NOTES ON BUILDING LIGHTWEIGHT MODELS

By Bob Bailey Feb 2014

WOOD SELECTION

To keep the weight under control, this aspect of construction is vitally important. Most components need wood of 4 – 5lb density. Unfortunately, wood in this density range is highly variable in stiffness.

When you cut out some components eg. wing spars, weigh them individually or as a pair and note the values. Then you can assess their stiffness in a simple manner by holding one end on the bench with most of the spar overhanging and hang a small weight on the end and see how much it deflects. If you cut out several from the same piece of wood you may find quite a lot of variation in their weights and the deflections you get.

To summarise:

Weigh all components eg. Spars, tips and ribs for wing/tail and record the values. Weigh individual sub components if they come out heavier than you expect from previous experience.

Assess stiffness by eg. hanging a weight on the end of the spar to get minimum deflection – most important for wing and tail spars.

CONSTRUCTION

For a complicated component like a motor stick weigh the balsa blank bare and record the value.

Weigh again when seamed up. This tracks glue usage. **Remember that glue is heavy!! This can't be overemphasised.**

Weigh the front bearing and rear hook and note values. Check weight of stick when these are added. **Remove all excess glue (outside the joint) at all times as soon as possible before it can soak into the wood. I use applicators consisting of thin bits of wire held by a handle of eg 1/8" sq balsa. These are good for removing the excess glue.**

Don't use cyano except for repairs eg. where a dihedral joint or a spar has failed and then only very sparingly. It doesn't evaporate in

the same manner as cement does, so the weight penalty is even greater.

Continue this process throughout construction.

You are building up a history of the construction process; this will give you guidance when building an identical component for your next model. Unless you find a weak area through flying, you can reduce the weight of the component next time either with lighter wood or a smaller cross section.

For an F1D motor stick, don't be tempted to use thinner wood; it will be far more prone to buckle under load. 13 thou seems to be the optimum here.

I now use Duco or UHU thinned with an equal volume of acetone for most joints including attaching boron; it has excellent contact strength almost from the instant of making the joint. Ambroid or similar is better in the highly stressed areas eg. at the motor stick nose since it is more rigid and is stronger when fully set. Ambroid is probably better than UHU for dihedral joints due to its greater rigidity.

I have found that the DUCO/UHU type glue is prone to creep failure if used to attach the tungsten bracing wire for the motor stick for F1D, F1M and F1R. The symptom is that the stick bracing goes slack because the wire actually slides along the wood when under tension in flight. Ambroid sorts this problem out!

I hope that these guidelines will help you to build lighter and stronger models.

Good luck!