Dave Ronneberg’s easy Cowl mold construction…

You may know that Dave Ronneberg was interviewed on videotape in Canard Squadron II at Santa Monica when he and I were young men. He discussed the installation of cowls – he had molds then built very traditionally and the most modern approach to cowls at that time. He has since designed the Berkut cowls with armpit cooling and upswept bottom cowl (like Hertzler) only possible with a forward facing injection body. Then he designed the O-540 Berkut cowls. He rapidly came to the conclusion that cooling is not really a comparison of pressure in the intake side versus the output side of the fins (delta P)…rather the more you can direct the incoming air right at the thing to be cooled, the better the cooling…his philosophy has been very successful.

He tells me that the armpit scoops were designed for one specific reason. He was tired of working for a couple of months at the end of every Long EZ O-320 build trying to get the cooling just right with all kinds of tricks – it seemed each installation needed special care to get good cooling…but with the armpit scoops he flies it for the first few test flights and knows how to adjust the cooling between the front and rear cylinders on each side. Mike Melvill has designed Long EZ cowls with Dave’s armpit scoop approach and is very happy with the cooling. Dave’s Berkut cowls are available for sale. Melvill’s Long EZ version (which are a little oversized) are available through Featherlite – a little pricey. Since the basic Berkut, he’s developed armpit type cowls for the L3 military drone program – where he learned a lot about mold making from a Lotus race car mold maker from England, Barry Kobernick. And recently he has developed cowl molds for a stock Cozy III, a very highly modified Cozy III (originally designed around a Rotary engine) and his son’s Long EZ. The Berkut center scoop is for looks more than anything else – you only really need the armpit scoops. He puts the Oil cooler under the starter, centered in the cowl of the O-360 installation and tilted up and kind of in a 7th cylinder position in the rear baffle for the O-540.

Asked how he develops a new mold, he said it is real work and takes some real art. First you need the firewall/turtle deck, the spar, the wings and either a dummy engine or the final engine (if local he might have the dummy to use) and for a dummy you need cylinder heads and the 12” back plate of the spinner and he prefers the 8” prop extension.

Dave bends ½” foam around the cylinders for cowl side clearance. He puts ¾ foam clearance on the top of the cylinders and then fills in the foam from turtle deck to spinner back plate for the top. After the foam is formed he lays up 1 ply of glass, adds micro and sands with 250 grit sand paper. He then brushes on PVA, adds wax on the basic cowl form and marks “part lines” where you will be cutting the cowl. He then applies 2 plies of BID with west system epoxy and after 2 hours adds wet micro about ¼” thick and then lays up 2 more plies of BID on top and to that he attaches a simple wood frame that will keep the cowl steady when turned over as a mold. After the top mold cures he finds the location (easy with the dummy engine) of the center of the oil filler tube and marks the mold where that is center – he waxes up the mold around that center, then lays up 8 plies of Carbon on the mold for the cowl door, with a straight side for the hinge, likely on the leading edge so the wind keeps it streamlined if you forget to secure it. He then brakes it free, trims the sides so that the it has clean edges and then sticks it down again, waxes the whole mold and the lower side of the new door and lays up the top cowl with the following schedule – 3 plies of carbon over the whole surface, 2” around front and sides for attachment support – the no the trailing edge of the cowl he adds 4” of 2ply carbon on the trailing edge.

After flipping the fuselage over, he puts injection on a 4” 90 degree bend to the bottom of the oil pan on the O-360. He actually modifies the O-540 pan to bring the trailing side higher and then molds the bottom as closely and smoothly as possible from the fuselage bottom to the spinner back plate and from the spar bottom around the intake tubes to the trailing edge. He puts PVC pipe over the pipes if they stick out the trailing edge of the cowl. He then duct tapes the pipes. (For the O-540 he makes a 3 into 1 pipe, specially modifying the injection system to make more room for the pipes. I have photos.) He uses the same foam/glass, PVA, Wax, part lines, 2 ply west glass, ¼” west micro, 2ply glass/wood frame as for the top cowl.

Please ask me questions so I can see anything I’ve left confusing for the next guy.

Thanks to Dave Ronneberg - Beagle