

## ***Building a Fibreglass Lost Foam Veneer Winged Alpha Jet***

***by Peter Garsden***



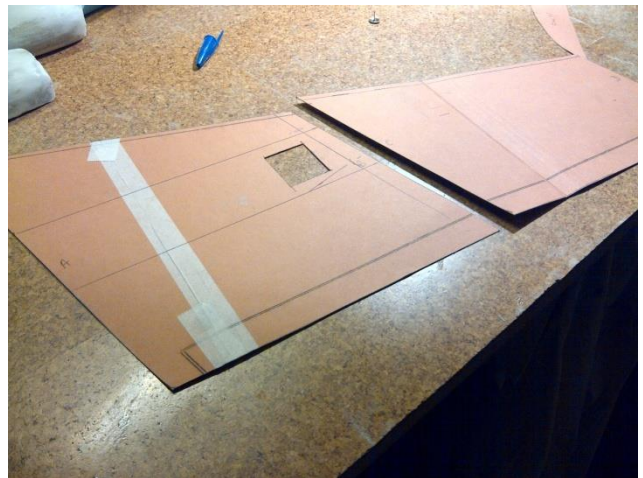
Taken on the Orme at the PSS Event

I decided last summer that I would have a go at a new building method to me - the lost foam fibreglass mould idea. This means making a foam core, sanding it shape, covering it with fibreglass, then dissolving the foam inside with acetone leaving the fibreglass shell. It would be a challenge if nothing else. I had read about it on the PSSA website and it seemed a good idea for the complex shape of a Jet.

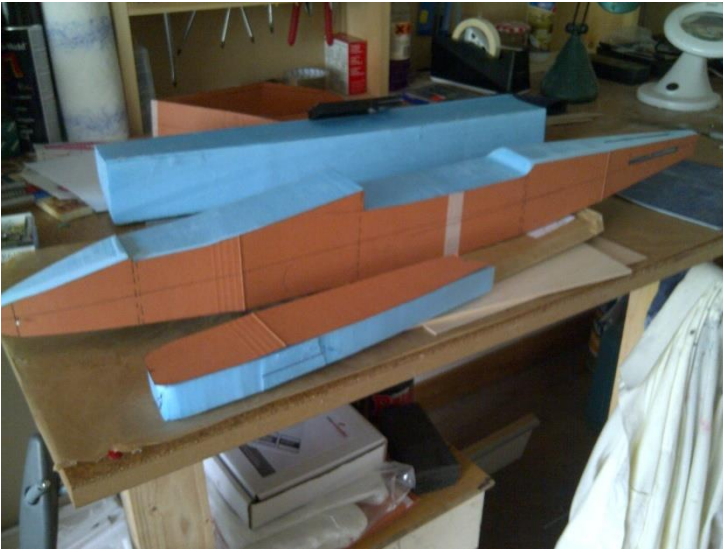
I went onto the PSSA Website and looked at the plans page which gave me a link to Paul Janssen's site - <http://www.pjmodelclassics.be/>. He is Belgium and has some connection with the Air Force. He writes better English than me and is very helpful. He has a range of plans which are mainly lost foam with veneer foam wings all PSS style. I chose the Alpha Jet because he said it was very aerobatic, and had good momentum - I later proved him to be right. It is after all the French equivalent of the Red Arrows Hawk.

If you want to see all my build photos, they are in a slide show on the Model Build section of the LMMGA website, together with series of other model build photos, mainly by Mark Ollier.

First of all I had to make a hot wire cutter – this is covered in another article on the subject. Secondly I had to make a variable current transformer to power the hot wire. I actually made two hot wire cutters, a long 50 inch version, which was actually underpowered with a 12v transformer - I need to swop it for a 24v version - and a short 30 inch cutter which is what I used. Lots of parts from Ebay and a short while later and I was in business. The hot wire is needed for cutting not only the blue foam wings, but also the outlines of the fuselage.



Wing Template to cut out shape - 4 piece



Fuselage and Jet shapes with templates

The plan and canopy arrived. There is not much to it in view of the construction method, but it is accompanied by instructions which helpfully explain the steps. First of all I decided to cut out the foam for fuselage and wings. I bought a huge block of Blue Foam for £30 off Ebay.

Next I used carbon paper (not easy to find these days) under the plan and over the cardboard - I used scrap files from the office. I marked the position of formers, fin, and tailplane cut outs etc to help later.

I then cut out the templates easily with scissors.

Next I set about cutting the blue foam to the right shapes for the templates. I found that an Irwin fine toothed Pullsaw which cuts on the pull rather than the push saw cut was absolutely superb for slicing up the foam to very accurate shapes. I then pinned both left and right views to the block. You can just see the centre lines on the templates which must line up with the centre lines on the block which I drew on to get it square. You can see that one does the jet moulds separately to the fuselage.



### Hot Wire Cutting

This is where you need two people.

Keith kindly offered to help. You must either mark out numbered steps on the template - better when doing the wing, or shout out where you are so you both cut at the same speed. The fuselage is

not critical as it is going to be sanded to shape anyway, but the wing supports are important. A very good article by Ivan on this subject appears on the club members only website.



One then rounds off the corners of the block using a rough sandpaper blocks and/or the Irwin - dust everywhere but not fine enough to get on your chest like balsa.

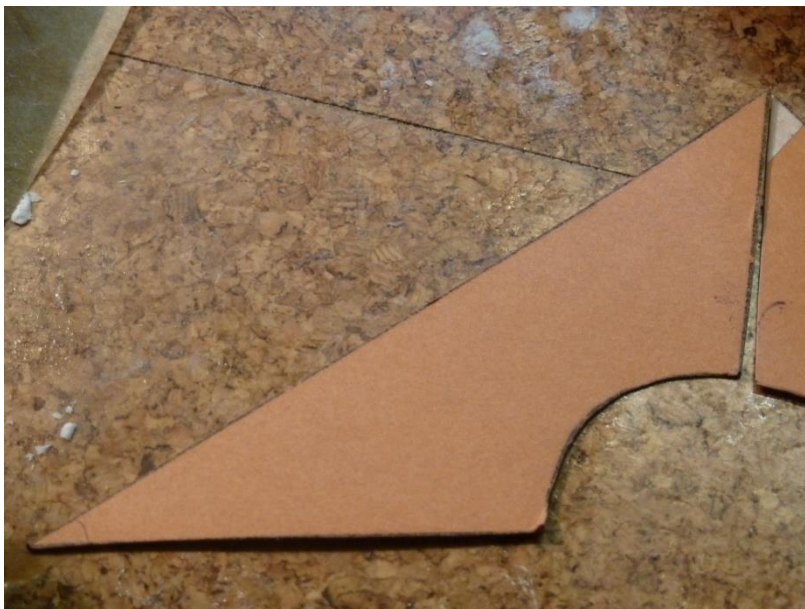
When you are happy with the size and shape (there are templates on the plan) - I didn't really take enough off the sides round the nose, and couldn't quite work out how the canopy fitted - then you have to wrap the whole thing with brown parcel tape - I used a heatshrink iron as well to assist and melt the glue - wrinkles aren't a problem here - and you can use Solarfilm but tape is just as good and cheaper. The tape insulates the fibreglass from the foam.



One then gives it a generous coating with bees floor wax - I bought some special removal mould removal wax from Easy Composites - [www.easycomposites.co.uk](http://www.easycomposites.co.uk) but it is not really necessary.

### Fibreglassing the Fuselage

I made a jig to hold the fuselage off the bench with a nail and a wood support at each end, so I could spin the fuselage round when applying the fibreglass cloth. One can cut the fibreglass cloth into 2

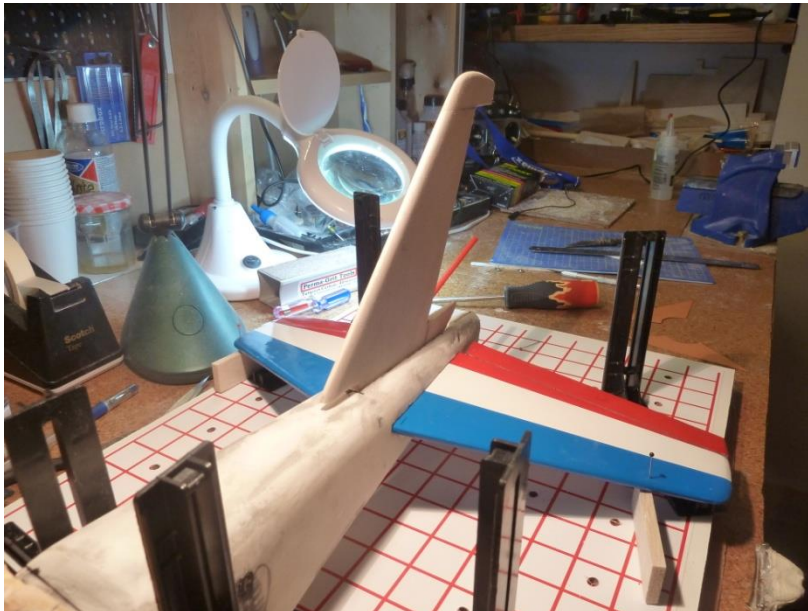


Tailplane Angle Template

inch strips then wrap it round the fuselage. Alternatively you can cut two sides, a top and bottom as per film covering. It is easier to attach the cloth to the fuselage with spray contact adhesive. This stops the cloth from slipping when you apply the resin. One applies 2 layers of 160gm/sq metre cloth followed by 1 layer of 80 sq metre cloth. What I did wrong was not dab off the excess epoxy resin. Thus the fuselage ended up heavier than it should have done. I also applied some

carbon tape/toes under the wings in stressed areas, and in the nose. The plan recommends cutting off the cloth and applying a balsa nose, but I managed to round it off in glass cloth.

Once the epoxy was dry, I sanded it down with a circular disc on my drill - I have now bought a Proxxon (like a Dremmel but German and arguably better) sander which is brilliant. I then made a mixture of epoxy and microballoons and applied it all over as a final layer. When dry I sanded it down to create a smooth final surface.



Next – the messy bit – one can see how I left some exposed parcel tape for the wing cut out and the canopy. One then makes a hole in the tape, and, armed with a bucket to take the goo, pores in acetone slowly. The foam just dissolves before your eyes. What I didn't appreciate was that the edges of the fuselage were razor sharp and cut me. The acetone then soaked in causing a stinging sensation. Why I wasn't

wearing rubber gloves I will never know. You are then left with a hollow fuselage. The next challenge is to peel off the brown parcel tape from inside. With it comes some goo. What a mess.

It is quite common to end up with one or two weak bits where the glass hasn't quite covered and local reinforcement by way of carbon tows or glass sheets is necessary.

I then marked the positions of and glued in, the formers, and the wing retaining bolt plate. As the fuselage is fibreglass made with epoxy I thought that epoxy resin would be a good fixative – wrong – one needs to add some milled fibreglass bits or some powder Ripmax supply called Xilica – works a treat. I used it after the wing retaining plate had disconnected itself from the fuselage side twice. It hardens



**Xilica Powder & Milled Fibreglass 1**

the glue to make the surface tension more similar to the hardness of the fibreglass – I think!

I then marked the position of the fin and tailplane with a Sharpie permanent marker which shows well on fibreglass. I cut out the holes with my Handy Proxxon Dremmel tool. At this point I lined up

the wing and tailplane to make sure they were aligned. I have shown a template I made out of cardboard to check the angle of the anhedral tailplane. Naturally I covered the tailplane and fin, leaving a gap of bare balsa for gluing before fitting and glueing with Xilica powder reinforced epoxy.



Not much else left to do – fit the servo tray in the fuselage, and the 9g servos in the wings. With hindsight the non-metal servos are not robust enough, but as this is a high wing model with a deep fuselage, I might just get away with it. The plan shows a conventional balsa connection rod for the twin elevators with a v formation of threaded rods coming out of the fuselage. I was worried that because of on the control horn. Hence I fitted

a ball joint and cup. It works well.

To recreate the jet pipes at the rear of the jet I painted lemonade bottle tops black and adhered them. The jet assemblies were attached using a microballoon epoxy mix.

### The Canopy

I quite enjoyed painting the two jet pilots which I got from Pete's Pilots on Ebay – I had to cut them down. I made the seat supports and instrument binnacle out of blue foam. Easy to carve and sand to shaped. I made the balsa base, and glued it together. I reinforced it with some thin fibreglass cloth at the join which is a little weak. I cut out some instruments from a freebie with RCM&E Mag. I glued the pilots down, and set to work on the canopy cover. I should



have solatrimmed the pieces on with hindsight but ended up spending ages masking off the canopy lines and giving them several coats of acrylic white gloss.

### The Wing



This follows conventional veneer foam techniques. Because of its shape, it consists of 5 sections, a centre section, and two panels each side. Keith and I cut out the wing sections which are very thin using plywood top and bottom templates at root and tip, marked from 1 to 10, so we could make sure each of us was cutting at the same speed.

As the plan is from a few years ago and showed a central servo with

two torque rods. This would have worked but I wanted to put a servo in each wing so I could have airbrakes as well. I was concerned that the inner wing panels would be weakened by the hole for the servo, so reinforced the foam panels with carbon tows and epoxy microballoons.

I had to join the 3 inch veneer sheets together with cryano, then used Copydex to adhere them to the foam.

To join the wings together and make it anhedral a template is provided. Fibreglass bandage is used to reinforce all joints. I also decided to reinforce the joint between the outer panels and the balsa tip with thin fibreglass cloth and resin.

To join the ailerons I used an angled top silicone hinge with a 2mm gap which works well. I bought some Graupner gap filling clear tape, which adheres to the



Veneer attached before trimming

wing and stretches over the aileron. It seals the gap left

underneath the wing to create the aileron hinge. I also bought some servo arm plastic aerodynamic covers, all of which help the model's slipperiness through the air – not that it needs it. Initially I also hinged the tailplanes the same way but the hinge kept coming off on impact – with it being anhedral it gets quite a lot of hammer. So I abandoned the silicone and used diamond tape instead.



I covered the whole model in solarfilm which adhered well to the hard fibreglass surfaces. I gave the veneer a coat of balsaloc first which helped. It required quite a lot of patience in view of the red/white/blue layout. The lux blue was absolutely right for the French Aerobatic Team colours. I first marked the lines with a black Sharpie, applied the white, and one could see the black line to line up the red and the blue pieces. The zig zag line on the

fuselage side, I did with a cardboard template

### Flying

The recommended weight according to the plan is 890 grams – mine is 1150 grams – about 1/3 heavier than recommended – no ballast needed?

The throws were set up as per plan – I subsequently increased the elevator – see below.

The plan showed the battery just in front of F2 (rear of canopy in front of wing). When I came to balance it on the suggested C of G, it needed the battery further forward behind F1 and a bit of weight. When I subsequently flew it, this made the model way too nose heavy, so I moved the battery back to the suggested position and removed the weight. This is now OK – so either the C of G is wrong, or the way you balance swept wing anhedral wings is different ie the balance line follows a line parallel with the leading edge of the wing as it sweeps back (I have looked at forums and the maths of it all seems way beyond me).



Bottle top for Jet Exhaust

With the CG further forward my maiden flight was at the Gate in an 8mph wind. A combination of the forward CG and the light wind meant it flew like a brick. The same happened at the Mermaid on a similarly light wind day. I moved the CG a bit further back and flew it in a 35mph wind at Edge Top – it flew, but was thrown around in turbulence. It was still nose heavy so I took out all the weight – I had added about 1.5 ounces taped to the battery – and moved the battery right back to the bulkhead. My best flight yet was at the PSS event on the Orme in March. Many were reluctant to fly

in 50mph winds at the edge. I chucked off and it flew like a dream and a rocket. Loads of lift, it was a case of getting it down.

The thin wing section and weight make it fly very fast. The nose can drop in the turn – must be something to do with the swept wing and anhedral angle? The elevator needs trimming properly flat with the tailplane to keep the nose up. The roll rate is electric with those little wings. In the instructions Paul says it specialises in flat spins but I haven't managed anything more than a spiral dive so far. The elevators, I thought could be bigger – if I was building it again, I would enlarge them from about ¾ inch strip elevators into about 1 inch widening towards the root. Whilst it will loop, it struggles to do so after a long dive, and needs more than the recommended elevator movement. Even though the ailerons are narrow strip affairs, they are more than adequate.

So on the Orme I had hours of very successful flights and perfect landings. I had coupled up aileron and down elevator on a switch for brakes. It is perfect and brings the model down perfectly for a gentle touch down.

So the conclusion is that you need a good blow and probably a good slope for this to fly at its best, but it is a great agile, nimble, highly aerobic little model that, with its 35 inch wing span slips into the car assembled easily with room to spare. You do, however, need a hand span of a large bear to grab the fuselage in a wind for launching with one hand (I have just ordered the R/C Gloves which are at half price (£50) so the extra grip may work)

NB – it would probably take well to an EDF conversion – or indeed an electric motor up front with a folding prop.



The Gate - maiden flight