

Using the steel wing templates for the Cozy MkIV

First, how they were made. I obtained the Eppler 1230 airfoil coordinates from the University of Illinois. I could not get a complete description of the modifications made by Rutan from Nat. He did not know all the details. I sized and rotated the original Eppler points using the numbers from the plans for cord length and thickness as well as washout at each template station. Then I overlaid the plans drawing and noted the differences. The cusp on the upper trailing edge was removed and some minor reshaping of the lower trailing about $\frac{1}{4}$ of the airfoil. I used the plans shape for this area. I then calculated the spar trough depth for each station using the layup schedule from the plans and added this as well as the fish tail. This data was oversized .032 for the cut templates and taken to a CNC laser cutter to produce the finished results. The tip template is a special case, as the thickness of the attachment for the winglets causes significant changes. This template is copied from the plans by accurately measuring the drawing best I could.

There are two sets of templates, one with the wire rest on the leading edge, one without. The one with the rest is .032 oversize and is used for the wire cut. The other set can be used to sand to size by removing the first set and attaching the second set using the same screw holes. Then using a long sanding spline, sanding to the on-size template will give a very accurate result.

A level is not needed to use these; only requirement is to have a flat surface to work from. This is important regardless of the template being used. First, prepare the foam blocks per the plans. Cut to size accurately. The bottom surface should be flat against the table with the ends perpendicular to the surface. There are two aluminum blocks each with two $\frac{1}{4}$ inch holes in them. These were made from scrap and are not square; wish I had taken the time to square them. Place the blocks vertically on the table with the holes on the upper end. Each template has two $\frac{1}{4}$ inch holes on the level line, the holes define level, not the drawn line. Insert the dowel pins into the blocks and through the $\frac{1}{4}$ holes of the template. This will level the template and properly position it vertically. On all except the tip template, use the lower hole in the blocks. I had to raise the holes in the tip template to keep both in the template, use the upper holes in the blocks for this template only. I pressed the dowel pins into the foam a little to locate the template, leading edge of template aligned with leading edge of foam. Attach the template with dry wall screws, I used about 2 inch long ones. Remove the aluminum blocks and dowel pins and cut away.

After the cuts are made, you can remove the templates and attach the on size ones using the same holes for the screws. Lay the core in the piece that was cut away and sand to size. There will be very little sanding, if you cut too slow or too hot, there may not be anything left to sand. If I were doing this over again, the cut templates would be at least .050 over size. For the sanding spline, I glued strips of coarse sandpaper to the edge of a 6 foot aluminum level. These are reasonably straight and are not overly expensive. Keep the spline aligned with the long axis of the core to insure maintaining the correct shape.

If you find any problem with this explanation, please contact me, this is written years after I cut my wings. My airplane, N100EP, has been flying now for several years. There are no shims on the wing mounting bolts, wings must be true.

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