How to Transform Your Clay Body into a Casting Slip

May 29, 2016 27 Comments

Ready-made casting slip is commercially available in all firing ranges, making it super convenient. But if you like to combine handbuilt or thrown elements in your slipcast pieces, it can be very difficult to find a casting slip with exact same shrinkage and absorption characteristics as your regular throwing or handbuilding body.
In today's post, an excerpt from our new free download Ceramic Mold Making Techniques: Tips for Making Plaster Molds and Slip Casting Clay, *Paul Wandless shows you how to make casting slip from your regular clay body. – Jennifer Harnetty, editor.*

Transforming Clay into Casting-Slip

by Paul Andrew Wandless

A common studio challenge is trying to keep the number of different clay bodies you have on hand to a minimum. Throwing, handbuilding, casting, and surface design techniques often require different clay bodies to suit the demands of how your work is created. Sometimes the clay bodies also need to be in different forms such as regular moist clay, slip or casting slip. If I'm handbuilding with a cone 6 clay body and want to add a slip-cast element to it, I'd be hard pressed to find a commercial cone 6 casting slip with the exact same shrinkage and absorption characteristics. A singular work made of multiple clay bodies can cause several problems. Disparate shrinkage rates, maturation points, iron content, etc., can all have a negative effect on the final outcome of the work when using different bodies. When possible, it's always best to stick with the same body. My sculptural work combines moist clay for general construction and casting slip for volumetric elements or for use with various image transfer techniques to address the surface. My solution is to use the clay body I'm working with and turn it into the different types of casting slips I need. This assures that all the parts and surface treatments shrink the same, fire to the same cone, and all the glazes work the same on all the different parts. The great thing about this approach is its simplicity. All you need is a 5-gallon bucket, a drill with a paint mixer attachment, a deflocculant, and the clay body you want to use as a casting slip.

Preparing the Slip

The process of slaking clay to make it into slip is a simple one. Step one is to have a 5-gallon bucket filled 60-75% with your bone-dry clay then add water until it's a few inches below the rim (figure 1). Let it slake for 24 hours then mix it by hand a little with a stick (figure 2). Once you've mixed the slip for about
5 minutes, use a drill with a paint mixer attachment to mix it into a smooth slurry, which should be the consistency of thick cream. Use the stirring stick to check the consistency and find any lumps of clay that didn't slake down (figure 3). Keep mixing until the lumps are gone.

Measuring Specific Gravity

At this point, I normally fill a quart container with the slip to use as a joining or brushing slip. The rest I use for casting slip. You'll need to measure the specific gravity of the slip to determine if the water to clay ratio is correct before deflocculating it with liquid sodium silicate or Darvan. To determine specific gravity,
which is a comparison of the weight of 100 ml of water (which is 100 g and therefore has a specific gravity of 1) with the weight of 100 ml of whatever liquid or slip you are
working with. First tare (zero out) the weight of a graduated measuring container on a scale then fill it with 100 ml of slip and see how much it weighs in grams. Once you know the weight, you divide it by the weight of an equivalent volume of water (100g). This works out, in essence, to moving the decimal point in your weight measurement to the left by two places to get the specific gravity. Example: 183 g = 1.83 specific gravity.
In general, a specific gravity of 1.80 to 1.85 provides good balance of fluidity and strength for most casting purposes. This number can vary, though, depending on exactly what is being cast. I've used it as low as 1.74 for volumetric casting and as high as 1.90 for casting flat slabs. Different clay bodies have different optimal specific gravities that are determined by good old-fashioned trial and error. Specific gravity is simply a tool for you to

adjust your slip to meet the needs of your particular casting project. Once you find a number that works, write it down and stick with it for that clay body. If you have a specific gravity that is higher than 1.85 and you want to bring it down, add a little water (only a few drops at a time), to your slip, mix and re-test. If the specific gravity is lower than 1.80, let the slip sit 24 hours, skim the water off the top, remix, and measure the specific gravity again.

Deflocculating the Slip

Once you have the correct specific gravity, you need to add a deflocculant to the slip to make it more fluid so it can be poured. Typically just a few small drops of liquid sodium silicate or Darvan is needed to achieve the appropriate fluidity. Clay bodies with high iron content will require less deflocculant than others. Use the drill to mix the deflocculant into the slip and use a ladle or pitcher to scoop some of the slip out to see how it pours. The consistency of cream is what you're going for so be careful not to over-deflocculate the slip, which will cause slow uneven drying and soft spots in the finished piece. Just add a few drops at a time to achieve fluidity and remember a little goes a long way with deflocculants.

Using What Works

I've done this process with commercially bought clay and with home made clay. I've also had the exact same success slaking down clay that started off as moist clay fresh out of the bag or as 3-day old bone dry clay. I keep a 5-gallon bucket around to throw all my scrap clay into and when it gets about 65-75% full, I turn it into casting slip. I also just slice up a 25-pound bag of commercial clay into 1-inch cubes and fill an empty bucket with them and use that to make my casting slip. I'm aware of the different opinions regarding initial water content of the clay and its effect on the speed of water absorption/saturation while slaking. In my personal experience, I've found if you let clay in any state of moisture slake for 24 hours, it all mixes up just fine. I suggest you simply slake your clay in the state of moisture that you typically have in the past.