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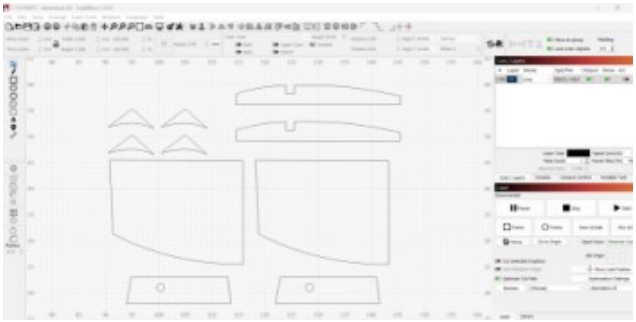
Walt Mooney Found Centennial. A Build – Peter Brown

Having built Walt Mooney's Boston Found, the only model I have achieved over a minute with, I thought I would have a go at his Peanut version of the original which is a nice looking plane with right proportions (in my humble view) for a decent flying model. I hope what follows is of interest and I have no intention of teaching Granny to suck eggs but I am still learning after 55 years of balsa wrangling and I hope you'll find the use of modern tooling interesting.

Plan & Scheme

Not many aircraft were made so there aren't that many schemes to choose from however the white & red scheme used by the Churchill Rocket Research Range of Canada (no idea what they did) looked nice so that was picked. Another problem, because of the low number produced, is that there's not a lot of data available (more on this later).

A plan was obtained from Outerzone and the games commenced. I imported the PDF into Inkscape so that I could trace the parts for cutting them on my laser cutter, an Atomstack A5 M50 Pro. As part of the tracing step I often find that notches for spars and stringers are not correctly sized for a good fit so I always overlay a sketched square of the correct size. This is usually 1/16" square as I'm not brave enough for 1/20". I then group parts together by sheet thickness and grain direction for best balsa economy before transferring the cut files to Lightburn, the application that drives the cutter.

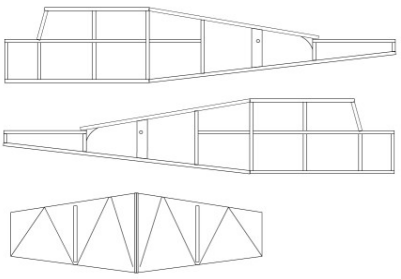


Part Tracing in Inkscape
Image: Peter Brown

Lightburn allows you to tweak the laser settings and add the little tabs to stop the cut parts falling out of the sheet. I always try to align these with grain direction as they pop out of sheet so easily, any at 90 degrees to grain have to be cut with a knife. Over the last two or three years I have built a library of laser settings for various material and thicknesses. I can cut for 1/64-1/8”” ply, 1/32-1/8” balsa with minimal scorching. The software also allows for the kerf, usually 0.075mm (0.003” in old money). Cutting speeds are in the order of 300-500mm/min although thicker/denser materials sometimes need more passes. I always test cut a little circle first if not sure. It will cut thicker stuff but a): I don’t need to and b): the scorching is more severe.

Tracing the parts in Inkscape allows me to clean up any fuzzy lines introduced by repeated photocopying of the originals prior to them being scanned. It also makes it easy to correct the asymmetries found in many old pen and ink drawings. Tailplanes are commonly asymmetrical.

I also make a right and left of the fuselage frames so if the square balsa stock is not all exactly the same size, the side touching the building board is always dead level (will end up as the outer surfaces). Its also makes it easier to fit sheet parts which are thinner than the square stock and have to be flush with the outside of the fuselage, e.g. cabin window framing.



Plan Fragment
Image: Peter Brown

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Wood Selection

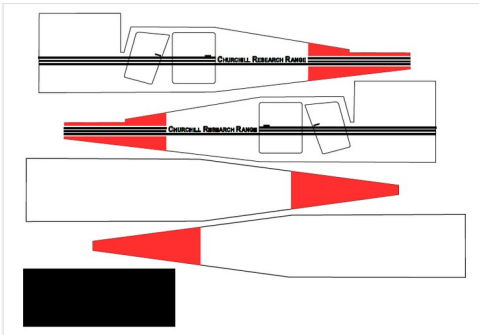
I have in the past been quite cavalier (code for can't be a*sed) in selection of the balsa for models reasoning (incorrectly) that it's all pretty light stuff until Steve Haines infected me with the bug of weighing the sheets. He's even got me holding them up to the light to see the least dense areas before I select the sections from which the parts and strips are to be cut.

I generally select wood in the 6-8lbs cu/ft region for parts & main longerons. This is probably a bit heavy for some folk, but I don't have the lightest of touches. Even with this "heavy" wood my typical weight for a Peanut is down from 10-11g to low 8g (sans rubber) which is a reduction equivalent to the weight of a good sized motor, e.g. a 14"-15" loop of 3/32".

Decoration

As most of you know I use a lot of printed tissue for my models and once again Inkscape is the preferred tool and my tissue of choice is the Asuka supplied by Mike Woodhouse.

The design can be drawn directly over the plan and any special logos etc gleaned from "teh intarweb" and pasted in and then all saved as a PDF. You do have to consider the grain direction of the tissue you're using, making sure the long elements of the design lie along the grain.



Fuselage tissue panels
Image: Peter Brown

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There is only one serious drawback to printed tissue finishes, the ink. The inks provided by many manufacturers are water soluble and completely unsuitable. Luckily I have an ancient Epson and Epson's Durabrite pigments are perfect for the job. White areas benefit from rubbing white Pan Pastel powder on the reverse after printing, it makes the white more "solid" and doesn't affect other colours such as the red & black in the Rocket Research scheme.

For sticking the tissue on I've followed another of Steve Haines' recommendations and I now use the 3M glue stick in the green tube. It seems to be smoother than other brands and really grips.

To finish off I water mist shrink then apply a couple of coats of banana oil, it seems thin enough straight from the tin when new.

Polymer Components

Although you don't need high tech. tools to build good models they do make the preparation of duplicate parts very much easier and quicker. For my Centennial this includes 3D printed socketed spinner type hubs, prop blade pitch guides and the buck for vacuum moulding the canopy.

For preparing the 3D print files I use SolidWorks which is £48 per year for the "hobby user" licence and it compares well with professional products.

Prop Moulding Cylinder.
Photo: Peter Brown

Prop Hubs. 3 Blade & 2 blade
Photo: Peter Brown

The prop is assembled from a 3D printed hub, 1.5mm carbon rod spars and blades formed from wet 1/64” ply wrapped around a moulding cylinder which is also 3D printed and is peppered with holes to let the blades dry out.

The blades are fixed to the spars with cyanoacrylate and the spars are fixed into the hub using 5 minute epoxy and the angle set using a 3D printed jig which is for 30º at 75% of prop. radius.

Propeller blade durability is much improved for very little added weight by lining the rear faces of the blades with 18gsm glass fibre and 5 minute epoxy very highly thinned with acetone.

Pitch Setting Jig
Photo: Peter Brown

Complete Propeller
Photo: Peter Brown

The subject aircraft has a ‘blown’ windshield, I could have chickened out and wrapped a flat one around but thought I would have a go at vacuum forming one. The vacuum box is made from laser cut 3mm ply connected to my big shop vac (called Big Bertha by Mrs B.). A sheet of OHP acetate was sandwiched between a ply frame. Next conundrum was how to heat it uniformly and safely. I was thinking toaster, grill, hot air gun none of which filled me with confidence. Mrs B to the rescue. I can’t believe she suggested (permitted) the use of the air fryer, but she did and it worked perfectly! I got a really good moulding on third attempt. I did lightly sand the printed plug and the part stayed nice and glassy.

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Documentation

The Centennial is to be my entry in the Indoor Scale Nats so I needed documentation and I couldn't find any!

I was in despair that I had stupidly selected a subject with no known data! However, after issuing a Mayday call the better side of social media showed itself and I was inundated with information, the best of which from a Canadian fellow who knew the Found brothers and emailed me reams of interesting stuff and photos.

Ready to fly
Photos: Peter Brown

Trimming

The initial test flight went quite well, naturally wanting to fly right but with a tendency to spiral in. All sorts of tabs and Gurney strips were tried which improved it. After some struggling to trim it to the right, I made it fly left which completely sorted it and it flew into second at the March BMFA event at the Velodrome.