

Using the material of porcelain and the process of slip casting, I have considered its relevance and effectiveness to the content and subject of my work. In particular, it brings attention to the use of recognizable objects, allows for production of exact replicas, influences my selection of an object, and how the context of that object will exist- be it in the realm of jewelry, sculpture, or for functional service ware. Overall slip casting has allowed me to transform an identifiable object into another material, often giving it new meaning and a purpose. Historically, the value of porcelain has been equated with the worth of gold, therefore it seems only appropriate that its ability to blend with precious metals in fine dining ware should be further developed and expressed using the same techniques in the creation of jewelry.

This article is a comprehensive introduction to the application of basic slip casting using a two-part drain mold. The process consists of: mixing porcelain slip, making a mold, pouring slip, refining, and firing an object. The outline is intended to reveal a method that has become a significant part of my studio practice, and it is one that is suitable for all levels of experience.

Before we begin the process, it is important to consider the object you are casting and how the rest of the piece will be fabricated. Placing emphasis on cold connections, please take note that the measurements of our connections and mechanisms (drilled holes, key in hole, etc...) will be determined after the piece is fired because the clay will shrink.



Soup Tureen  
Porcelain, sterling silver, copper, and fired on decal.



Soup Tureen (detail)  
Removable pistol handle.

## The Slip

Starting with the right porcelain slip is important to a successful casting experience. Before mixing up the clay remember to wear your NIOSH certified half-face piece particulate respirator, be in a well ventilated area and cover your workspace with plastic.

The porcelain slip recipe I make, developed by Amy Norgaard, has produced excellent consistent results and is used for firing to cone 5 or 6. When mixing my own clay, I tend to make large batches, so keep in mind that the amounts provided below produces A LOT of slip.

### **Slip Ingredients & Proportions:**

Ingredients	Amount
#6 Tile Clay	20lbs
EPK Kaolin	25lbs
OM#4 Ball Clay	10lbs
Flint	15lbs
G200 or Custer Spar	25lbs
Darvan #7	1 cup
Water	20 quarts

According to our definition of \*Slip, the deflocculant suspends the particles in the slip keeping the consistency at a fluid state and preventing the materials from settling. This substance is sticky and should be measured wearing protective latex gloves.

The equipment needed for this step includes; two measuring buckets, a drill mixer, pound scale, and a larger bucket or empty trashcan. (Figs. 4, 5)

### **Mixing:**

- 1.) Measure out water dumping it into the larger bucket. Pour the amount of Darvan necessary and add it to the water.
- 2.) Add ingredients making sure to drill-mix in between until well blended.
- 3.) Drill-mix the mixture for a half an hour and let it sit over night. (Fig. 6)
- 4.) On the next day, drill-mix and check for consistency.



Fig. 4



Fig. 5



Fig. 6

### Testing the slip:

- Viscometer: This tool will indicate the amount of slip that flows per second in addition to showing the water to slip ratio.
- Hydrometer: This is an instrument that indicates the viscosity of the slip as it associates to a particular gravity.

There are various measures of testing the slip that are more sophisticated than others. In my studio I typically will submerge my hand into the slip -- pull it out, and look for fast action webbing between my fingers (Fig. 7). If the clay slides off my hand and through my fingers without webbing, the clay may have too much water. If the clay is **too thick** add 50/50 water and Darvan mixture by the drop as needed. The clay can also have too much Darvan, so keep track of how many additional drops you add.



Fig. 7

### Making a 2-part drain cast mold

The mold is the most crucial part of the process, and a well made mold can result in easy or little clean up. Trying to figure out short cuts is not an option and will actually waste time. In addition some objects might need extra steps for example; an object that can absorb moisture, such as wood, will need a lacquer applied to the surface, while hollow objects, such as a plastic bottle, will easily cave under pressure and therefore need to be filled with plaster before beginning. And always try to select objects that do not have undercuts.

For this two part mold you will want to be selective knowing that the object will be divided into two parts and much like centrifuge casting, you will need to create a spout or sprue for the material (slip) to enter. What you will need for producing a quality mold includes; cottle boards, Murphy's soap, paint brush, sharpie, modeling clay, x acto knife, wooden clay tool, cardboard cutter, and thick foam or soft clay. (Fig. 8, 9)



Fig. 8



Fig. 9

- 1.) Selecting the object you wish to cast, measure it in half tracing a line around the entire piece with your sharpie (Fig. 10). Next, determine the location of your pour spout. The position of your spout is important because this is an area that will be the opening to your hollow form and allow the slip to enter and exit.



Fig. 10

- 2.) Trace the outline of your object onto the foam. Measure and mark  $1\frac{1}{2}$  inches from your outline to create a boarder. Cut out the framed area leaving a cavity in the foam. It's important to leave at least a  $1\frac{1}{2}$ " boarder for smaller objects as it gives the mold strength and also enhances absorption of the slip unlike a thin walled mold (Fig. 11).

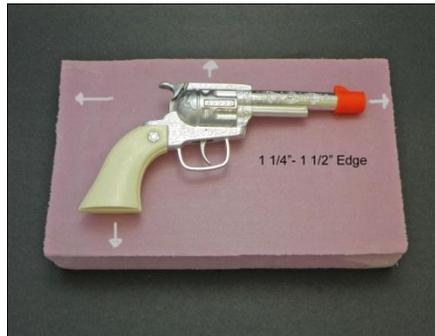


Fig. 11

- 3.) Cut out the area in the foam and seat your object up to the dividing line (Fig. 12). Fit the object into foam making sure there are no under cuts. Place modeling clay anywhere in the foam that may cause undercuts (Fig. 13). Build your spout using modeling clay.



Fig. 12



Fig. 13

- 4.) C-Clamp the cottle boards around the foam and extend the spout to the wall of the board (Fig. 14). Once the piece is boarded up paint on a thin layer of Murphy's Soap and let dry. Repeat putting on Murphy's Soap three times letting it dry in between each application. \*Your board should sit flush with the tabletop and not wobble.



Fig. 14

Another option is to seat your object in clay following the same guidelines as foam.

## Mixing and Pouring Plaster

The water to plaster ratio should be 7-1. This number refers to the number of parts per 100 parts of plaster by weight. For instance, if you are using 1 lb 7oz or 652.05 grams of plaster you would use approximately 1 pint of water. The equipment necessary for this task includes; a bag of pottery plaster No. 1, drill mixer, pound scale, spoon, Murphy's soap, and a spongy paint brush.

- 1.) Weigh out the amount of water in one bucket and plaster in the other (Fig. 15). Slake or sprinkle the plaster into water and soak for 2 minutes (Fig. 16).



Fig. 15



Fig. 16



Fig. 17

- 2.) Mix on high for 3 minutes. Hand-mix the plaster for 1 minute. Dip your hand in the mixture, if the plaster is translucent in appearance with your skin showing then the plaster is too thin and you should continue to mix for another 30 sec to 1 minute. If the plaster coats your hand (Fig. 17), continue to step 4.
- 3.) Pour the plaster in one corner of the mold to reduce bubbles (Fig. 18) and continue pouring until the piece is covered and the plaster reaches an 1 1/2" above the highest point of your object. Once you have poured the plaster, lightly tap the sides of the cottle board with a mallet to release air bubbles.



Fig. 18



Fig. 19

- 4.) Drying time of the plaster varies with humidity and temperature. After the plaster is set and the mold feels cold, release the cottle boards. Remove the pink foam (leaving your piece in the plaster) and proceed to the second half of your mold.
- 5.) Flip over the mold and with your spoon create registration keys by digging slightly into each of the corners, creating small dimples into the plaster (Fig. 19).
- 6.) Using the same steps found in 3 & 4 of the previous page create your spout, set up the cottle boards, paint on Murphy's Soap, and pour the plaster (Fig. 20). After the second half has set up and the plaster is cold, pull apart both sides and remove object \* you may need to tap slightly with a rubber hammer to release the two halves.



Fig. 20



Fig. 21



Fig. 22

- 7.) Place the mold in a dry climate and wait until it's completely bone dry. Once your mold is dry, using a plaster scraper, remove the edges of all the plaster sides to help separate the two halves and prevent damage of sharp corners from breaking off (Figs, 21, 22).

## Pouring and Finishing

Before pouring your slip, drill-mix your slip for a couple minutes to bring up all settling from the bottom of the container. Check the consistency of the slip with your hand and look for webbing action as mentioned on page one. Using a strainer pour the slip into a pouring pitcher (Fig. 23). The strainer will catch all undesirable 'foreign' objects or materials that were not dissolved into the



Fig. 23



Fig. 24

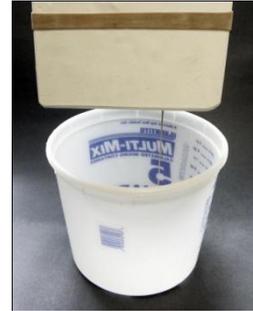


Fig. 25

- 1.) Rubber band both halves of your plaster mold together and pour slip into spout. If the spout is smaller, use a funnel. (Fig. 24)
- 2.) In about 15 minutes check the wall thickness by lifting the back of the edge around the spout using a wooden knife tool. Ideally your edge should be approximately  $\frac{1}{4}$ " thick. What is happening is that the plaster is absorbing the moisture out of the slip, causing the slip to accumulate and shrink away from the plaster.
- 3.) Once the correct thickness is achieved it is time to drain the mold and pour the excess slip back into your bucket (Fig. 25). Now wait for the slip to dry enough to release from the plaster mold, and depending on the size of your object, drying time will vary.
- 4.) \*\*\*When pulling the two halves apart do not use force. Both sides of your plaster mold should separate easily -- releasing your piece. (Fig. 27, 28)



Fig. 27



Fig. 28



Approximately  $\frac{1}{4}$ " wall

- 5.) Clean up can be done in a variety of ways using any number of tools. I usually use an x-acto knife to cut/scrape excess clay from the seams created during the process, and a sponge for blending and removing the seams altogether.
- 6.) Make sure the clay is completely dry and then fire away!

## Bio:

Lisa Johnson is the current Artist-in-Residence at Arrowmont School for Arts and Crafts where she will be conducting workshops in the Spring of 2012. She started her career in fine arts at Miami University earning her B.F.A degree in Metals in 2004 and continued her education at Indiana University receiving her MFA in 2009. Exhibiting her work nationally and internationally, for the last few years Lisa has been incorporating porcelain into her studio practice where the content of her work arises from an interest in the juxtaposition of puns, translations, irony, and duality. Through identifiable objects, her obsession with redefining the recognizable is a direct expression of her observations or experiences that communicate as appealing, stimulating, and sometimes humorous antidotes.

~ Lisa would like to express her gratitude and appreciation to Amy Norgard as well as the Metals and Ceramic departments at Indiana University for all their help and support.