

## **MAKING A FIBERGLASS MOLD**

### **THE PLUG**

In order to have a form from which to develop your mold, you must either build the article from scratch using wood, plaster, polyester putty, Formica, sheet metal, etc. or you must have on hand a completed article which you wish to duplicate. The latter is of course the fastest method. The plug is generally a male model exactly like the item you wish to fabricate in every detail. If the plug does not have draft (taper) then you will have difficulty getting parts off. If the plug has reverse bends, like many canoes, then you will need to make a split mold which can be spread or taken apart.

If the plug contains soft materials on its surface such as plaster, wood, or putty, then it will have to be sealed with lacquer or resin to fill the pores. If plaster is used, it must be oven dried and then sealed.

To prevent your mold from sticking to the plug, the plug must be coated with plastic film known as "PVA." This is a plastic dissolved in alcohol and has a green color. It can be brushed or sprayed on, but the best system is to spray on three thin coats, the first being a "mist coat." The appearance will then be green. Each coat must dry half an hour or so and there must be no pools or drips to blemish your mold surface. For the easiest possible parting, before applying the PVA, apply a soft wax (Partall #2) formulated for use with PVA. After the third coat of PVA has dried, a coating of this wax can be gently applied over it for easy parting.

### **THE MOLD**

The first step is to apply a gelcoat which will be the mold surface. The gelcoat must be "exterior gelcoat" (wax free). If many parts are to be taken off the mold, it is desirable to use a "tooling gelcoat" which is designed to give longer life in mold use. The gelcoat should be in contrasting color to the surface of the part you will make. Since most parts are light colored, black gelcoat is commonly used. This facilitates spraying up a uniform thickness of light colored gelcoat since the black will show through thin spots.

If the gelcoat is to be brushed on, two coats must be applied, and the first coat must cure several hours before the second coat is applied. The best means of gelcoat application is a simple gelcoat gun designed for the purpose and easy to clean. Air pressure of 80 to 90 pounds is desirable. Gelcoat must be applied at least 15 mils thick, or a quart to every 25 square feet of surface. If the plug was rough so that considerable sanding of the gelcoat will be necessary, then double the application. Before applying the gelcoat, it must of course, be catalyzed with MEK peroxide hardener, using from one to two percent.

When the gelcoat has cured so that it cannot be scratched off with the fingernail at the edge of the mold, which takes from 2 to 4 hours to overnight in cool or humid weather, you are ready for the "skin coat." This is a layer of  $\frac{3}{4}$  or 1 oz. fiberglass mat, thin enough so you can see and remove all air bubbles entrapped by the resin when you

“wet-out” the mat. The resin should be applied with a mohair roller or brush until no white fibers remain. Any air bubbles are then eliminated with a grooved plastic or metal laminating roller. The polyester resin used should be “lay-up resin,” which is wax-free. Be careful not to over-catalyze when laying up the glass. Above 75°F one 10-15 cc of hardener to the quart will generally suffice. Below 70°F, 20 cc per quart. Do not work below 65°F.

In laying up a fiberglass mold, warping can be avoided by allowing each layer to “kick” or gel before proceeding with the next layer. For a large mold, it is good to apply just one layer per day. After the “skin coat,” you can use 1½ oz. mat for a faster build-up. Generally, woven roving is not used in molds because the pattern transfers through the mold to the gelcoat. If it is necessary to use woven roving for strength in a large mold, it is applied after a thickness of 3 or 4 layers of mat has cured hard. The thickness required in a mold depends upon size and shape and the number of parts to be taken off. For a dinghy mold to be used only a few times, four layers of mat might be adequate.

### **REMOVING MOLD FROM THE PLUG**

Allow mold to cure several days if possible so it will hold its shape. The first step is to trim the excess laminate back to the molded edge. This is easily done with a saber saw and a metal-cutting blade. The edges are sanded carefully until the line between the mold and plug is exposed. Then a sharpened “tongue stick” is forced between mold and plug to separate the edges. The stick is then pulled clear around the plug until all edges are free and no bridges remain. Avoid using metal tools for this purpose as they will scratch the mold surface. Then the mold should pull free of the plug. If not, the parts can be flexed or pounded gently with a rubber mallet. If necessary, air or water can be forced under pressure between plug and mold. A hole can be drilled through the interface for this purpose. PVA is water soluble, which facilitates parting with water pressure.

### **POLISHING THE MOLD**

Depending upon the condition of the mold surface, it may have to be sanded with 220 grit working up to 600 grit wet or dry. The surface is then compounded with regular and fine finish compound formulated for fiberglass work. Best results can be achieved by using special compounds such as our “Heavy Duty Cleaner” followed by our “Sealer Glaze” to bring out a mirror finish.

Before using a mold, it should be allowed to cure a week or more if possible. Be sure to use PVA parting film and soft wax for the first 3 or 4 parts, after which a carnauba wax can be used.

### **GELCOAT PROBLEMS**

Alligatoring, or wrinkling, can result from:

1. Gelcoat too thin in some spots
2. Insufficient hardener, or hardener not mixed well enough.
3. Gelcoat not cured long enough before mat lay-up.

4. Acetone cleaner drips out of roller or brush during mat lay-up.