# How to Make a Secondary Mold

by David E. Parvin, A.L.I.

Weather one is trying to derive income from life casting or just wants to produce the highest quality products possible, being able to make secondary molds is an essential technique. In this, the first of several articles, I will describe how to make the simplest type of molds, block or pour molds in this case of infants' hands and feet. In the following articles, I will explain how to make molds of faces, bodies, and multiple hands.

You may be asking why not just cast the infants hands and feet over and over until you have enough copies for the parents, grandparents, "and his sisters and his cousins and his aunts." (Sorry, Gilbert and Sullivan just pops out sometimes.) You could, except that for even experienced casters, multiple perfect impressions of wiggly babies' hands and feet can be problematic. But while allowing one to cast additional copies is the most obvious advantage of secondary molds, there are several others. The first is that different materials can be used giving the client a variety. Some of the different materials can not be cast in alginate molds. Also, if the customer realizes later that he/she left out old, great, rich uncle Bob who just happens to be making a new will and might generously remember the little tyke with the proper memory jogging gift, you can supply it?

The last advantage may not be quite as obvious, but you will probably get more perfect castings from the secondary molds. Let us say that your hand and foot had been cast in plaster or something similar. Often there are imperfections, usually bubbles either in the plaster (innies) or in the alginate (outies) or tips of fingers that are missing due to trapped air in the mold.

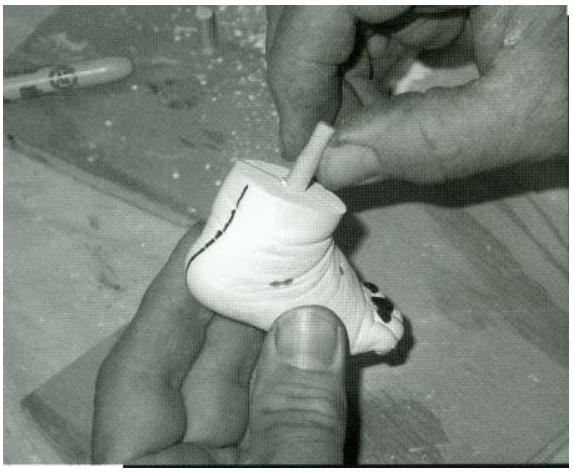
Outies are the easiest to repair since you just trim them off and texture the surface to blend in. Innies and fingertips are more difficult because you have to add material. It does take some practice before one can sculpt the last digit of a finger and not have the mother notice. Even if plaster is wet enough for new plaster to be added to old, there can be a color difference. Paint can cover up a multitude of imperfections but can also cover up some detail such as fingerprints. I have found that the easiest way to make repairs is using wax or clay. You must wait a few days so that the plaster will have dried enough that the clay or wax will stick. But of course, wax and clay are different colors than the plaster and paint will not help here. But if you remold after making repairs, what ever material you use to cast will all be the same color and the repairs would be hardly noticeable if at all.

Note: one material that does stick to itself wonderfully is Forton MG both plain and with metal powders. Forton MG can be cast directly in an alginate mold but of course, the mold will most likely be usable only once.

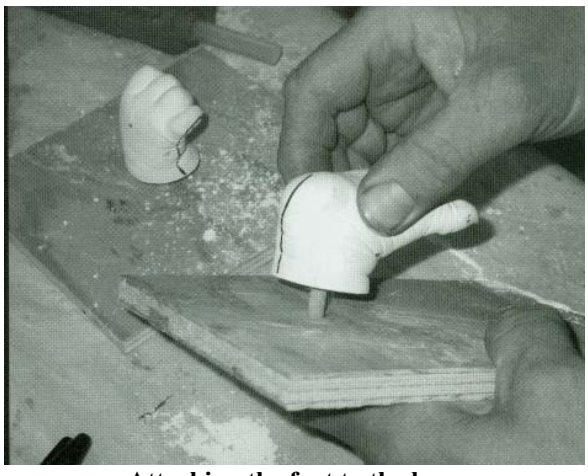
After repairing any imperfections in the plaster hand and foot, attach them to bases made of wood, plywood, or MDFB. Using a 1/4 inch drill bit, drill a hole into the plasters and into the bases. Attach the pieces to the bases with a 1/4 inch piece of dowel that is long enough to suspend the pieces about 1/2 inch above the base. This 1/2 inch space is very important as you will see below.

The cured rubber molds will have to be cut or opened on one side to remove the castings. There will be seams in the castings where the cuts are made but they should be almost invisible if properly done. The best place to cut open the foot mold is along the back of the heel. For a hand, along the outside edge down to the tip of the little finger. To help in cutting the molds in the right places, I make heavy black lines in permanent ink to indicate where to cut.

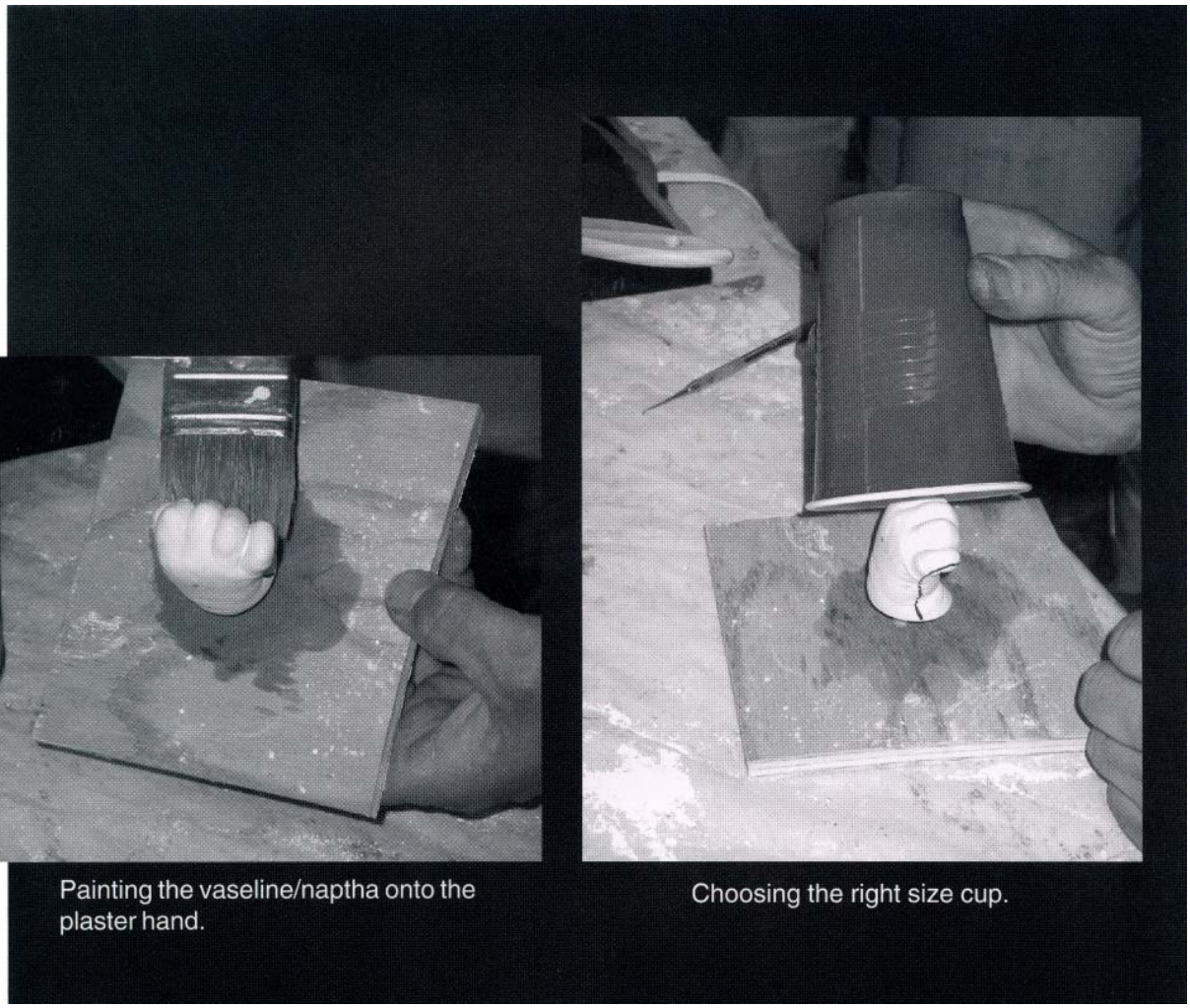
The next step is to attach the pieces to the bases with the pieces of dowel and hot glue.



**Putting the dowel into the plaster foot**
**Notice the black line**



**Attaching the foot to the base**



Painting the vaseline/naptha onto the plaster hand.

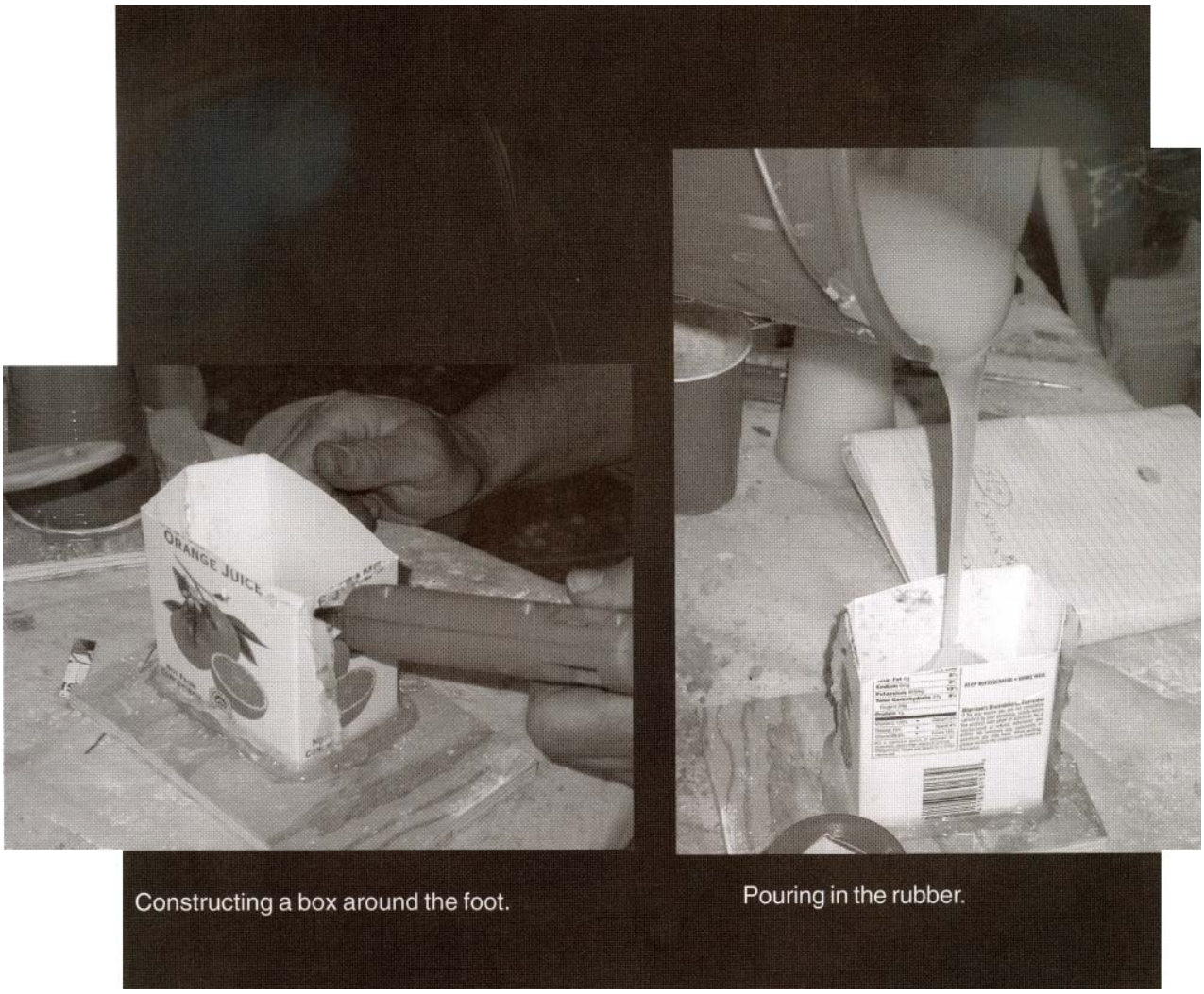
Choosing the right size cup.

The mother or outer mold for the hand is just an inverted plastic cup with the bottom removed. The cup should provide 1/2 inch of clearance when centered over the hand. However, when the cup is glued into position, it should be 1/4 inch from the thumb side and 3/4 inch from the opposite side where the incision will be made. As I will explain, the right type of rubber will not require a mold release. However, I paint the plaster with a solution of 15 parts Vaseline and 10 parts naptha by weight. I also paint the base around the dowel out to just inside where the cup will cover. Doing this will allow the mold to be more easily dissembled but is not absolutely necessary.

Next put the cup in position and glue it in place with a hot glue gun. Note: I did not paint the naphtha and Vaseline outside the edge of the cup because it might have kept the glue from attaching to the base. Also, liquid rubber tends to run out of even the smallest opening. Therefore, glue around the edge of the cup several times until you are absolutely positive that there is no possible way that the rubber could leak out. Then do it all over again and just maybe it won't leak! This mold is now ready for the rubber.

For the foot, a cup is not a practical mother mold because if you use a cup that is '/2 inch beyond the toes and the heel, it will extend an inch out from the sides. Not only will this take too much rubber adding to the cost, the mold will be so stiff that it will be difficult to spread it open to remove the castings. I simply build a box around the foot using the cardboard from a milk or orange juice carton. The box should surround the foot with a '/2 inch of clearance along the sides, 1/4 inch at the toes, and 3/4 inch at the heel where the incision will be made. A mother mold will not be needed because the rubber will be rigid enough by itself and the mold may be held tightly closed with several rubber bands. Now for the rubber.

The type of rubber one chooses is very important and one has many choices. I will try to keep the selection simple. The two most commonly used rubbers are urethanes and silicones. The disadvantages of urethane are that the components must be measured precisely, the components must be mixed evenly and exactly, it tends to stick to the object being molded and to the casting especially if the final casting material is urethane, and the mold has a shorter life that one made in silicone. The only advantage is that urethanes are about half the price of silicones. However, this is really a false advantage because the few dollars saved on small molds will be lost many times over fixing




Constructing a box around the foot.

Pouring in the rubber.

**Attaching the cup to the base with a hot glue gun:**

imperfections and problems caused by using urethane rubber. As for silicone rubber, there are two types, tin cured and platinum cured. The "tins" are a little easier to use because they are not as sensitive to contaminants that can cause inhibition. However, "platinums" are more durable, have no shrinkage whatsoever, and will cure very quickly if exposed to heat. The only time that you must use a "platinum" is if you cast clear urethane which will not set-up in a "tin" mold. Follow the directions and you should have no problems with either.

I would suggest that whatever rubber you choose, choose one that is soft, i.e. has a low durometer of 15 or less: You will be much more likely to be able to remove the little hands and feet from soft rubber molds are less likely to leave visible imperfections in the castings.

In this case, I choose a translucent platinum silicone rubber with a durometer oft 5. The platinum was to allow for some clear urethane castings. The translucence would make it easier to follow the base line when cutting open the molds.

The next step was to figure out how much rubber was needed. I computed the volume of the molds to the top of the hand and foot. I did not

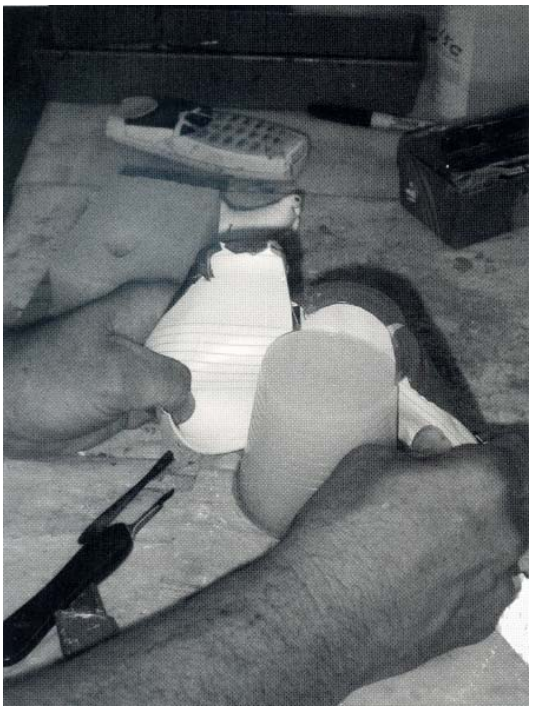
Removing the box from the foot mold.

Cutting open the foot mold along the black line.

subtract anything for the volume taken up by the hand and foot figuring that that would allow for enough rubber to cover both sufficiently. The simplest way to calculate the amount of rubber needed would have been to weigh how much water it would have taken to till the molds to about 1/4 inch above the hand and foot. Rubber and water have almost exactly the same specific gravity and so many grams of water would have required the same number of grams of rubber. However, I didn't want to take a chance on tilling the mold with water. The volume of a box is just the width times the weight times the length. The volume of a column is Pi times the square of the radius times the height. Since a cup is not rally a column, I just used what I guessed to be an average of the radius. In this case, I came up with 835 cubic centimeters for both. This meant that 835 grams of rubber would have been required and they were.

Following the directions for the rubber, I measured out 835 grams of matrix and catalyst. Most silicone rubbers are mixed at 10 parts catalyst to 100 parts matrix by weight. However, another common ratio is 50/50. Just follow whatever is recommended. You want to take some care when mixing. Make sure that you scrape the sides and bottom several times. Often the catalyst changes the color of the mixture and a uniform color means that the rubber has been thoroughly mixed. In this case, both the matrix and the catalyst were translucent and neutral. Since there was no way to tell by looking when had mixed it properly, I just mixed it a little longer than I would have otherwise done and it set up perfectly. Once mixed just pour it carefully in to the molds unless...

If you have the capability of de-airing the rubber, do so. I not only have a vacuum chamber but also possess a number of pressure vessels. So I was able to de-air the rubber prior to pouring it into the molds and allow the rubber to cure under 50 p.s.i. of pressure. Note: these steps are not necessary but will result in more perfect and longer lasting molds. (For a complete discussion on this subject, see "Using Vacuums and Pressure in Casting," "Making a Vacuum Chamber," "Making a Pressure Chamber," and "Putting Vacuum and Pressure Chambers to Practical Use: by yours truly, "Sculpture Journal," August, September, October and November 2003.



**Removing the cup from the hand mold Notice the enlarged hole on top of the foot mold.**

Once the rubber has cured for the recommended time in the directions, cut off the cup and the box. Using a very sharp blade such as a scalpel, cut open the molds along the black lines. The incisions should only have to go to the bottom of the heel and the tip of the little finger. Zigzag the cut near the surface for registration. But where the rubber touches the plaster on the black line, make the cut as straight as possible so as to minimize any indication of the seam in the castings. Enlarge the hole around the dowels to become a reservoir for extra material. Some materials shrink when they set up and without the reservoir you may lose part of the wrist and ankle.

Spread open the molds and pull out the plasters. If they come out easily without breaking off any toes and fingers, you should be able to cast any material in the mold; including plaster, hydrocal, Forton MG, etc. However, if the fingers or toes do break off, you will probably want to use something stronger such as polyurethane or polyester resins.

When you fill the molds, use your best technique to minimize bubbles such as tipping, shaking, vibrating, etc. Again, if you have the capability, de-air and pressurize. Once the material has cured, remove your copies. You will probably find that some material has solidified in the enlarged opening/reservoir. A few seconds with a belt sander will remove this. All that remains would be any buffing or patina depending on the material.

I realize that this process may seem rather complicated, but it isn't. The time required to make these molds and cast the first copies, excluding the cure times, took no more than an hour. It took far longer to write this article.

**Fitting the hand mold into a new cup which has had its bottom removed. Notice rubber bands around the foot mold.**

**Baby feet and hands cast in different materials. Forton MG with metal powders, polyurethane resin with metal powders, POLYURETHANE a clear polyester resin and polyester with crushed marble.**

David E. Parvin is a Colorado sculptor whose primary subject is the human form in a variety of materials. He also teaches life casting workshops held at his studio in Denver, Colorado throughout the year. For inquires regarding his schedule of workshops he may be reached at 303-321-1074.

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