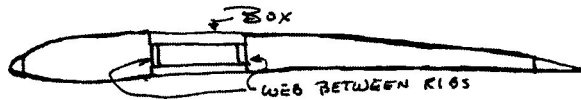


A Technique for Building Light, Strong Wings

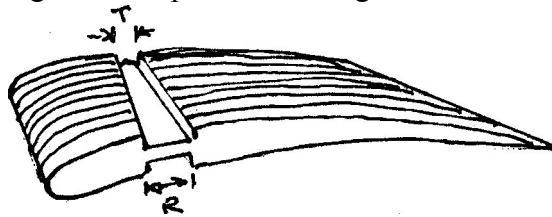
By Don Hockaday

During the 1980's the Union Jack wing construction was the most popular method, i.e., Pilfered Pearl for power and a whole host of Bob White Wakefields and Coupes for rubber. If weight was not quite so important the D-Box balsa wing took the cake. In the 90's carbon fiber took over along with Kevlar, and the Ukrainian trailing edge and carbon cap strips enabled construction of thin, efficient wing sections and high aspect ratios. But they were hard to build though.

In reading old Ziac yearbooks, I found box spar construction by Bill Hartill that seemed to have merit for thin wings.



I have now built about 5 of these wings of several sizes, using 1/32-1/20-1/16 & 3/32 wood. this method becomes practical with the rib generation method I described in my previous article. (Ed. Published in the March-April 2003 issue of Thermalier) Before gluing the plywood pattern end pieces to the rib blanks, first determine the spar width (R) at the wing root and the spar width (T) at the last rib at the wing tip, and cut the spar notches in the plywood patterns to match the root rib and the end rib width and depth. When the rib block is sanded down to airfoil shape, but before putting in water, cut spar notches in a tapered pattern to fit the diminishing width (from root to tip) spars on both top and bottom as shown. NOTE: the rib spacing must be equal throughout the span of the wing.



Then cut spars from medium hard 10-12# sheet A grain. I have used 3/32" spars in which $R=3/4"$ on wings with 7" cord, 1/16" spars in which $R=1/2"$ on 5" cord and 1/20" or 1/32" spars in which $R=3/8"$ on 4" cord, tapering the spars to $T=1/4"$, 3/16" or 1/8" respectively.

When assembling the wing, glue the top spar while the assembly is still on the board, then turn it over and glue the bottom spar. Finally, fill in the web between the ribs with 1/32, 1/20 or 1/16 sheet. If your rib spacing is 1.5", these webs can be cut from 3" sheet (cross grain) with minimum trimming.

You will now have a wing strong in tension and torsion! If you want it even stronger you can epoxy a thin carbon reinforcement (.002 or .003 carbon) on the top of the spar, going from the root outboard to about 1/3 of the span.