

Opportunities in Slip Casting

by Sandra Torres

In 2003, I was an apprentice for Piet Stockmans in Genk, Belgium. He introduced me to slip casting as a process to make handmade and one-of-a-kind works, and to soluble salts as an alternative for decorating without glazing.

I see slip casting as a process that, like any other, has its own limitations and offers its own opportunities. The combination of this process and the intrinsic qualities of porcelain allows me to achieve forms that are thin, soft, and translucent. The result is delicate to the eye and strong to the touch, defining the difference between delicacy and fragility.

I prefer working in smaller scale, with a size that comfortably fits a person's hand, creating objects with domestic roots that enhance the intimacy of our daily rituals.

Design Principles, Prototypes, and Mold Making

I start sketching forms, sometimes with an intentional function, but often times just forms that can become more than one component, be that a foot, a spout, or something else. The sketch is then transferred into a more precise diagram to determine size (accounting for the 12% clay shrinkage factor) and mold design.

All forms are really basic, as I want them to be able to come from a one-piece mold whenever possible. When a mold needs to be made in two pieces (or a very seldom three pieces), the seam line must be on a ridge of the piece where the extra clay that builds up can easily be cleaned or intentionally accentuated. This is one of the main directives of my mold designs to avoid any unwanted discoloration or lines on the unglazed surface.





Although sometimes prototypes are made out of solid clay, most often they are carved directly from a plaster block, and the form is refined and adjusted in the plaster prototype. Once the prototype is ready, a master mold and a block and case are made out of plaster. The block and case are the molds used to make the production molds, where the block mold (negative) is made from the original model to make the case (a positive, duplicate of the original model, made out of Hydrocal due to its hardness and impact resistance). From this case, production molds are made using a diluted casting-soap solution as a mold resist to keep the plaster parts from sticking together. I make sure that there are no marks and that the interior of the production molds are as smooth as possible to minimize any need to clean up the greenware or sand the bisqueware. For each design, I usually make between half a dozen and a dozen production molds. Molds have a limited production life, and it is recommended to cast each mold about 50 times. Once the pieces start sticking to the mold or coming out with a grainy surface texture, it is time to make new production molds.

These molds don't have a riser or pouring basin, as I intentionally want my pieces to warp through multiple firings. The extent of such warping depends on the thickness of the walls, the manner in which the mold is drained, the way the excess clay is cleaned, and the manual alteration of the rim, yielding mostly unpredictable results. No two pieces ever warp in the same way. The porcelain gets the opportunity to demonstrate a life of its own, resulting in an imprint of its own memory. This is how I give up control to the process and, eventually, to the results.

Slip Casting and Assembly

I work in a small-scale production. The inventory on hand, the kiln capacity and loading configuration, and upcoming shows and commitments determine what will be made.

I use a commercially prepared cone-6 porcelain slip, working directly from the slip buckets. The slip is mixed by hand to minimize air bubbles and avoid any pinholes. I cast in series of 6 to 10 of each form, always thinking of them as a set or a series of smaller sets. I have determined specific casting times for each piece, which range from 30 seconds to 3 minutes for small pieces and 6 to 8 minutes for larger pieces. Small pieces have walls between about $\frac{1}{16}$ inch to $\frac{1}{8}$ inch (1.5 mm and 3 mm) thick and the walls of bigger pieces are between about $\frac{5}{32}$ inch and $\frac{3}{16}$ inch (4 mm and 5 mm) thick.

Although my studio is insulated, exterior temperatures can vary from 95°F (35°C) in August to 40°F (4.4°C) in the winter. Since the cast forms are so thin, pieces come out of the molds within a few hours with the actual time depending on the weather conditions. Each piece's rim is modified by hand, and the form is mostly defined by sponging the piece to remove enough clay to obtain an undulating rim and give a unique character to each piece.



Opposite: Sake set, to 4¾ in. (12 cm) in height.
Top: Wine cups, 3½ in. (9 cm) in diameter.
Middle: Molcajete, 5½ in. (14 cm) in diameter.
Bottom: Carafe, 8 in. (20 cm) in height. All pieces: slip-cast porcelain, assembled, iron sulfate, fired to 2232°F (1222°C).



1 From left to right: model, block, and case. The case can be used to make additional molds. **2** Mix the prepared porcelain slip by hand. **3** When casting, always time how long the slip stays in the mold to make sure all pieces have the same thickness. **4** Clean the excess clay from the top of the plaster mold with a sharp knife. Cut the excess with an outward motion to avoid ripping the wall of the piece. **5** Mark the place to cut the parts that will be assembled together, leaving 2–3mm for the joint. **6** Cut the top of the piece to define its profile. **7** Score and slip the pieces, and reinforce the join with a bit of extra slip applied with a slip trailer.

The components of pieces that require assembly are cast at the same time and to equal thickness. The parts are pulled out of the molds simultaneously as soon as they release from the plaster and the clay is softer than leather hard. Each part is cut, sponged, and attached. Since the walls are thin, the area of contact is small, and scoring is minimal. It is critical to attach the different components at this stage, while the pieces are still pliable. The different parts for the composite forms are attached with a significant amount of slip, which will be cleaned once the piece is leather hard. I am particularly fond of this process as it allows for similar pieces with unique features and personalities by changing the cuts and position of the components.

The porcelain slip I use has a very low plasticity which, in combination with the thin walls, makes the pieces very brittle as they dry. Most loss happens at this stage if the pieces are handled when the clay is bone dry.

Firing and Decorating

After bisque firing to cone 06, soluble salts are applied. I use a very limited color palette—blue (cobalt chloride), pink (gold chloride), rust (iron sulfate), and occasionally green (potassium dichromate). Some of the soluble salts are colorless when in solution and are difficult to see in application. If I am painting freehand, I add some food coloring to the solution to be able to see my strokes.



8 Marking the design with a pencil makes the application of the latex resist and the soluble salts easier. **9** Apply latex resist as per the design and let it thoroughly dry. **10, 11** Apply the soluble salts with a clean, soft brush. One layer is often enough. Let these areas dry well. **12** When the first layer is dry, you can apply a second layer of soluble salts to increase intensity or make some color accents. **13** After the second bisque firing, the color from the soluble salts is set and the interior of the piece can be glazed. **14** Apply small colored glaze details. **1-14** Photos: Simone Noble.

Different patterns are also made using painter's tape, wax resist, or ammonia-based latex. Once the soluble salts are applied, the pieces go through a second bisque firing to set the color.

After the second bisque firing, the interiors of most pieces are coated with a thin layer of commercial clear glaze. Sometimes I skip this step and some pieces remain fully unglazed (the porcelain vitrifies to the point that it is water tight without glaze). Colored glaze accents are applied to the pieces by hand, one by one, before the pieces are fired to cone 6.

Line patterns are drawn by hand with a very fine pen and transferred to the pieces via an iron- or gold-luster transfer. The pieces are fired one or two more times to lower temperatures

(cone 018 to cone 1), depending on the transfer layering. Pieces in any given set have the same motif but no two are identical, resulting in small but significant variations within repetition of form, size, and patterns.

I like to refer to my process and my work as simple intricacy, as it takes many steps to achieve a rather simple looking result.

the author Sandra Torres currently works from her home studio in Ojai, California. She was an apprentice to Piet Stockmans in Belgium and is a member of the Association of Clay and Glass Artists (ACGA) in California and the Ojai Studio Artists. To learn more, visit sandratorres.com.