

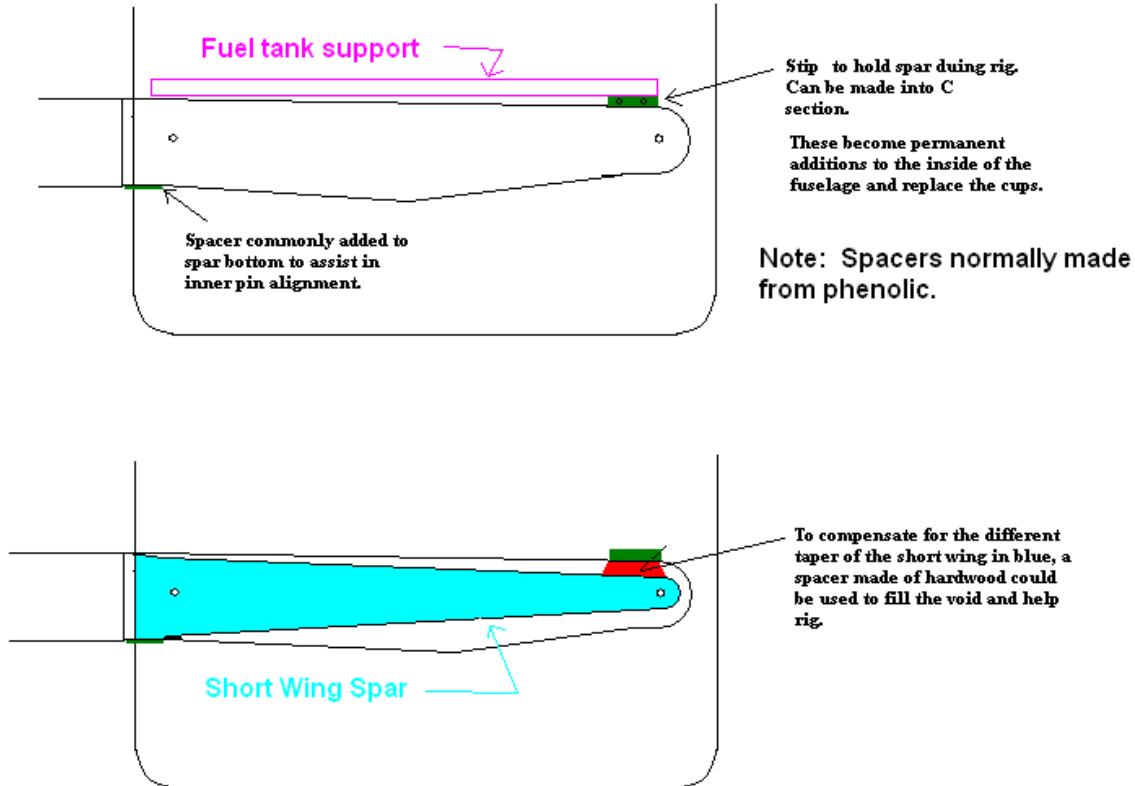
Tech Talk  
March 31, 2013  
Mod 78 Rigging Aids for Post Mod 78 Aircraft

In the Mod 78 Tech Talk article we indicated the prudent builder would check for fit and possible interference points prior to starting. Once the clearance and fit issues are solved, the builder then is confronted with constant rigging problems due to the lack of spar cups. The solution is fairly easy. In one weekend the problems can be solved to allow post Mod 78 aircraft to use both sets of wings to make each set of wings easier to install.

First we will show how to modify your aircraft to allow some rigging aid with the lack of a starboard fuselage mounted cup.

Since a rather beefy T shaped fuel tank support was built into the top of the tunnel for the wing spars, we will use this as the support for our port wing. See the photo and drawing below:

**CFC Solutions to Glider Wing and Short wing rig aids**



The support strip shown in green above can be phenolic, or just a plane piece of plywood. I do not make my support square, I do put a bevel on the inboard side so as not to have a catch when rigging. The short wing needs a small addition to the spar tip to fill in the space and make rigging that wing easier.



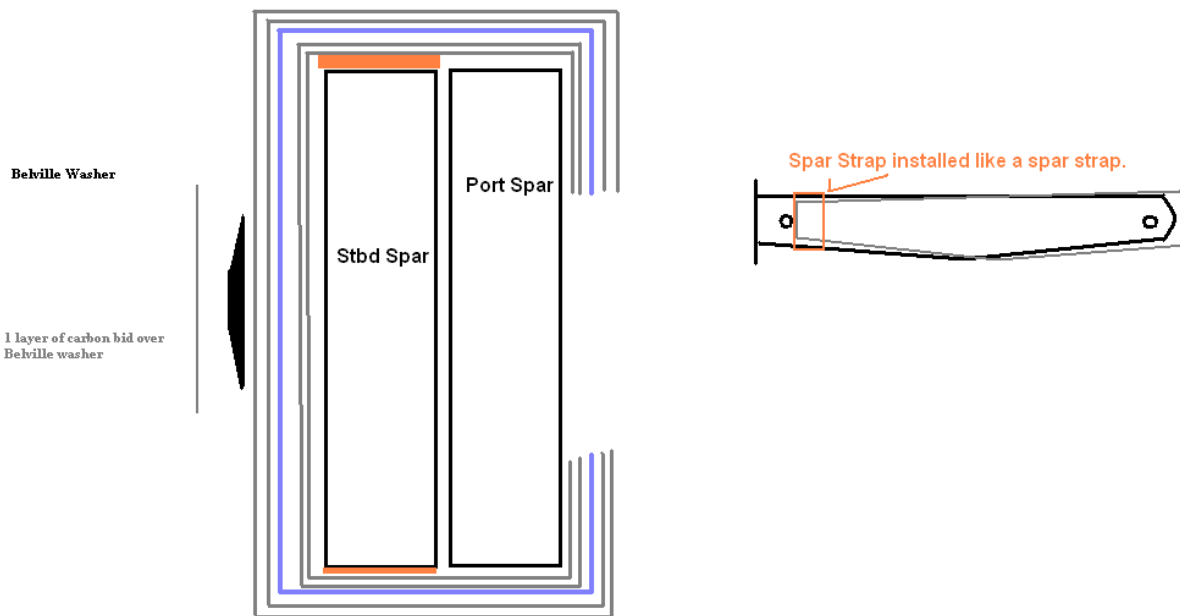
Note that the ply piece shown above is simply glued in. To get exactly the right height and spacing of the ply/phenolic, obviously one has to rig the left wing completely to determine the thickness of the ply and the ply only contacts the port spar and does not hang over the the spar width. The piece of ply will be the wedge that holds the port wing spar at the height to allow the wing pin to be installed. Since there is no bending at the end of the spar the support is fairly tight to the spar.

The next problem is the lack of a spar cup on the starboard glider wing. Initially, I knew that once in a while, when rigging the aircraft, the assistant on the wing tip may not be able to hold the tip long enough to get the pins aligned. Some sort of spar cup was needed for quick and full proof rigging. In my initial attempt I built a cup, similar to the spar strap, but stronger still and made from left over carbon fiber. I estimated that the cup would have to hold about 500 pounds of shearing force as the glider wing is about 150 lbs and the center of mass is about 10 feet out. Since the spar pivots at the wing pins during rig, the poor spar end needs to hold about 500 lbs of load. (I know this as I caught my finger once placing the rigging shim discussed above.)

Carbon fiber has a tensile pull strength of 180,000 PSI however, this is a shear load so I overbuilt it by 50%. The drawing below and photo shows that the cup is made as a 3 inch by 15 inch tape, just like a spar strap but using two bid, one of the tow, and two more bid. Be sure to cover the starboard spar with release tape completely. Truthfully, it could be built with only one layer of bid on both sides of the tow and be thinner if clearance of the port spar to fuselage is a factor. Many of you would prefer to not lay the ¼ inch tow tediously side by side, but it only takes a couple minutes. One other note is I placed a small piece of wood over the top and bottom of the starboard spar to allow me to sand off the spacer to allow a nice slip fit.

To cap the end of the cup off one only needs to apply two layers two inches wide of bid carbon wrapping onto the spar and top of the cup by two inches, staying clear of the belcrank support.

Spar Cup for MG Wings





Once the glass has set, I remove the port spar pin and drill through the bushings with an undersized bit to punch a hole for the spar pin. Then ream the hole to a nice fit. Remove the wings from one another and countersunk the Bellville washer into the top bid layers to assure clearance with the fuselage quick disconnect belcrank. Redux in the washer and apply one layer of carbon bid over it. Clean up your glass work and put a slight taper on the cup entrance for ease of installation when rigging.

Rigging is now as easy as your short wings. This spar cup is a bit beefy but don't abuse it.

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