Making Fibreglass Moulds

The Plug: One of the biggest secrets to making a mould is in the preparation of the plug. It needs to be as near to perfect as you can get it. The finish is an epoxy based paint that has been polished to a mirror finish. If your plug is of a standard built up balsa design, it's best to cover it with 2 oz cloth, which is filled and primed before painting. If you use a solid plug of bass or similar wood, it's easy to seal the wood and then prime and paint. Sand your final primer with 400 grit until it's smooth.

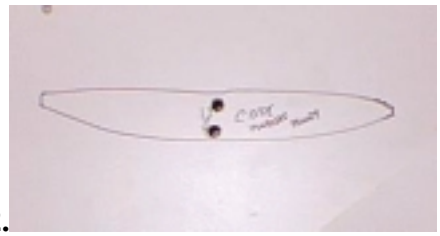
Once you have your primer sanded to satisfaction, it's time to start spraying with epoxy. LusterKote and appliance epoxy spray paint, work best. Some LusterKote paints, have problems with spattering and recommend that you stay away from the red. Appliance epoxy goes on smooth and gives a nice glossy finish, but its main problem is that it takes 5 days to completely cure.

Once your epoxy paint has cured, sand it in stages from 1000, 1500, to 2000 grit paper until you get the desired finish. The paint may stay a little dull but will shine up once you start applying wax. The next step is to start applying coats of wax. The wax should not be silicone based. Several coats of wax should be applied and buffed off with about an hour between coats. The final coat should be left to dry overnight once it is buffed off (*pic. 1*).

The Parting Board: Once your plug is ready to go it's time to work on the parting board. The best material to use is Melamine covered particleboard that is used for shelving. It is fairly inexpensive and can be bought in various sizes at your local hardware. Cut the particleboard large enough to leave 6" of board beyond both ends of the plug. Use a 2 x 4 cut to size to make a frame around the bottom of the parting plane. Use long wood screws to mount the frame to the board.

Next, lay the plug on the board and make an outline of the plug. Drill a couple of holes in the middle of the "hole" to let you start your cutting tool in the board (*pic. 2*). Use a jigsaw to rough-cut the hole and a router (*pic. 3*) with a straight bit to take the hole to its final size. On smaller moulds you can set the router bit to make a step in the side of the board that you can rest the plug on. This makes it easier to support the plug in the board. Test fit the plug in the board and keep enlarging the hole until the plug drops in (*pic. 4*). Don't worry about getting the hole to match the plug perfectly. You'll fill in the gap later.

1.


2.


3.

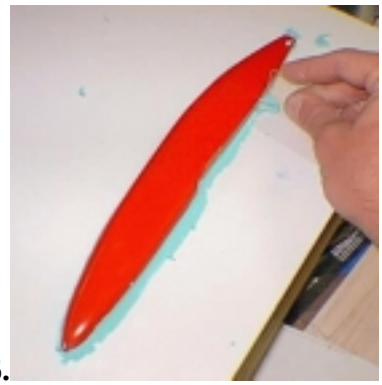

4.


Once you're satisfied with the fit of the plug, it's time to mount the plug in the board and prepare it for molding. Measure the center of your plug and mark it with a permanent marker. That mark will be aligned with the top of the board. Use modelling clay to support the plug in the board and form a seal around the plug. Put a small amount of clay around the step in the board and press the plug into it until the mark you made is even with the top of the board. You can also support the bottom of the plug with balsa or other wood.

Make a "rod" of clay about 1/4" in diameter buy rolling it between your hands. **Tip: Putting modelling clay in a bowl that is floating in warm/hot water will help to warm up the clay and make it easier to use**. Press the clay along the gap between the plug and the parting plane, making sure that the clay is squeezed down into the board. Also make sure that you use enough clay to leave it sticking up above the top of the board. Do this all around the plug (*pic. 5*). **Note: be very careful not to push on the mould or you take the risk of pushing it through the board or breaking the seal that you're working on.**

Once you have a good seal around the board, it's time to remove the excess clay. Use a piece of plastic laminate like that is used for laminating pictures or ID cards for this job, but a putty knife or something like that may work as well (*pic. 6*). You want to make sure that you have a nice level surface between the parting plane and the plug. **Note: Be careful NOT to scratch or dent your plug while removing the wax**. Once you're satisfied with the seam, very carefully wax the board and the plug again.

5. 

6. 

Applying the first layer of resin: Once you've waxed and buffed the board and plug it's time to put on your first coat of resin. Use an epoxy based coating resin. Mix an appropriate amount of coating resin being careful not to use too much hardener. Excess heat generated when the resin kicks can do real mean things to your plug!

Using an acid brush put a generous coat of resin around the plug at the seam between the plug and the parting board (*pic. 8*). Continue putting the resin on until the plug is completely covered. Also spread a thin layer of resin out on the parting board about 2" from the edge of the plug (*pic. 9*). Draw a line 2" from the plug to determine how far out I need to go with the resin. Make sure that all of the sharp angles or curves on your plug, as well as the seam, have plenty of resin on them and there aren't any air bubbles. Once satisfied with the resin coat, clean up your work area and get ready to cut your cloth while the resin hardens.

7. 

8. 

9. 

Adding the fibreglass cloth: Start preparing to add the fibreglass cloth while the resin hardens (*pic. 10*). Start cutting your glass cloth by cutting pieces that are about 1" bigger than the plug. On larger plugs you'll probably need to cut smaller pieces. All cloth should be cut at 45 degrees to the bias (*pic. 11*). Cut some 2" wide strips that will be used to go around the edge of the plug. The amount of cloth that you need is determined by how big the mould will be. Use 6 oz cloth for the moulds. Line the outer edges of the moulds with 1" wide fibreglass tape. This adds strength to the mould and also helps to clean up the edges.

Once the coating resin has cured to a tack, it's time to start adding the cloth. Mix up a batch of resin **(Use tooling resin for this next step, as it is extremely strong and is made specifically for making moulds)**. Brush on a coat of resin and start laying on the glass, starting with the 2" wide strips around the seam of the plug. Brush the epoxy through the cloth until it's saturated. Work around the plug until you've surrounded the seam, working out any air bubbles as you go. Once complete, start laying the larger pieces of cloth onto the plug. Working from one end to the other, make sure the cloth is saturated and that all bubbles are removed. Lay up enough glass to make sure that it extends out at least 2" from the plug to the edge of the gel coated area (*pic. 12*). Continue laying up glass until you have the desired amount on the mould. Finish by adding 1" wide glass tape around the edge of the mould.

Trimming mould: Wait until the resin is almost set but still "green" (usually overnight depending on how much hardener you've used.) Take a utility knife and trim the edges of the mould back to the 1" tape. If you wait until the resin has cured it will take a large amount of work to trim the edges back.

10. 

11. 

12. 

Removing the mould: After the mould has cured (let it set for a couple of days) it can be lifted from the parting board. Take a wood wedge or piece of laminating plastic and work it under one edge of the mould (*pic. 13*). Gently work it toward the plug and pull it along the side of the mould. Your mould will release and pop off of the parting board with your plug in tact (*pic. 14*).

13. 

14. 

Making the second half: Once you have the mould off of the board, you will need to clean up the seam. Clean the modelling clay off of the mould and plug. Wax will help remove the clay. Check the seam around the plug to see if it is flat and smooth. If not, remove the plug from the mould by twisting the mould to break the seal between the mould and the plug. If needed, work a soft wedge between the mould and the plug. Again, use the laminating plastic here as it flexes and wraps around the plug to help release it. Use a sanding block to level out the area around the seam and put the plug back in the mould. Wax everything again.

You'll need to make keys in the mould so you can align two halves when making a part. Use a round bit in a Dremel tool to make a slot about 1/8" deep and 1/4" long. Make several of these slots around the perimeter of the mould. Wax the mould again, making sure to get wax down inside the keys.

Repeat the glassing process starting with the coating resin and ending with the glass cloth and tooling resin as outlined above. Once the mould has completely cured, separate the halves using a soft wedge of laminating plastic and remove the plug as described. Let the mould cure for a week before you start waxing in preparation for making a part.