

Making glass fibre cowls

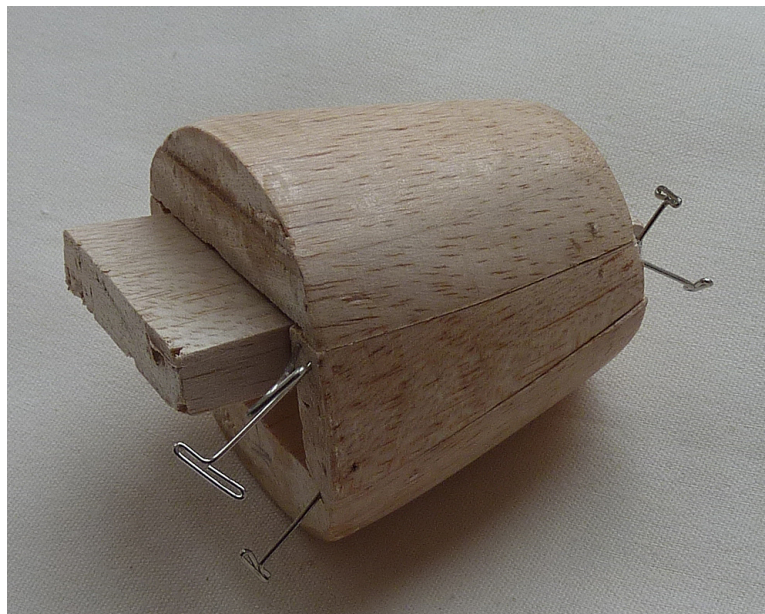
Have you noticed how many models have fuselages that are chopped off square at the front with the motor sticking out? Well of course, it's because the nose takes the brunt of a sharp stop and cowls are weak. Often you can't buy a replacement and they are difficult to make. Or are they?

After making a neat cowl repair I have found a solution. The cowl was thin polystyrene and was in six pieces. Using a steady hand, thin CA and accelerator spray I jigsawed the fragments back together, without getting my hands stuck to any. I then used Eze-Kote and glass cloth over the outside to make a cowl that was much stronger than the original and to my surprise fitted perfectly. Even the fitting screw brackets were correct. Cowls don't have to be very strong but must be thick enough not to resonate

I decided this was the way to make a cowl for an electric glider. This needed to be elliptical tapering to circular at the spinner. I thought I would make a re-usable male mould out of balsa. The tapering sides would slide out releasing the tapering top and bottom parts. There would be a central key, which would push the parts outwards and would be removed first. I would shape the balsa mould then tightly cover it with cling film as a release agent. The cowl's inside finish wouldn't matter. If it went badly wrong and I couldn't slide the parts out I'd have to chew them out. However I hoped the mould would be re-usable.

The first question was a geometric one. For a given circle radius how thick would the sheet balsa have to be to allow the box shape to be trimmed into a circle? Dredging Euclid out of my brain I calculated the thickness to be 0.28 of the radius. If you calculate thickness using about a third of the radius then there would be margin for strength. Size the wood for the worst case which is the largest circular cross-section and the rest should be fine. Obviously square-ish shapes could make do with thinner wood. In the end, however, I decided to have two layers of 10 mm balsa top and bottom and a single layer for the sides. I made it several millimetres too long to allow for trimming rough edges.

All went to plan. I shaped the male mould and gave it two sanded coats of Eze-Kote to aid release. With a new scalpel blade I sliced the sides and tops apart. Note the taper to the back. I then pinned them back together with the key as shown here.



I stretched kitchen clingfilm over the mould with overlap at the edges to avoid sticking. I gave the clingfilm two sanded coats of Eze-Kote, then one layer of 48 g/m² glass cloth. This was followed by two more sanded coats of Eze-Kote. I then trimmed the edges with the scalpel, pulled out the key and tried to spring the other parts apart. I only needed to prise one or two parts with a blade, otherwise it all fell apart easily.



First layer of glass

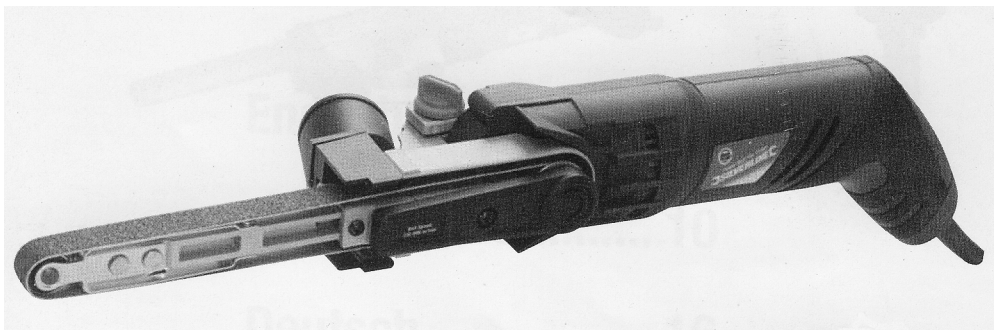
The resulting moulded cowl was much too flexible. I think Eze-Kote, being a polyester resin, is less rigid than epoxy when cured, so I reassembled the mould parts and wrapped them in some more clingfilm to avoid adhesion at the edges. I applied two more layers of 48 g/m² glass with several more coats of Eze-Kote, sanded between. This felt rigid enough but I decided to glue in ply annular shapes to make the ends even more rigid and to aid mounting on the fuselage. I made the ply out of four cross-laminations of 1mm birch ply glued with PVA.

After sanding some more I felt the surface still wasn't smooth enough. I decided to apply several coats of primer with the airbrush. Still not good enough.



Untrimmed cowl

Then I bought a great new tool, called a belt file. It's a Silverline one and cost £28.50 on eBay. I gave the cowl a real bashing with it on the slowest speed setting using a 120 grit belt. Then when I was happy that it was reasonably flat I applied some more glass, 24 g/m² this time, and coats of Eze-Kote.



The next step was to glue in the ply end-plates and trim the fibreglass to length. The plates made the whole thing very rigid. Here is the completed cowl prior to painting. The rear view shows that the cowl is locked in position by the cutouts for the motor mount. I used a diamond holesaw to cut the hole in the front as that would be visible when the spinner was off.



I puzzled over how to fix the cowl to the fuselage. I considered screws but access was difficult both from front and back. I decided to go for two pairs of neodymium magnets.

Final weight before painting was 13.2 g.

Even after cellulose filler and sprayed primer, the final result wasn't perfectly smooth. The next will be better after lessons learned. However I proved that the method worked.

Lessons learned

1 Collapsible male moulds are quite easy to make out of balsa.

2 Cling film works as a release agent but it is difficult to get it really smooth. It might be easier on a larger cowl. I will experiment with coating the wood parts with a release agent instead. Provided the parts can be separated the internal ridges won't matter. I will experiment with release agent on scrap wood and a few coats of Eze-Kote.

3 It might be possible to achieve rigidity with fewer coats of epoxy resin even though making several lots of two-part for a small component would be wasteful. Eze-Kote seems fine on this smallish cowl though. You need to use more layers of glass and resin. I think that the convenience of Eze-Kote makes this worthwhile and the end-plates removed any doubts about rigidity.

4 Don't be afraid to sand aggressively. You can reapply glass and resin. It weighs very little. Keep the sandings off your skin and out of your lungs.

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