BMFA Knowledge base document

Cutting foam wings:

This document aims to point out the basics of cutting really accurate foam wings for model aircraft. Straight and accurate wings rarely need aileron trimming and fly better.

Try to use/find the flattest surface possible to work off of, kitchen worktops are quite good, with the very best ones being the granite type. Also use this same surface when covering/applying the wooden skins, which is best done by pressing the skins onto the cores and bonding with epoxy rather than latex contact adhesive.

Cut the wing blank to the required plan form using squares to run the bow on, consider making a bespoke cutting fixture if producing more than 5 wing sets. Try to setup to be able to skim the foam sheet to thickness as this takes out any bends or bows in the block and gives a stress free piece of material to work with.

Fig 1. Lower template of double template system setup on granite table.

Aim to use the double rib template system as alignment becomes uncritical, if possible run the cut section right to the wing TE as this gives a more accurate section in the area that is quite critical to straight flying (no trim).

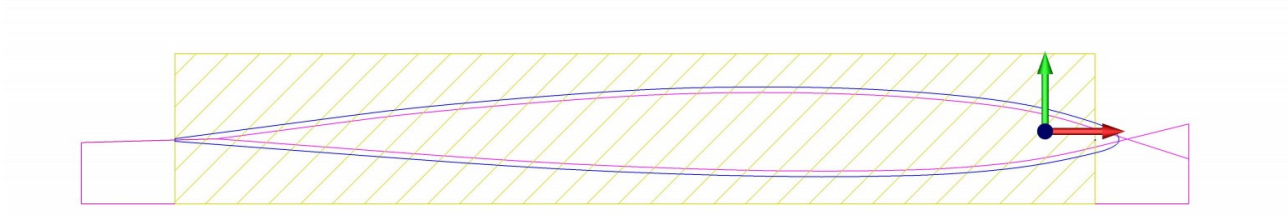

Fig 2. Layout of foam block and double ribs (shown in magenta). Note allowance for wood skin thickness.

Mark station positions (0-10) on the templates to assist in checking the cutting wires progress if cutting with two people (one calls progress and the other matches their position according to the marks).

Make a simple bow using a section of 25mm dowel as the main handle, drill holes in either end (125mm deep at least) for the wire legs to fit into, the legs need a lot of bend which is applied by tensioning the nichrome wire. See *Fig 3* for general layout.

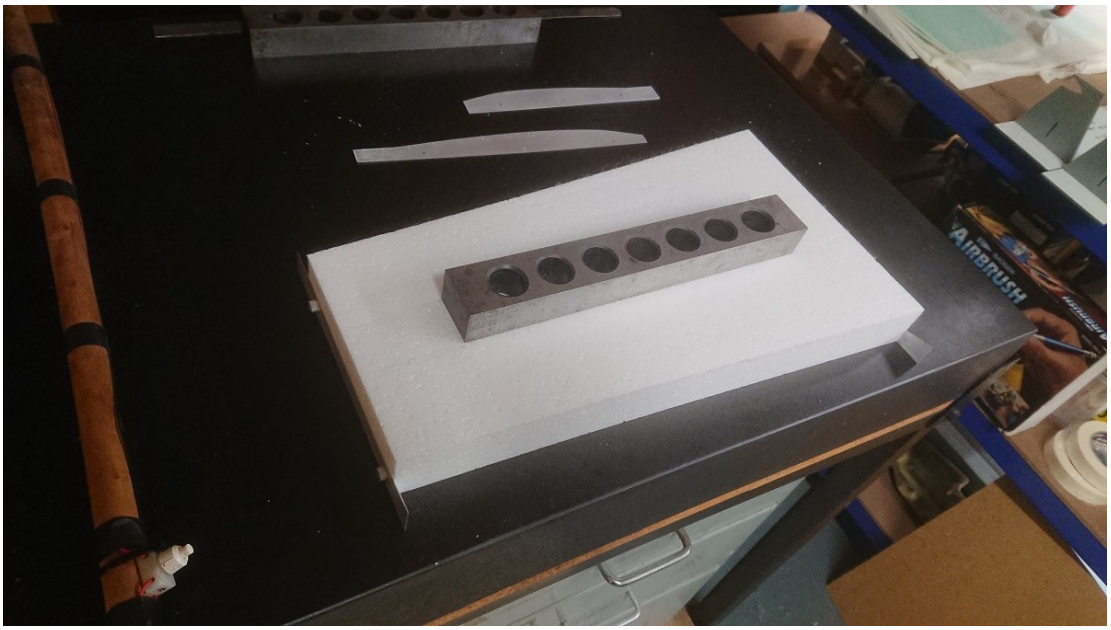

Fig 3. General layout just prior to making the first cut.

Always cut the lower/underside first and work from the trailing edge to the leading edge, once the underside is cut then change the templates over and cut the top surface.

Once the core is cut then gently sand the core with 240 grit abrasive paper, the TE will be very fragile so be careful. If covering with balsa sheets then join 3” or 4” sheets together (use thin cyano) tape with sellotape whilst bonding.

Sand out ridges in the joins and vacuum or brush off dust from both the cores and skins.

Consider using some glass cloth or carbon fibre reinforcement in the trailing edge between the wood skins, 49 gsm glass cloth is good for this, one on each piece of wood sheet (2 plies of wing covering glass cloth per skin would do the same thing).

Apply resin (must be epoxy) to the wood, aim for a dry satin finish, apply a band of resin to the perimeter of the foam, the band to be about 15mm wide. This aids edge bonding of the skins.

Use the foam block sections to press the wings skins onto the core whilst bonding, place another flat section on top of the wing core assembly and then apply weights, you can never have too much weight for this job. Aim for at least 120 lbs per 150 sq inches of core area, so close to 1 lbs per sq inch, more is better though.

Trim wood to core edges to finish, then add LE’s and tips as per a normal foam wing. Join the wings using the bottom foam sections to align over a flat surface, reinforce the centre section with epoxy and glass cloth.

Materials and equipment list

Materials:
White polystyrene foam, a good online supplier is Ecclecstone & Hart.
Balsa or veneer to cover the wings. SLEC or Balsa Cabin
Bond wood down with epoxy. BSI or Zap skinning epoxies are good, also Easy Composites EL2
49 gram glass to reinforce the trailing edge.

Equipment:
Fusion 200W PS, or alternatively car battery charger or well charged car battery.
0.3 to 0.4mm Nichrome wire www.wires.co.uk or Ebay
25mm Broom handle or similar for backbone of the bow. Hardware shop or SLEC
1/8” piano wire for bow legs. K&S #507 – model shops
Electrical wire – Ebay
Push button switch – Ebay
Electrical insulating tape.
Kitchen worktop, granite is better.
Weights.

Fixtures and templates:
Templates – either G10 sheet at 1mm or aluminium sheet at 0.75mm
Nails or custom made pins.
Aluminium squares custom made, 0.75mm aluminium sheet.