

## Lamination for model aircraft

I am a returner to model building. Of course I fly foamies but I really enjoy designing and building. When I visited SLEC to buy wood and other materials I realised how much better they were than when I built models before. Buying from SLEC allows you to trawl through the stacks of balsa to choose exactly the grain, stiffness, density and hardness you want. They also stock hardwood sheet and sections, liteply, and birch and other plywoods down to 0.4mm thickness. The range of adhesives and coatings is now very large. I particularly like De Luxe materials products, especially Eze-Kote. Used with 24 or 48 g/m<sup>2</sup> glass this can be used to coat and strengthen structures and even to make mouldings. However I still make wide use of balsa cement and white PVA glue, though I intend to experiment with Super 'Phatic. And of course film allows speedy and smart covering.

One upshot of this is that laminations become easier. I like curved models surfaces so need to form curved components such as structural components, formers, mouldings and leading and trailing edges. Using flat laminations very light, strong structural parts can be made.

### Leading and trailing edges

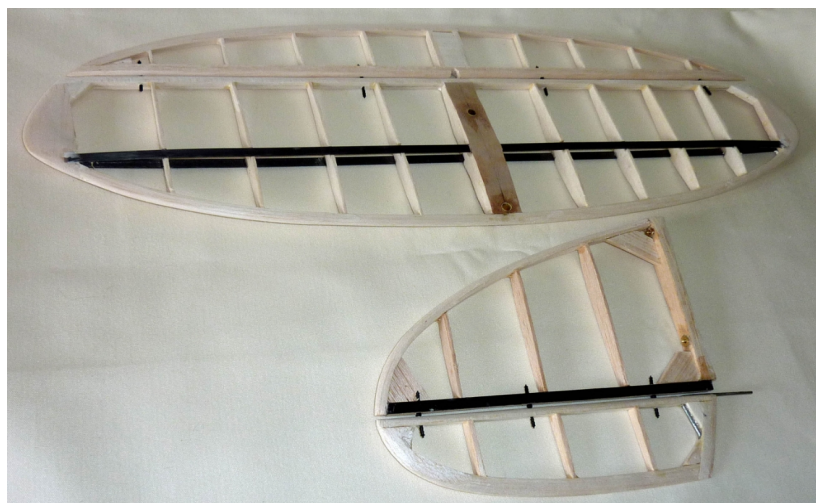
I use flexible, medium balsa sheet sliced up using a Master Airscrew stripper.

I made the formers out of 6mm liteply, cut with a jigsaw and sanded to exact shape using a belt sander.



To start with I soaked the balsa and bent it while drying, before gluing. Then I discovered that using PVA to glue the laminations wetted them enough to bend them permanently. I clamped them against the former using scrap balsa blocks and pins. As a bonus the PVA strengthened and hardened the lamination without adding much weight.

Here you can see the curved, laminated components used as leading and trailing edges in the tail surfaces. These are for my 2m sloper, Rider.



## Structural components

At first I used liteply. However I moved to a lamination of thin birch ply and thick soft balsa glued with PVA. This proved lighter and very strong. I found that you must clamp the drying lamination between two strong, flat surfaces or it will warp.

This is the laminate



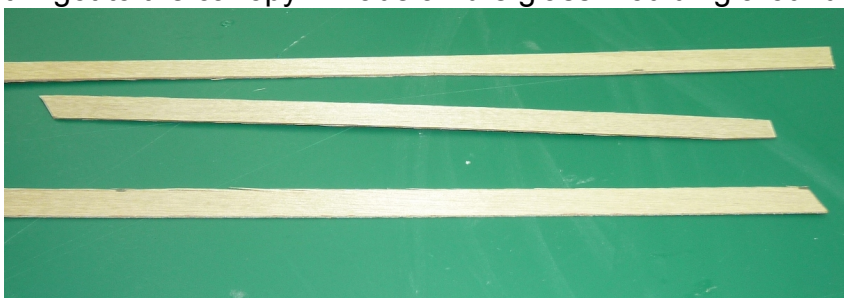
These are the crossed laminations used as a fuselage core in my 2m sloper.



I am about to start on a Tony Nijhuis 1.7m Mosquito. To research the structure I re-read my copy of the definitive book on the full-size aircraft, 'Mosquito' by Sharp and Bowyer, with a foreword by Geoffrey de Havilland. It turns out that ply/balsa/ply laminates were used in the fuselage skin so I'm in good company.

## Three-dimensional curves

I built a new glider using some ancient Graupner Cirrus wings and tailplanes. I didn't use laminations in the fuselage until I got to the canopy. I made a fibre glass moulding around a male mould. Of course this curved in all three axes. It wasn't rigid enough so I had to make a frame for it. I cut the front and rear formers from the same lamination as the Rider core and clamped them onto the fuselage after covering the space with cling film to avoid unwanted adhesion. For the sides I tried thin spruce but, because the parts had both to bend and twist, it wasn't flexible enough. So I cut strips of 0.8mm birch ply. I glued them up in threes with PVA and clamped them in place using pins at each end and clamps in between. I was delighted that the frame turned out very strong and the twisted laminations didn't unbend. Just to be sure I added an intermediate former, before epoxying on the moulding.





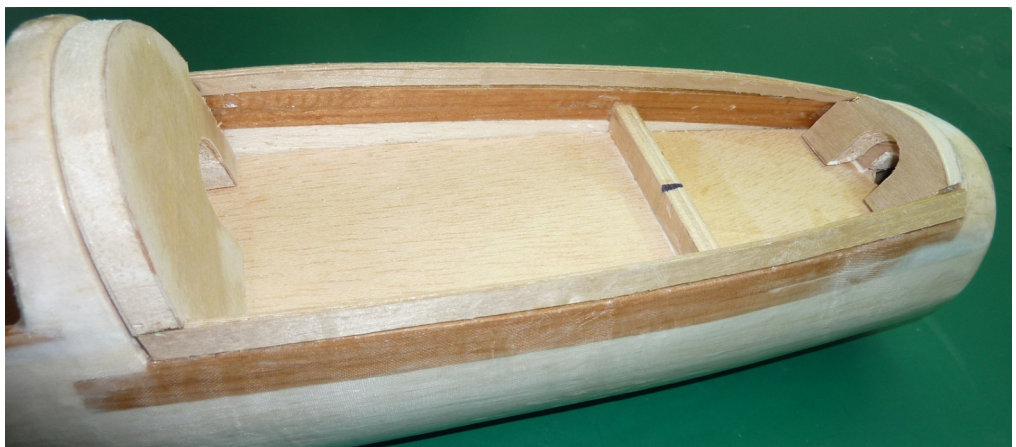
Glued strips  
pinned and  
clamped in place



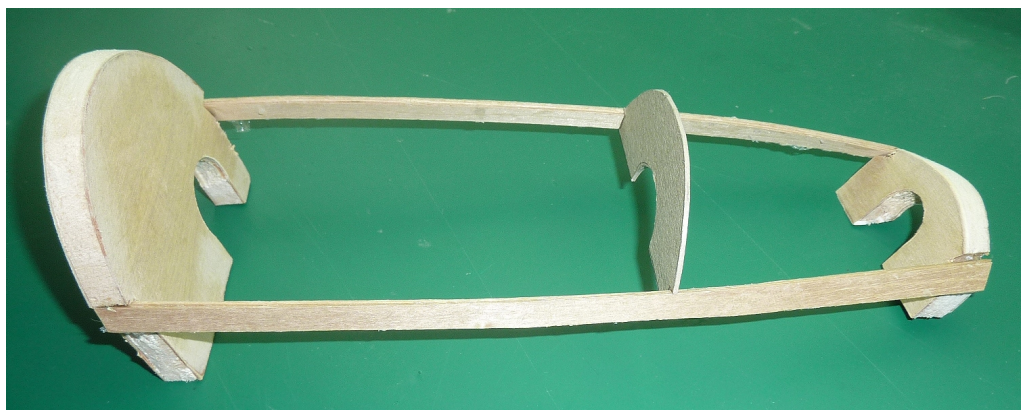
Dried frame  
placed inside  
glass moulding  
but not glued yet.



Frame in place  
on the fuselage.

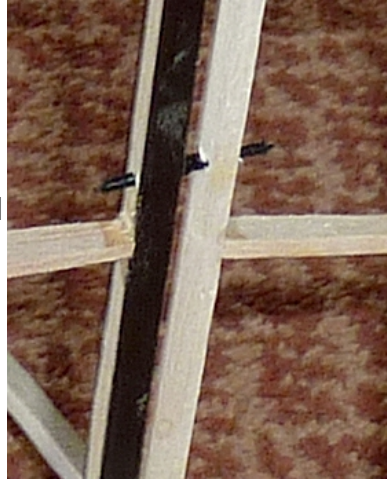


Intermediate  
former being  
sized using  
1.5mm card.



## Beams

I like carbon fibre for spars and other beams. However it is heavier than balsa or hardwood. For the rear fin post on my Sirius glider I used a 6mm square CF box. This was strong but I had to drill it for the fin hinges. For the Rider design I laminated the post with 5x1mm CF on each side of a 3mm balsa core. This was lighter and almost as strong. Cutting the holes for the hinges was extremely easy so I will be using this method in future.



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