



FIGURE CONVERSIONS:
MOLDMAKING:
Making Molds

by Alvan Fisher, Jr.

The last article discussed casting toy soldiers from purchased molds. This time we'll look at the art of making your own molds. Although not an expert in this procedure, I'd like to share some experiences in the hopes that you will try it. (*As I reflect upon my own experiments, perhaps the title should be "How not to . . .!"*)

Before getting into the intricacies of making molds, you should be aware that it is illegal to copy and sell sculpture (including toy soldiers) that are in copyright, without a license. This does not apply to older toys that are out of copyright. However, recent changes in the copyright laws make it difficult to determine the date a figure is no longer protected.

Sooner or later, anyone who converts toy soldiers will need parts that cannot be purchased. If you need only a few, simple parts, then it is cheaper to create each part separately. If you want to make multiple figures requiring heads, packs, et cetera, then it might be worth while to make a mold from a master pattern and cast your own.

Mold Materials

Although you have a choice of materials for the mold, the general method of construction remains the same. The simplest and cheapest material is a good grade of casting plaster such as that purchased at an art supply store. If you choose this medium, be sure that the plaster is completely dry before pouring molten lead in the mold or an explosion may occur. The detail from plaster molds is minimal, but will suffice if details such as straps and buttons are added later. Of course, plaster molds are very fragile.

Those of you that have access to dental supplies may try using the same materials used to cast dentures.

Room-temperature-vulcanizing (RTV) silicone seems to be the most widely used choice, and is the method I have chosen.

RTV Silicone

There are several sources for RTV silicone, but they are not always easy to find. I was successful in locating a supplier simply by looking in the local telephone yellow pages under "Silicone and Silicone Products". Dow Corning 3120 RTV silicone rubber appears a likely candidate, but again, I can't recommend it because I haven't tried it. I know several modelers, including some toy soldier manufacturers, who prefer the Dow Corning product. A product called Castomold SR, advertised in model railroad magazines, should be acceptable according to the Castolite catalog. Whatever you use, make sure that it is flexible, can handle minor undercuts, and tolerate temperature to 500oF if you want to cast in lead.

You can get about two molds from a quart of RTV silicone. Thus, you must plan on making a goodly number of castings if you want to keep the cost per item reasonable. Fortunately, molds made with V-1030 are sturdy; I have made several dozen castings from the same mold without unacceptable loss of detail or mold damage.

Molds made with RTV silicone are very pliable; a real boon when trying to remove castings with minor undercuts. RTV silicone is easy to work with, but I heartily endorse using an appropriate breathing mask, safety glasses, and plastic or rubber gloves.

Weather conditions affect silicone mixing, pouring, and curing; a moderately windy day with air temperature around 70°F seems to work well.

Mold Design

Before making the master pattern, there are several things that must be considered. The most important part of mold design is to ensure that the master is free of major undercuts so that the finished casting can be easily extracted from the mold. Some silicone molds can tolerate minor undercuts, but try to keep them to a minimum. High detail and multiple undercuts can reduce the life of the mold significantly. Some undercuts can be eliminated by using a little taper toward on the outer edge of objects such as bayonets and bullet pouches. This both saves a lot of wear on the mold and keeps the casting from being locked in the mold.

The location of the part line separating the pieces of the mold must be considered before making your master. Recently, I failed to heed my own advice and failed to place the parting line in the proper place. The wear caused by the resulting undercut will limit the life of this mold to a couple of dozen castings.

Remember that any imperfections in the master pattern (scratches, rough areas, glue overflow) will be transferred to the mold.

Although, the simple molds described herein are in two parts, there is no reason why more complex molds with three or pieces cannot be made using the same techniques. This is the way more complex subjects as horses and cannons must be made.

A channel (*sprue*) both carries the molten lead to the mold cavity and exerts the pressure required to force the lead into all areas. I use sprues from commercial molds as their success has been proven. Small pieces can be attached to the sprue with pieces of plastic-covered wire inserted into holes drilled in the master and sprue held in place with super glue. The head mold supplied with Prince August Set #800, with a sprue that splits into four separate channels, is ideal for small parts. When the master and sprue are ready, mark the approximate location of the parting line on the master pattern and sprue with a felt-tip pen.

Check to ensure that the part line eliminates all but minor undercuts. The position of the part line is critical around detailed parts such as the face. I prefer to have the part line pass over the ears to preserve facial features. However, the shape of the headpiece may require a part line over the nose.

Small pieces such as arms or packs can be attached to the side of the sprue. Allow at least 1/4 inch between pieces or the edges to prolong mold life.

Making the Mold

When ready to make the mold, roll out a layer of plasticine on a flat surface -- another use for my trusty piece of plate glass. The plasticine should be a quarter to a half inch thick and three or four inches across. Make an indentation to receive the sprue and attached master and press them into the plasticine. Use small pieces of plasticine to bring the level of the base up to the previously drawn part line or to fill the gap between pieces.

It will be necessary to keep the parts of the mold from slipping laterally to assure that the casting will be a faithful duplication of the master. Small protuberances (called keys) are used for this purpose. There are two ways to create keys: (i) by making indentations into the plasticine (female key) or (ii) by adding additional plasticine to the base (male key). One way to make a female key is to press a smooth object such as the top of a pen into the plasticine. Make male keys by adding rectangular blobs of plasticine -- about 3/4 by 1/4 inches and about 1/4 inch high -- at each corner of the base.

You will need to make a dam around the base and embedded master to provide a receptacle for the silicone. Any material will do as long as it doesn't react with the silicone during the curing process. Plasticine, wood, or styrene strips work equally well, but maintaining their rigidity and form can be a problem. After painfully assembling and re-assembling boxes made from styrene strips held in place by globs of clay, I use the kid's old Lego blocks to form the dam. Now I can get the same size box every time without the effort of reinforcing and gluing the styrene.

Coastal Enterprises sells instructions for making silicone molds that include directions for making an adjustable wooden dam.

Height of the dam must be at least the thickness of the finished mold. I prefer molds about 1 1/4 to 1 1/2 inches thick as I find that they can withstand the wear and tear of bending required to release figures while not too flexible to permit excessive flash.

Fit the base over the base and master and again fill any gaps with small pieces of plasticine. When everything is solid and all the gaps filled, you are ready to start thinking about the mixing and pouring of the RTV silicone.

Pouring the Silicone

You'll need to have a general idea of how much silicone compound is needed before calculating the amount of catalyst required.

This can be done by filling a measuring cup or beaker with more than enough water to fill the mold box. Usually, 200 ml is about right as most molds require about 125 to 150 ml of RTV silicone.

Pour the water into the mold box to a depth of about a quarter of an inch above the top of the embedded master pattern. Subtract the amount of water remaining in the cup from 200 to determine the amount of compound required. By using a container graduated with millimeters instead of ounces, you'll be able to obtain a more precise measurement. Fill a plastic or styrene cup with an equal amount of water plus ten percent. Mark the height of the liquid on piece of tape stuck on the side of the cup. Depending upon the type catalyst used, you may need to draw a second line representing the amount to be added.

Thoroughly dry the plastic cup and pour in enough RTV silicone base to reach the lower line. Then slowly add the proper amount of catalyst, stirring well until no trace of the catalyst is evident. A coffee stirrer or tongue depressor is great for mixing and will be useful later to scrap the last of the mixed silicone out of the cup. Use a cheap brush or toothpick and carefully paint the mixture over the mold master, making sure to fill all crevices and depressions. After covering the master, pour the remainder of the mixture into a corner of the box and let gravity carry the silicone to all parts of the mold box.

Periodically pound the table alongside the mold to help air bubbles rise to the surface. Let everything sit in a warm (not hot) area for at least a day.

Once the silicone has cured, the dam can be removed and the plasticine peeled away. Place the completed part of the mold face up on the original surface. It is necessary to provide a barrier between the halves of the silicone mold to prevent the two from sticking. Several commercial sprays are available for this purpose, but I find a petroleum jelly such as vaseline perfectly acceptable. Cover the face of the mold with vaseline,

being careful to get the jelly into every nook and cranny. No harm will be done if the jelly gets on the master, but loss of detail can result if it is too thick. A hair blower can be used to warm the jelly, thus permitting better spreading.

Replace the dam and pour the second part of the mold in the same manner as the first. Again, allow 24-hour curing before the separating the halves of the mold. Use a hobby knife with a chisel blade or a table knife to separate the halves. If the procedures have been followed, the only imperfections should be small air bubbles. These can be easily trimmed from the lead casting using a modeler's knife. Let the mold cure for an additional day or two before casting. As with commercial molds, you may need to cut air channels to permit free ingress of lead while allowing trapped air to escape.

I've had only one problem during the curing process. This occurred when the silicone base and catalyst were mixed on a cold, damp day. After several days without complete setting, I decided to cut open the soft spots and add more silicone mixture (with a somewhat higher ratio of catalyst). A plastic syringe purchased at a dental supply store permitted the addition of the matrix in a safe and neat manner. I should think that hobby and craft stores would carry similar syringes.

In Closing

This article has provided the basic steps required to make your own molds. It is a simple process; perhaps the most important element is taking the time to think out everything beforehand.

Try it and be sure to let me know if you come up with some clever techniques. The next two articles will discuss some basic techniques used to convert simple commercial castings to represent different figures and poses.

Suppliers

- **K. R. Anderson Co., Inc.**
2800 Bowers Ave.
Santa Clara, CA 95051
(408) 727-2800
(Dow Corning 3120 Silicone with catalyst; US\$35 per lb plus postage)
- **The Castolite Co.**
P.O. Box 391
Woodstock, IL 60098
(Castamold SR; 1990 price US\$26.98 per lb plus postage)

- **Coastline Enterprises, Inc.**
P.O. Box 1053
Bricktown, NJ 08723
(908) 477-7948
(Instructions for Making Silicone Molds; US\$10 plus postage)
- **Dutkins' Collectibles**
1019 West Route 70
Cherry Hill, NJ 08002
(800) LIL ARMY

<http://theminaturespage.com/boards/topics.mv?id=32>

<http://www.alumilite.com/>

<http://www.dunken.com/>

<http://www.dutkins.com/index.cfm>

<http://www.miniaturemolds.com/mainframe.htm>

http://www.michtoy.com/MTSCnewSite/supplies_folder/casting/castingx.html

<http://www.hirstarts.com/>