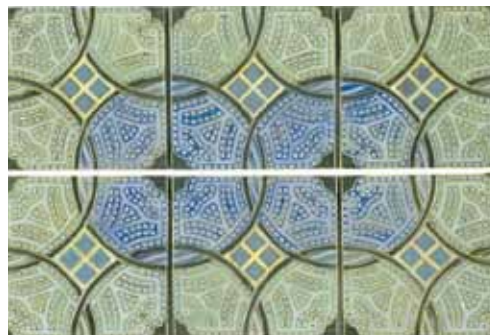
Start by making a good set of adjustable mold boards (*figure 1*). Cut four laminated boards ( $\frac{3}{4} \times 5 \times 12$  inches is a good size). Attach a 90° framing bracket (available at hardware stores) flush to one edge of each board. **Caution:** If you are not comfortable using power tools have someone who is do this step for you. Most home centers will cut wood to your specifications.



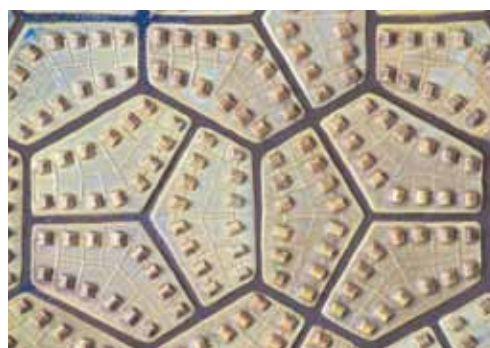
*Blue Streets*, 23×23 in. (58×58 cm), earthenware and low-fire glazes, 2001.



*Blue Streets* detail. A geometric pattern was first carved into a plaster block. I pressed a tile with this pattern and added the small house-like elements. A cavity mold was then made from the finished tile.



*Freeway*, 11×17 in. (28×43 cm), earthenware, underglaze, stains, and glaze. For this piece the original tile prototype was made completely out of clay, 2001.



*Hive* detail, individual tiles are 4-inches wide, earthenware with oxides, glaze, and grout. This hexagon-shaped tile has a shallow Y-shaped groove cut into it for grout, making it appear as three separate shapes, adding another element to the design, 2000.

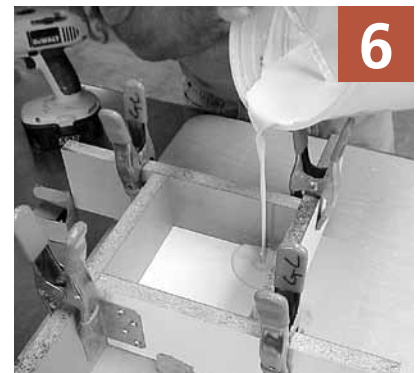
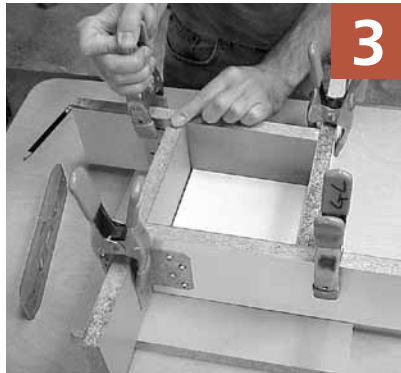
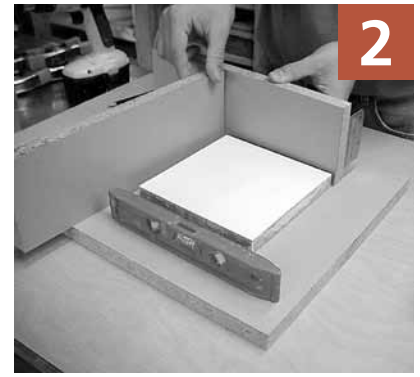
Good plywood also works for mold boards, but use mold soap on them. Try to get wood covered in Formica. Shelving sold in most home centers is only covered with thin contact paper. This will work, but after continuous use it will begin to deteriorate around the edges. Try a local cabinet shop for scraps or a home center for a damaged countertop. If you can't get laminated wood for templates or a smooth work surface to pour directly on, try Plexiglas, glass, or fine-grained plywood coated with sealer. Remember to always use a release agent, such as oil soap, on a porous surface before pouring plaster on it.

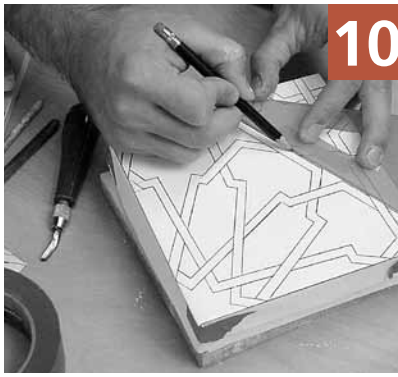
Cut additional square pieces of laminated board as templates for plaster molds. When determining the size of your template, accommodate for clay shrinkage in the final tile: if you're using a clay body that shrinks 12% you'll need a 4½-inch mold for a 4-inch tile and a 6¾-inch mold for a 6-inch tile. Assemble the mold boards snugly around the template (*figure 2*). The mold should be level so check your work surface with a level and adjust it with shims if necessary.

Fasten the boards together with four spring clamps (*figure 3*) or C-clamps. If the boards are all cut accurately at right angles, the assembled form will keep plaster from leaking without the need to seal the joints with clay. Since laminated wood is non-porous, it also eliminates the need for a release agent. Put a wad of clay at the base of each wall to keep the form secure.

For most studio applications, I use #1 Pottery Plaster. Make sure the plaster is fresh (stored for no more than 6 months) and completely free of moisture. Measure room-temperature water and plaster by weight (*figure 4*) in a ratio of 0.7 parts water to 1 part plaster. Use 1 pound of water to 1.4 pounds of plaster for a 4½-inch square mold and 2.1 pounds of water to 3 pounds of plaster for a 6¾-inch square mold. Note: I've used decimals not ounces.

Slowly sift the plaster into the water (*figure 5*). Once all the plaster is in, allow it to soak (slake) for one minute without any agitation. Mix the plaster with a clean stick until it becomes a heavy cream consistency (a milkshake consis-





tency is too thick). This should ideally take 2 to 3 minutes, but can happen anywhere from 1 to 5 minutes.

When the plaster has reached a proper consistency, pour it into the form in a slow, steady stream (*figure 6*). Shake the table (but not too much) to bring any air bubbles to the surface, and to settle the plaster out, making the top completely flat. Swirl some water in the dirty mixing container immediately and dump it into a waste bucket.

**Caution:** Never pour plaster or plaster waste water down a drain.

When plaster sets, it gives off heat. After about 30 minutes it will cool back down and you can then take the form apart (*figure 7*). If the boards stick, give them a quick tap away from the mold and they will pop off. Tip: Pouring a few of these plaster blanks is a good way to get used to plaster before trying something more critical.

Clean up the edges on the top of the mold with a scraper (*figure 8*). Leave the other side (facing the template) untouched; it should already be perfectly flat and free of air bubbles. This is the side you will carve.

Create a scale drawing of your image (*figure 9*). Remember that your final product will be a mirror image of this,

so if you use any text it will need to be written backwards. To transfer the design, place your drawing over the plaster block and trace it with a slight amount of pressure (*figure 10*). This will leave a shallow mark in the plaster.

If you have trouble seeing the design, scribble some graphite or charcoal onto a piece of paper and smear it on the block. Use a hook tool or a V-shaped linoleum block carving tool to deepen the grooves to about  $\frac{1}{16}$ -inch (*figure 11*). This is most easily done when the plaster is damp. If the plaster block is dry soak it in some water for a few seconds first.

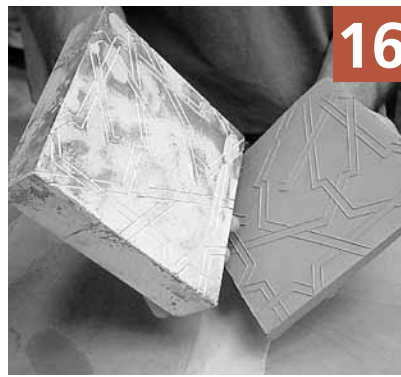
You can press some clay onto the mold to check what it will look like, but allow the mold to cure and reach full strength (about two weeks) before using it for production. Cut a slab of clay slightly larger than the mold (*figure 12*). Roll the slab out so that it is a bit thicker than the desired tile thickness (*figure 13*). Use a straight edge to smooth the surface of the slab.

Place the mold on top of the clay and place a wooden block on top of the mold. Hit the wooden block a few times with a rubber mallet until the clay squeezes out on all four sides (*figure 14*). If your table is not sturdy, you may want to do this on the floor. **Caution:** It is possible to





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crack a mold in half (more common with cavity molds). To avoid this, use soft clay and make sure the wooden block and plaster mold are both flat and free of debris.

Trim the excess clay with a knife before removing the mold (*figure 15*). To keep the corners square, place your thumb at the end of each cut. If the tile does not come off right away, set it aside and allow the plaster to do its work. Before long, the clay will stiffen up and release easily (*figure 16*). One of the things tile makers struggle with is preventing tiles from warping. Try not to bend a wet tile, as plastic clay retains a memory. Place it on an absorbent board and allow the tile to dry evenly.

## Making a Cavity Mold for Ceramic Tile

If you have a sculptural tile and want to minimize distortion around the edges, or want a consistent tile thickness, you should make a cavity mold. Make an original tile out of clay, avoiding undercuts. Rub some water on the bottom of the tile to create a thin slip and stick it to a board allowing a 1½-inch border around all sides (*figure 17*).

Pour the plaster at least 1½ inches over the top of the tile—any less and the mold may crack during pressing. To use the mold, cut a slab of clay the same size as the opening (*figure 18*). Cover the clay with canvas and use

a rubber mallet and a block of wood to press the clay into the mold.

If you get serious about tile, you may want to invest in a tile press (*figure 19*). There are several types available. I prefer this converted arbor press. It is compact and applies over 2 tons of pressure. Cracking molds is sometimes unavoidable, but, if it is a problem, switch to a plaster mix of 2 parts #1 Pottery Plaster and 1 part Ultracal.

Use a wire cutter to slice off the excess clay (*figure 20*). This homemade wire tool is based on one used at Moravian Pottery and Tile Works. Use a wooden straight edge to scrape off and level the back of the tile. You may want to sign or stamp the back at this point.

Give the clay some time to set. This may vary greatly depending on the weather and dampness of the mold.

If you want to make several production molds of the same tile, create a durable master with mold-making rubber. To do this, seal a cavity mold with oil soap (Murphy's). When the soap has dried, mix the 2-part rubber and fill the mold to the brim. When the rubber has cured, glue it to a board and use it as you would a clay master. If you are pouring plaster on plaster, always seal the plaster original with oil soap.

After setting, if the tile still sticks, gently tap the mold on all four sides and the open-face side with your palm or a rubber mallet. Or try shooting air between the clay and plaster with an air compressor.

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

By Donna Rozman

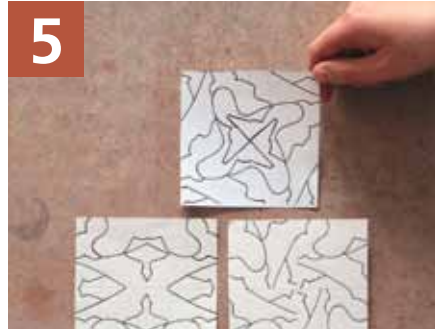
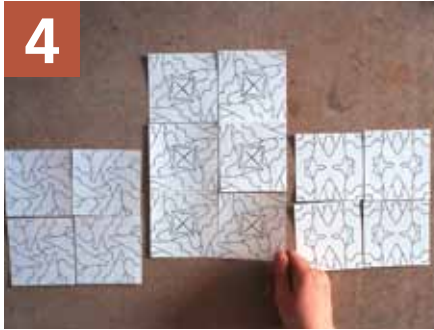


Top: Detail of *Enough Red-Violet*, 22 in. (56 cm) square, majolica, fired to cone 04.  
Right: *Pinwheels*, 30 in. (76 cm) square, majolica, fired to cone 04.

*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 %

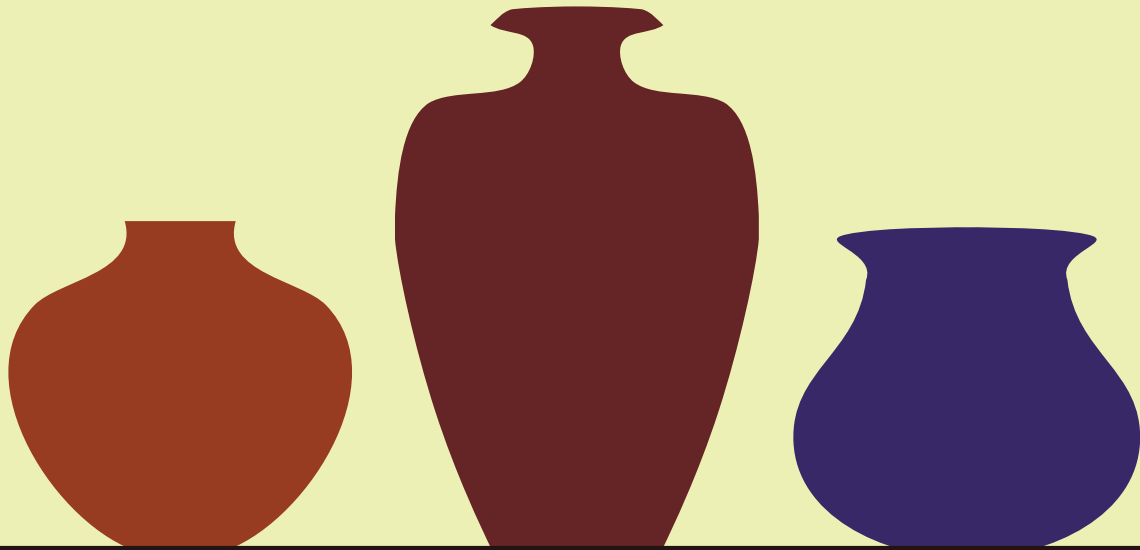
**When the design requires leaving a lot of the white glaze showing, I add 2% rutile to soften the whiteness of the glaze for a creamier look. CMC Gum should be measured out, put in hot water and mixed in a blender, then added to the glaze. Sodium hexametaphosphate was the ingredient found in the retired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



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