

MOLDED Balsa SHELLS BY WINDY URTNOWSKI

Almost every type of model can benefit from parts molded from thin sheets of balsa to form "shells." This is especially true when light weight and maximum strength are priorities. A carved block offers very little grain-direction strength, but a molded piece has excellent strength derived from the grain.

Another benefit is that there is almost always a savings in time. Carving a turtledeck or fuselage top from a solid block and then hollowing it out is a common way of building fuselage tops and bottoms. Unfortunately, not only is the carving process laborious and prone to error (who hasn't had a problem trying to keep uniform wall thickness or going through?), but also, the cost of large blocks of very light-weight balsa is almost unbelievable these days. Once you hollow the block, to make another, similar ship, you would have to carve another block over again, and of course, buy another relatively expensive piece of wood.

On the other hand, you can turn a carved but as yet un-hollowed block into a mold much more quickly than it would take to hollow out the block. You would have to buy the block and do the original carving either way, but from that point on, the choice is either to hollow or to spend a bit less time and make a mold, with the advantage of then being able to make as many parts as you like, quickly and accurately, using inexpensive sheets instead of expensive blocks. If you tend to build models on the heavy side due to "thick" hollowing techniques, you will benefit even more.

At first, molding may appear difficult to do, but not long into a project you realize that it's almost always quicker to do than you first thought. After a few trial runs, you can replicate parts quickly, over and over, with very little effort. The technique described in this article has been easily adopted by many entry-level modelers in our club, and in large clubs, you may want to share molds for popular designs. We now have molds for about ten very popular designs, and they get used regularly.

So, if you think you'd like to try molding balsa, here are some points that will help you succeed right away and avoid pitfalls.

Some fuselages with complex or convex shapes may not be good choices for your first attempt. My Spitfire was molded in three separate pieces: nose section, turtledeck, and one-piece fuselage bottom. There were no radical shapes, so it was extremely easy, and I made usable parts on my first attempt. Following this technique, you should have success right away, and even if you don't, making corrections is very easy. Let me take you through a typical fuselage top, as an example.

Build the fuselage up to the point of carving the top block.

Tack glue your block on and carve to final shape, but don't final-sand yet.

Always try to use a fairly light-weight block to carve the plug-it's easier to carve, contour, and block-sand to final shape than hard balsa is. Four to six-pound wood is ideal, but six to eight-pound wood will work fine, with just a bit more carving.

A trick scale modelers often use is to make female templates at various fuselage cross-sections to insure symmetrical side-to-side profiles.

Pop off the block now-you need to reduce its size slightly.

One effective way is to take a marker pen and "paint" the wood surface.

Once you sand this off, you've under-sized the plug it by about 1/32 of an inch.

Depending on the thickness of your shell, you may want to repeat this step, but don't worry if you make it a bit too small-there's a trick I found to fix that easily.

After the undersizing operation, lay the block back on the fuselage, and you should see that it's a bit smaller than the sides' width from end to end. It's not critical at all, as the finished shells are quite flexible and forgiving when final installation time

Originally, I'd mold right over this under-sized block, but getting the right "edge" to fit against the fuselage was difficult. Instead, here's a foolproof way to do this accurately:

First, cut or sand a slight radius on the joining bottom edges of the block.

Next, glue the mold block to a piece of half-inch balsa sheet, then use a jigsaw to match the outline of the carved block to the base piece-do this carefully.

Finally, glue a piece of 1/16-inch wire in each "joint" between the mold block and the base, where you created the radius. The wire will leave an impression in the molded final shell, showing the correct "trim" line. At this point, you're already a few hours ahead of the guy with a hollowing knife, and your mold is ready for a test to see how accurate it is. Molded balsa is actually very forgiving-to work well, fits don't need to be as accurate as you might think at first, and even if you demand perfection, it isn't difficult to attain.

Select a sheet of 1/8-inch or 3/32-inch four to six-pound A-grain balsa that will cover the whole mold and the sides of the base when wrapped around. (Use only A-grain sheets for molding parts-C-grain tends to split.) If you need to splice the sheet to make it wide enough, the glue joints should go as close to the edges as possible. Rough-trim the sheet so it does not go beyond the edges of the base when wrapped around.

Now, soak the sheet with ammonia, Windex, or water until it is thoroughly soaked (about five minutes). During this time you can pre-bend the sheet around the mold by hand, just to soften it up. Ammonia has a strong odor, so it's nice to do this step in a garage or outdoors, if possible. Windex and water should be used if you're sensitive to ammonia smells. They work almost as well as ammonia-just allow a little extra soaking time.

You'll need a few Ace bandages to wrap the sheet tightly over the mold-the best ones are the kind that stick to themselves. They're available in drug stores and last forever. I've found that the easiest way is to start wrapping in the middle and work toward the end, but you could start at the front and work toward the back, also. The idea is to make a "mummy," with the wrap reasonably tight all around. Put a pin in the end of the wrap when it's done, so it won't unwind while everything is drying. Let this dry 24 hours with the bandage in place.

The next day, unwind the wrap, and peel the shell off carefully. You'll see the impression of the wire on the inside face-trim off the extra wood at this time. I use an old sanding belt contact-cemented to my building table to true up the shell edges before installation. Once you're satisfied with the shell's fit, it's ready for a final sanding. Frank McMillan had a good tip: he recommends doing most of the sanding of a shell on the mold, for best results. This works great, and I recommend it.

If the shell is too big, sand down the mold some more and make another shell. If it's too small, you can put layers of masking tape on the mold, or a sheet (or two) of 1/32-inch under your next mold sheet and mold the 1/32-inch and 1/8-inch at the same time to make a slightly larger shell. This also allows one mold to yield several sizes of shells for different designs.

About the time you're finished molding, you're even with the guy who's hollowing, but you can now make as many parts as you like, every one straight, true, and of uniform wall thickness. Keep in mind that the same mold can make parts that will fit similar-sized ships. For instance, my Spitfire turtledeck mold makes a perfect Nobler top-rear shell. Most nose molds are similar and interchangeable, so once you do a few sizes, you can make custom shells for almost every model.

Another technique is to laminate several layers of 1/32-inch sheet with glass cloth or carbon fiber veil between the layers. First, do all the shaping by molding three or four pieces right on top of themselves, all at once. Once they're shaped and dried, separate the sheets, and using slow-cure epoxy, sandwich the layers of glass or carbon fiber veil in between, on the mold. A good tip here is to wrap the mold with Saran Wrap to prevent any of the squeezed-out epoxy from sticking to the

mold. The Ace bandage pressure will squeeze out almost all the extra resin, making an extremely strong, extremely light part.

On complex designs, you may want to add laminations of 1/32-inch sheet inside the shell, especially where it butts up to the spinner ring. Adding cooling vents of 1/64-inch molded plywood is a nice touch, too. Use a piece of tubing for the mold, soak the plywood, and wrap it in the direction opposite to the grain of the outer lamination.

To install a finished shell, I glue about six inches at a time with CA, alternating sides and checking that things are staying aligned, then run a bead of CA down the seams on the inside and fine-sand the final exterior joints.

I videotaped the whole molding operation for modelers who'd like more information. The tape is a full two hours long and is available from John Brodak.

Once you've installed your first shell, look over at that mold and smile, because building your next ship will take a fraction of the time, and with the money you save by not having to buy another block, you can take your wife out for pizza.

Using this technology, you'll quickly see other parts that lend themselves to molding. Turtledecks, wing tips, leading edges, hollow rockets, bombs-the ideas are limited only by your creativity. When Joe Adamusko and I did our Spitfires, we pre-molded the leading edge sheets of the elliptical wings. You can even take an old wing and use it to mold leading edge sheeting, or just carve out a mold piece from styrofoam. I've made wrapped stabilizer and rudder leading edges, and hollowed rockets for my F-16. Once you run off a few parts, you'll have ideas of your own, too. It's a modeling technique you'll find many unique uses for.