Great Mold Part III

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Photograph #26

At the end of last month's article, I was ready to pour in the rubber and finish a really great mold. My next step was to determine how much rubber would be required and then choose which rubber to use.

Pouring in the Rubber

What I needed to do was to fill the space with rubber that had been occupied by clay. In other words, if I had known the volume of the clay, all I would have needed was an equal volume of rubber. It just so happens that the specific gravity of most types of rubber is very close to that of water or one cubic centimeter weighs one gram. But rather than playing Archimedes and placing the clay in water and measuring its displacement or filling the mold with water, there was an easier way. I used "Dave's Law" that states, "The amount of rubber required to fill the space between a mother mold and a model is approximately equal to 70% of the clay by weight." In this case, the clay weighed 1,680 grams so about 1176 of rubber was estimated. This was only a close guess because the model had been wrapped in plastic preventing the clay from fitting snugly and filling every nook and cranny. In fact, I came out a little short, the actual amount of rubber needed was 1215 grams or two pounds and eleven ounces. I just mixed and added a little more. Since rubber is not inexpensive, having a pretty good idea of the amount needed helps prevent mixing too much and wasting it.

As to which rubber, there are two types most used by mold makers, silicones and urethanes. I much prefer silicones and have discussed why in detail in a previous article (See "How to Make a Secondary Mold," *SJ*, July 2004.). In this case, I preferred a rubber with a low viscosity so that it would pour in and around the model filling the void completely. Since the model had significant hollows and undercuts, the rubber needed to have a low durometer meaning that it would be soft enough to separate first from the model and then from the castings pulling out of tight areas without tearing. A durometer of 8 to 15 is considered low and a low viscosity would be 15,000 to 20,000 centipoise. For more information on the properties of silicone rubbers, (see "How to Select and Buy Silicone Rubbers," *SJ*, May 2005, by Michael J. Sisbarro.). The rubber I selected was a tin cured silicone with a durometer of eight and a viscosity of about 15,000 centipoise.

I mixed the rubber according to the directions specified by the manufacturer. I then de-aired the rubber with a vacuum chamber. Photograph #26 shows me pouring the mixed components of the rubber into the mother mold. Once I was sure that there were no leaks, I placed the mold into a pressure chamber, set the pressure at 50 p.s.i., and let it cure overnight.

O.K., some readers are probably saying, "Oh great, I don't have either a vacuum or pressure chamber!" Don't despair, it is possible to make an acceptable mold without either one. But using one or both absolutely will result in longer lasting molds with fewer flaws. For a complete discussion on both vacuums and pressure in casting, see the following *Sculpture Journal* articles by yours truly:

"Using Vacuums and Pressure in Casting," August 2003

"Making a Vacuum Chamber," September 2003

"Making a Pressure Chamber," October 2003

"Putting Vacuum and Pressure Chambers to Practical Use," November 2003.


Photograph #27


Photograph #28


Photograph #29


Photograph #30

Finishing the Mold

In order to remove the mother mold and expose the now setup rubber, I first unscrewed all the bolts. Since I had used a silicone rubber, it was very unlikely that the mother mold and the rubber would be stuck together except by suction. Gently inserting a sharp wedge or pry bar into the seam would probably have been sufficient. However, photograph #27 shows a simple but very effective trick. I had drilled a small hole, about 1/8" or 1/3 cm., through the Forton MG in the middle of each side of the mother mold. One who has never done this might worry about drilling through the rubber. The fact is that it is much easier to drill through Forton MG than rubber. As long as only slight pressure is applied to the drill, you will fell the bit break through and then stop, barely nicking the rubber. Then blowing air into the hole and between the rubber and Forton MG will separate the two easily.

In photograph #28, I was cutting off most of the rubber that filled the pour spout. This really wasn't necessary since this particular rubber structure wasn't actually in the way or doing any harm. But to leave it dangling there just didn't seem like a proper thing to do in Colorado; maybe in California ... Where was Sigmund Freud when I needed him?

The only thing remaining was to remove the plaster model, the need for the reproduction of which started this epic journey. All it takes are two hands to spread the seam apart as a third hand wields something very sharp, preferably a scalpel as in photograph #29. Make a zigzag cut so that the rubber keys back together until very close to the model. For the last 1/4" or 2/3 cm., make the parting cut as straight as possible so that parting line on will be minimized. Remember to follow the black line that was drawn on the model (photo #1) so that the parting line will be where you had determined that it would be the least conspicuous. Proceed slowly and carefully so as not to cut your assistant, yourself, or through the sides of the Mohawk. Don't make the parting line any longer than necessary, cut only far enough to extract the model. Photograph #30 shows the rubber spread apart like a butterfly shrimp after the model had been removed.

Using the Mold

To reproduce the model with this mold was just a matter of deciding what material to use, mixing it, filling the mold, letting it cure as necessary, and extracting the reproduction. Almost anything that will go from liquid to solid such as plaster, hydrocal, hydrostone, concrete, polyurethane and polyester resins, epoxy, wax, Jell-O, chocolate, Forton MG, etc. would have worked fine. The only thing that I can think of that I could not have used was optically clear polyurethane resin which requires a platinum cured silicone rather

Photograph #31

than a tin cured one. Photograph #31 shows the first reproduction made in this mold which was cast in Forton MG with copper powder. This casting came easily out of the mold with **no flaws**. There were no bubbles either innies our outies and no voids. The parting line was almost invisible and disappeared with just a little rubbing with my thumb. The finished product complete with marble base is in photograph #32.

I could have made a mold of the hand and foot used in this three part article a much easier way by just building a box around it and filling it with rubber as I described in detail in the above mentioned article in *SJ* July 2004. But a mold made the simpler way will have much thicker rubber, at least in places, and if the sculpture is delicate, it might be difficult to impossible to remove the castings without breaking them. The rubber in the mold I have described here is much thinner and allows for more delicate and/or complicated castings. Since the mold comes apart and goes back together so easily, it is a pleasure to use especially important for larger editions. The most important thing that any mold can do is accurately reproduce the model with the absolute minimum of flaws in order to preserve the integrity of the sculptor's work. And because correcting flaws is tedious and time consuming, extra time spent in making the best mold possible can save time
and money. There is one more advantage, if the mold is used so many times or is stored so long that the rubber deteriorates, just reattach the mother mold around the model and pour in new rubber and you're back in business with a new mold.

Photograph #32

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