A JIG FOR IMPARTING TWIST IN A FOAM CORE WING

While it may be possible to construct a swept 'wing without incorporating any twist at all, most of us would like to have a degree or two of washout to assure us that any tip stalling problems will be minor. So we've cranked in the twist as we cut our cores by simply placing the root and tip templates at an angle to each other. This method spreads the twist evenly across the semi-span of the wing.

When we consider that the wing tips are taking the place of the tail assembly, it seems immediately obvious that we should concentrate the twist at the end of the wing. Placing the twist at the end of the wing will inhibit tip stalling and will also be a small step toward increased efficiency, as none of the lifting center portion of the 'wing will be twisted to a lower angle of attack.

Featured this month is a jig for cutting foam core wings. Of interest to tailless fans is the jig's ability to automatically cut the desired washout into the 'wing. Specifically, this jig is set up to begin the twist at the one half semi-span point; the root end wing half has no twist at all. The entire set up is adjustable to construction parameters.

Our jig was started with a base of flooring plywood. With a thickness of well over an inch, this three foot by eight foot base is heavy, but it is also very resistant to both bending and warping. All of the wooden strips are of 3/4 inch pine and are nailed in position.

We utilize aluminum roof flashing for template material, making a female template for the wing's lower surface and a male template for the upper. The templates are mounted one at a time between two pieces of pine stock fixed an appropriate distance apart. You will no doubt want some sort of locking mechanism to hold the templates in place in order to get consistent alignment. As these aluminum templates absorb heat from the cutting wire, be sure to mount the

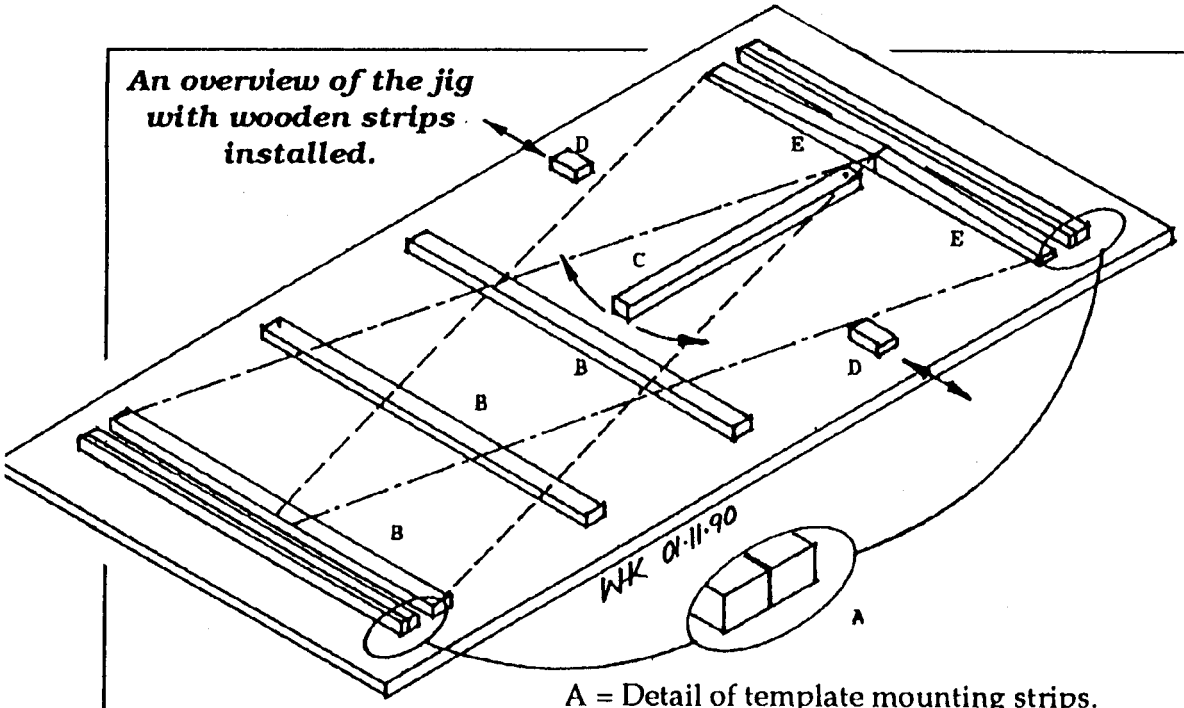
templates at least an inch away from the ends of the foam.

The root of the wing is always positioned at the left end of the jig, as shown in the drawing; the tip will always be at the right end, resting on the bevelled support strip. The bevel is set to the washout desired at the wing tip, but in the reversed direction. Note that after weighting down the foam block that the leading edge is straight, while the trailing edge is lower at the tips. After cutting, when you place the foam beds on a flat surface, the correct amount of washout (trailing edge up) will be automatically built in, along with the distribution of the twist across the span.

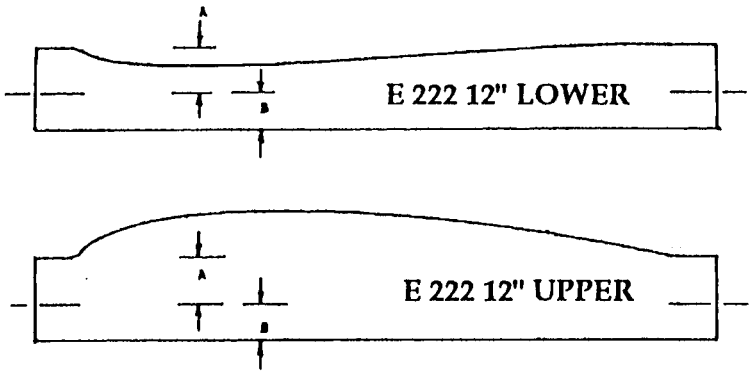
The drawing shows a movable leading edge brace (the swinging piece) and positionable trailing edge blocks. By varying their thickness and position, these TE blocks can control the rate of twist across this half of the semi-span. The left wing is outlined by the "dashed" line, the right by the "dash-dot-dash" line.

Our jig is easily adjusted. We just pull a few nails and tack the wooden strips in their new position(s). As we said before, the jig is heavy and is not easily moved. For this reason, some of you might want to try a good hollow core door as the base and use 3M "77" spray to "tack" the strips in position. An alternative that is a bit more sturdy would be to epoxy together a sandwich of two pieces of 1/4 inch plywood with one inch foam between, using a giant vacuum bag.

Like most of our projects, we cannot claim credit for much of this. First, the concept of twisting the foam before cutting, and "shelling" it while on a flat surface, is a simplified version of a process for creating elliptical wings of foam for use with F3D pylon racers. This was described in an RC Modeler article by Jaromir Bily. Second, the use of female and male templates is the recommendation of Bob Bayard of the South Bay Soaring Society in SBSS' Silent Flyer newsletter. Third, placing the twist near the tips, rather than across the entire span, came from the Hortens.



A = Detail of template mounting strips.
B = Supports for root half of wing.
C = Movable leading edge support.
D = Trailing edge blocks.
E = Wing tip support. Note direction of slope!



These two diagrams show the female lower and male upper templates.
A = A distance usually equivalent to one half the foam's thickness.
B = The thickness of the supporting strips.