Canard Cowl Made Easy

Here are some instructions how to make a cowl with your favorite neighborhood home building products. A friend of mine and I came up with this idea years ago when we found that using pour foam or other means of making a big cloud around your engine to carve up was messy, expensive, and tedious (making one side symmetrical to the other). By the time you get to this part of the build you'll be an expert with epoxy and glass and you'll find this method fun to do.

Before you begin you need to have the engine, prop extension, starter, intake, exhaust, and wings attached. This is all for clearances and proper fit to your configuration.

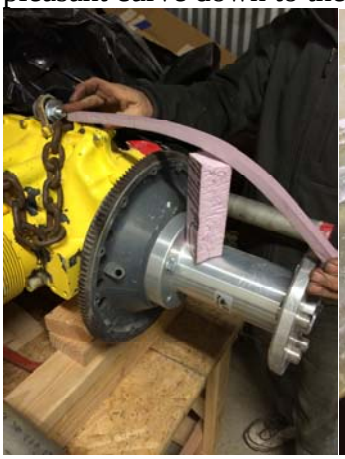
You'll need:
A sheet of the 1/2 inch, 3/4, or 1 inch pink 4x8 sheet of wall insulating foam. Any of them work fine. I found the ½ inch to work best for curves, 1 inch for stiff areas and supports. Read further to understand.
A bucket of the lightweight easy sanding drywall mud. Get the stuff easiest to sand.
A piece of scrap plywood or foam about 1 foot by 3 foot.
Enough UNI to cover 3 plies on top and 3 plies on the bottom cowl.
Enough BID of one ply on top, one on bottom.
Epoxy of course.
Some newspaper, plastic, or masking paper to protect the wings and fuse from epoxy.
A roll of clear packing tape.
A couple rattle cans of shellac or fast drying paint (any color) to seal the drywall goo.
Tools - A hot glue gun and plenty of glue sticks, putty knife for the drywall goo, sandpaper for the drywall goo (100 is good).

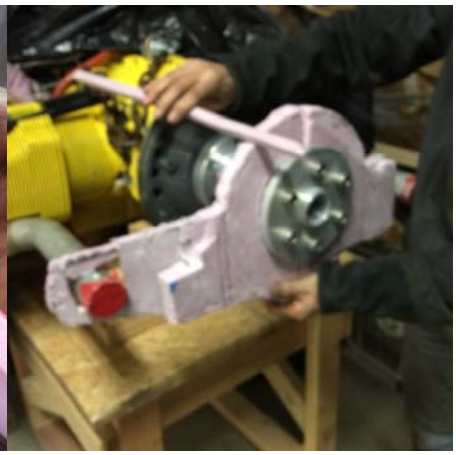
1) Mask off the wing roots and around the fuse. Masking the engine is not necessary.

2) Grab your scrap piece of plywood and make a clearance block to surround your prop extension. Make holes to bolt it to the prop extension. Here you can see I used foam.

3) Now cut 1 inch wide strips from the foam board. Make a pile because you'll go through quite a bit. Make some ½ inch wide as well. They'll come in handy in some places. I used a band saw and just flew through a sheet in no time.

4) Warm up the glue gun and attach the end of the first strip to the firewall at the center edge. You can glue it to the cowl lip if you already made one. If not stick it right to the firewall. Attach the strip end slightly lower (about 1/16 – 1/8 inch) than the fuselage surface. This will make room for the drywall goo thickness and the layers of glass. Don't worry it does not have to be precise. Lots of layers to fix that. Note – when making the bottom cowl you will need to make a filler block for the NACA scoop and attach the strip to the center of the block. Next, make a nice contour and attach the other end to the center edge of the clearance block. Sorry I don't have exact photos of this step so I hope you get the idea. You can notice immediately after the glue dries to the firewall you can make a pleasant curve down to the prop extension.





5) You may not need this step but my 540 cowl is a bit longer. I made a piece of foam for each side the shape of my wing root to trailing edge then made it about 6 inches longer. On this photo you can see it attached to the firewall at the same level and width of the spar. I made sure the "point" was level with the trailing edge then supported it with more pieces of foam and the glue gun. Notice in this pic I have the NACA blocked with a piece of foam as the attach point for the center strips.

6) Now attach a piece end to the trailing edge of the wing and the other to the farthest out ward edge of the clearance surround block. This you can make straight or curve it to your liking.

7) Next is to take one strip and glue it to the firewall next to the center strip and the other end to the clearance block. Do the same on the other side of the center strip the same way. Continue doing this to the left, then right adding more strips until you get a nice contoured surface around the firewall to the clearance block. You should run out of space when you get to the outside edge center of the block intersection to the wing trailing edge foam strip. Don't worry about gaps. Gob all the glue between the strips and make small supports to the engine to make it all a bit more rigid. You will have gaps. Here is where the foam shines. Cut some strips to fill the gaps. You can see here I had a large gap on the side I made a triangle piece and glued it in. No biggie.

8) The intersection of the wing transition to the shape of the engine surround is gluing smaller strips to the wing root and the surround in the opposite direction. Notice how I added strips to make the transition from the firewall, strake, and wing root to the end of the cowl (clearance block to a pleasant contour to my liking. The idea of the strips is to make it easy for the vision you have of your cowl to materialize the way you like it. Both left and right sides naturally become symmetrical this way and the strips dictate that you have a good continuous flow from front to back. If you don't like what you see at this point pop off some strips and start over. You can see on mine I have the bulge from the sump going all the way back. I've seen some canards with just a sump bulge and leave it at that. You exhaust will also dictate

where you want it to contour as well. I have a friend who used this method with the strips exiting to a rectangle. To each their own.

9) You can now see your shape well. Carve down some sharp protruding corners or edges at this time with some of that 40 grit you have laying around. When it all feels stiff from adding supports and more glue start slathering on the drywall goo. Let it dry a day before sanding. It should look like this photo when done.

10) Next, sand it smooth making any corrections with more goo. Don't worry about cracks. The tape doesn't care. Be sure you sand down well below the lip of the wings and fuse areas. Making a slight bit of clearance for the plies of fiberglass. If the glass layers are higher than the wing and fuse you can compensate later with your micro finishing. Believe me I had no problem here. Air gun or vacuum all the dust off. Spray the surface with the shellac or fast drying paint. This is only to seal the surface so the packing tape sticks. I final sanded mine with 220 and tried without the shellac. It stuck fairly well and that's all you need. The idea is so when you pull off the cured cowl the dried goo doesn't come with it.
11) Apply packing tape to the surface of the "mold" (yeah it's a mold now) on a diagonal. Why diagonal? There's so many contours now you'll have a hard time getting it flat without kinks

and creases.

12) When all taped up lay down your three plies of UNI. One parallel to the plane fuse, one at 45 degrees to the right, one at 45 degrees to the left. Why these directions? If you go perpendicular with the UNI you will get more kinks and bumps on those sharp corners and ridges. One top ply of BID to keep it all nice and uniform.
13) You'll thank me later for this trick – Lay down one ply of 2 or 3 inch BID tape OVER the cowl and wing/fuse intersections if you did not already get some glass over these areas. Be sure the wings and fuse are covered so they don't get stuck to the cowl. This is not a flange (that's later on the inside). This overlap layer will help you align the cowl for the plans attach flanges later. I used small sheet metal screws to hold the cowl in place to the wings and fuse from the outside –in. Layup your flanges, let cure then back out the screws. Better than Bondo and popsicle sticks. Cover it with peel ply strips (no sheets).

14) This was a blast to do and I've got this down to a weekend including Friday afternoon and well, maybe Monday afternoon. Waiting for the drywall goo to dry was the most frustrating. And I'd say flipping the plane to get both halves was the hardest part. I have a friend who followed my lead and did the bottom cowl underneath. I guess if you can get the first ply to stick upside down you're all set. It would seem flipping the plane over would be your best bet. Make the cowl bottom, let it cure, make your flanges, and finish the entire bottom of the

plane. Flip it right side up then make the top cowl and finish…..or vise-versa. Your plane, your plan. Have fun! If you have any questions email me at gnorm76@gmail.com
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