The Electronic News letter of the Chichester and District Model Aero Club

Clear Dope

March 2023

Chichester and District Model Aero Club: Committee 2023
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Club Evening Thursday 9th March
a
lecture by Rod Dean - "Flying the Hunter and other things"

George Fridlington kindly sent me this a copy from the December 2010 edition of Clear Dope in my opinion its a great picture, but my, how **tempus fugit.**

BALSA BRAIN 2010

from Bruce - With apologies to the Salisbury Scroungers' Team

This Annual 'pub-quiz' on general Aviation and modelling topics, took place on Friday 12th November. The CAD-MAC Team, rumoured to have well in excess of 100 brain cells between them, was made up of (left to right, below) Derek Honeysett, Ken Knox, Tony Chant, Bruce Smith and John Riall. The quiz started

at 20:00 and, with a break for a (free) buffet supper at 21:00, continued until about 22:00 ending with a draw for a good batch of raffle prizes that had been generously supplied by John Hook of Flitehook.
The event took place for the first time at a new venue in the Royal British Legion Club at Netley Abbey which, with the excellent facilities (and a lively, well-stocked bar), is likely to become a regular location in future years.

AVisitor to Thorney 2010 HtH

David Hayward writes:

Peter Miller Model Designs

On returning to this hobby in 2015, after an absence of about 30 years, I started out with a trainer again and chose a Seagull Boomerang which proved to be an excellent choice. In preparing for the next step and looking for something slightly more advanced, RCM&E provided the answer with a free plan for a low wing model designed by Peter Miller, the Ballerina.

As it happened the Ballerina was chosen for the RCM&E mass build of 2016 and so it seemed a good idea to join in and document the build along with all the other builders. The build started in January 2016 and by March I had a completed Ballerina; the build blog can be viewed on the RCM&E site here.

I didn't realise it at the time, but building Peter Miller's Ballerina, started something of a trend as I have now built four of his designs, images of the first three here:

Ballerina

Fokker D. VIII

Grumpy Tiger Cub

The Ballerina, now unfortunately departed, was a lovely model to fly, attractive design, very docile and made a perfect transition from my high wing trainer to a first low wing aerobatic model.

The Fokker, what can I say, a mixed bag, I love the look of the D VIII but its a pig on the ground, ok in the air. Long story short, having retired it a few of years ago I recommissioned it last year and with some help from Colin, I'm having another go at setting it up again.

The Grumpy Tigercub came about because I really like the look of the de Havilland Mosquito, however, I didn't feel I had enough skill or experience to fly one at this stage.

Luckily along came the The Grumpy Tigercub, another RCM&E free plan and it's basically a docile sports aerobatic model which, according to Peter Miller, is easy to manage on one engine. I tweaked its appearance slightly to have more of a Mosquio-ish look and finished it with a camouflage paint job to enhance the illusion.
It is very nice to fly, looks good in the air and sounds great with the two Saito 40's. I can't comment on how easy it is to fly on one engine currently and not I'm really in a hurry to find out!

Peggy Sue 2 will be the fourth of Peter's designs, which I started in November 2022, here is an image of his finished model in flight. It has a wingspan of 58" and is powered by a 40 four stroke. Has the look of a Cub or perhaps even a Super Decathlon.

I am going to build mine a little bigger so it will have a 6ft wingspan and power will be a Saito FA-82. Here's a quick look at the build.

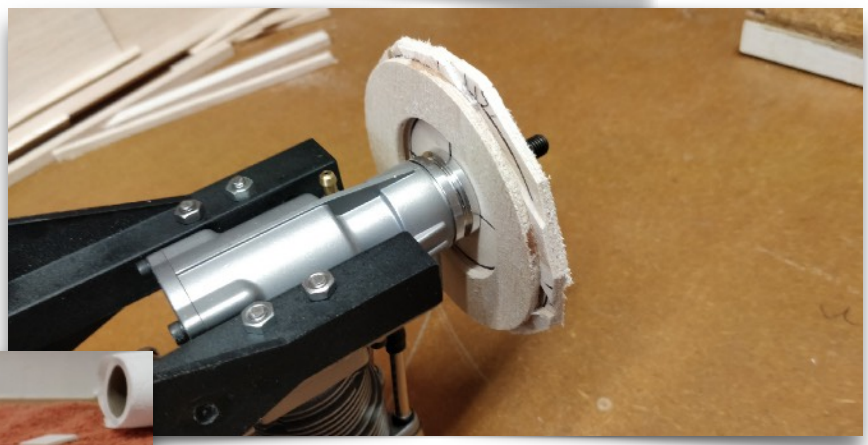
Started with the fuselage which is a 'stick build' and followed standard practise building one side on the plan and second side on top of the first to ensure they are the same.

Used a jig to join the two sides together and ensure all is straight.

Basic fuselage built with undercarriage temporarily in position.

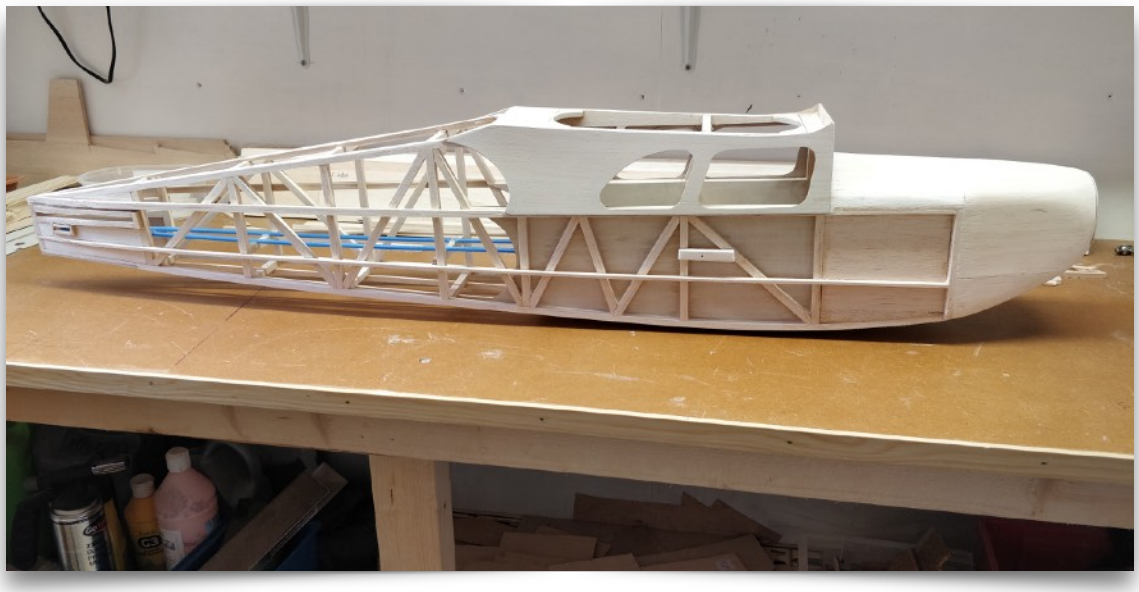
Next step was to build the nose/cowling. I forgot to take pictures of this stage and so have used images from another build as the process is exactly the same.

Engine mounted to F1, nose ring fitted to the engine but spaced back slightly to give clearance for the propeller

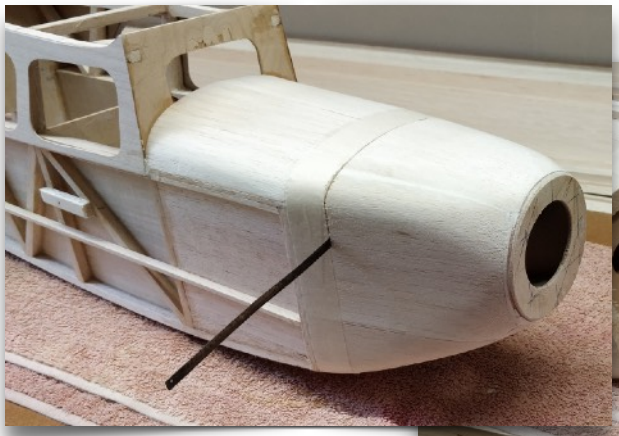


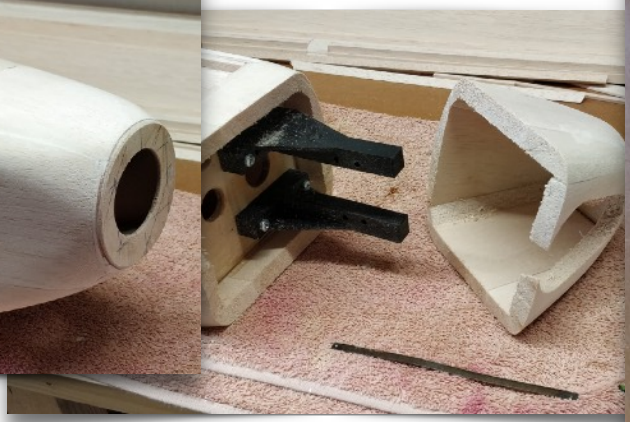
Although Peter had a side mounted engine I will be mounting it inverted, so top, sides and bottom sheeting added to enclose the engine.

After a bit of work with a razor plane and some sanding it looks a whole lot neater I'm pleased to say.



Having just glued the nose on, it has to be cut off! I just use a junior hacksaw blade for this





Fixings inserted and the nose fixed on again providing a neat detachable cowling.

The cowling is lined with lightweight glass cloth and epoxied, adding strength and also fuel proofing.

Attention to the wings next which are completely flat and so can be built as one piece. Standard arrangement with ‘D’ box section, 2x servo’s in the wing, ply plates front and rear of centre section of wing to support 4x wing bolts to fuselage.

Construction completed its time to put it together, fit the engine and fuel tank, link servos to control surfaces. I have fitted a Model Radio Workshop onboard glow driver to make life easy with the inverted engine. Checked the balance, which just needed rx and glow driver batteries locating at the back of the cabin. Weight at this point was 5lb.

Googling for inspiration to help me decide on a scheme for the finish, I came across the Super Decathlon, many of which feature a red and white fuselage, red wings with white flashes and stars, looks good and very different from anything I have already, so I opted for that. I used Solarfilm Polyester for all covering/trim red and white, plus Solartim for the black stripe.

Here's the result of a few hours work:

All that remains now is to set up the engine before that nervous maiden flight as soon as we have suitable conditions. Hopefully this will be another Peter Miller success.

David

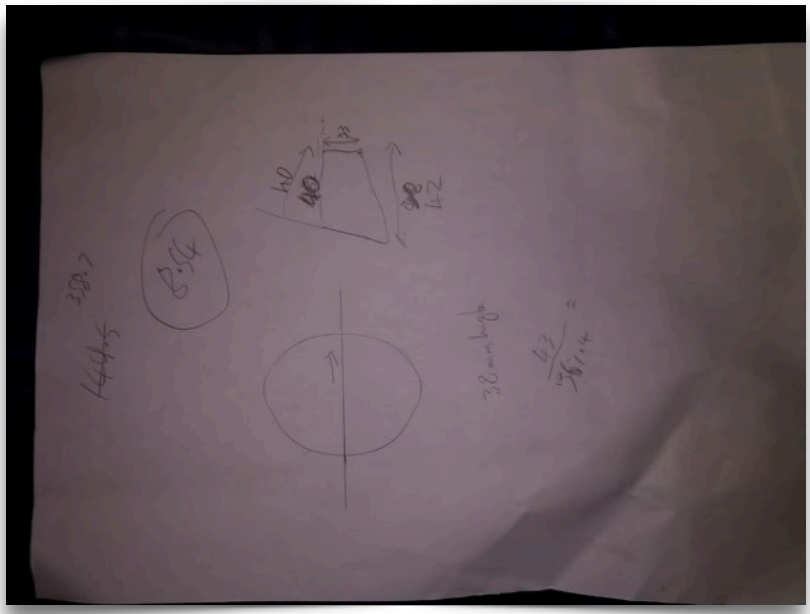
Peter Rieden of the Border Club writes this interesting article on CAD and 3D printing

In response to the veritable flood of one request I'll put down some ramblings on how to actually do useful things with a 3d printer. These machines have become the "in toy" in some circles and they can be extremely useful, but most people seem to spend a few days making toy Yodas and the odd twisted vase before putting it away and never touching it again. This is because the printer itself isn't the whole story - they do absolutely nothing for you unless you have the designs to print in a specific file format. While you can get some of these files from the internet that limits you to producing things other people have designed - not very useful. So to get the best from these machines you also need some 3d Cad (computer aided design) software in which to design things and then save the designs in the required file format. So that's where I'm going to start - we'll get onto the printing side in a little while.
I'm going to use the improved cowling I made for my Hobbyking Skipper as the worked example for lots of reasons. It's the sort of thing 3d printing does very well because it's a complex shape that would be tedious or complex to make by other means, and it also uses many of the CAD features that show how you go about drawing these designs in CAD.
The stock cowl was a perfectly good (actually rather nice) vac-formed ABS part:

But I didn't like it for two reasons:

1. I wanted to replace the nasty glued-on foam foam spinner with a better one. This was made more difficult because the front ring of the cowl was a strange size (33mm IIRC) and the nearest spinner I could find was 30mm.
2. The cowl has side air intakes that are behind the motor and no air exhausts, so it was not likely to do much in the way of cooling.

So I set about designing a better one. Strangely enough the best way to start something like this is recreate the design of the original one - this is the easiest way to ensure you have the basic geometry right before changing the design. To do this I removed the cowl (a little careful work with a blunt plastic blade to break the glue joints) and took some measurements from it. Nothing desperately sophisticated, in fact this is my original sketch:



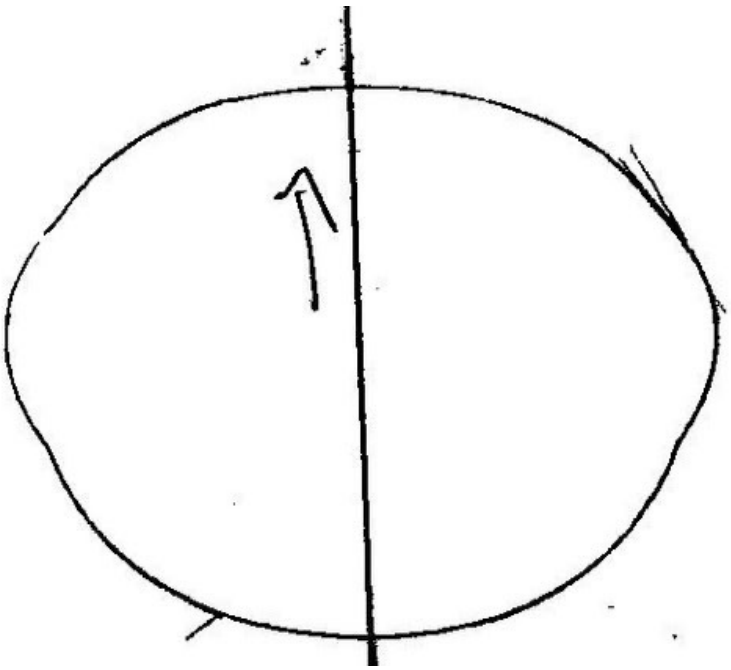
On that sketch there are some important things.

Firstly, the bit in the middle where I drew around the back of the cowl and marked the centreline. I took the centreline from the joint line between the fuselage halves because while not essential it's a very useful feature (for reasons that will become clear later). The back face of the cowl is flat, and any flat surface is a potential "datum" face to use as the reference to relate dimensions to (that will become clear later as well).

Secondly you will see lots of measured dimensions. You could use a 3d co-ordinate measurement machine, 3d scanner or photogrammetry methods to get these, but if you don't happen to have those to hand you can use less sophisticated techniques:

It's worth taking some time and care over these steps because the accuracy of everything else depends on them, but it still should only take 15-20 mins to get all the data. Now in this case the important feature for good fits was the shape of the back, and it was a non-regular shape (ie not a definable circle, ellipse, square, triangle etc). So to get this shape I scanned the sketch on that piece of paper. You could possibly do this with a photograph if you're very careful to ensure the camera is

perfectly parallel to the paper, but it's much easier to be accurate with a scanner. That gave me this image to bring into the CAD system:



So now we park this and attention shifts to the CAD bit.

3d CAD - what's that all about then? 2d drawing (aka “drawing”) is a process of creating a 2-dimensional shape using a combination of lines, curves and standard shapes like circles, rectangles, ellipses etc, and sometimes getting the shapes you want by manipulating these simple elements - stretching, bending, resizing etc.

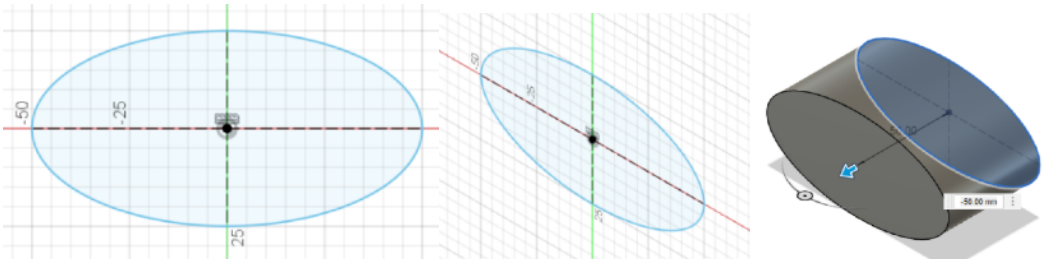
3d design is very similar - it is a process of constructing a 3d shape using combinations of basic shapes like cubes, cylinders, spheres etc and getting the shapes you want by manipulating these simple elements - extruding, lofting, trimming shelling etc. The main difference between 2d and 3d is that in the 3d case much more of it is done with the manipulations. You rarely draw the 3d shapes directly - you get the system to that by defining the constraints the shapes must meet. But if you did pictorial drafting at school or college (3rd angle isometric, orthographic etc etc) you can forget all that because you won't need it. All 3d-CAD is based on this basic concept although the details may vary. There’s also a convention that 2d drawing gives you a drawing where the output of the 3d process is called a “model” for lots of good (vbut still essentially pedantic) reasons.

There are some choices of CAD software - some good, some less so. Many years ago I was reasonably proficient in the Catia system we used on the Harrier programme and I like the facilities you get in the fully-blown commercial systems. After the Harrier programme was closed down I then became familiar with a system called “Solidworks” produced by Dassault (the French aircraft company) because it was similar, and you could get very cheap licenses by being an EAA member. But then that deal was withdrawn and as my wife wouldn’t let me spent $15,000yr on a license I had to choose something else. There are several “free” ones like FreeCAD, but I chose a package called “Fusion360” – the latest evolution of AutoCAD. In principle they charge money for this, but if you search around the website for long enough you’ll find there is an option to get a free “personal use only” license. They do try very hard to steer you away from it, but it’s worth persisting to find it.

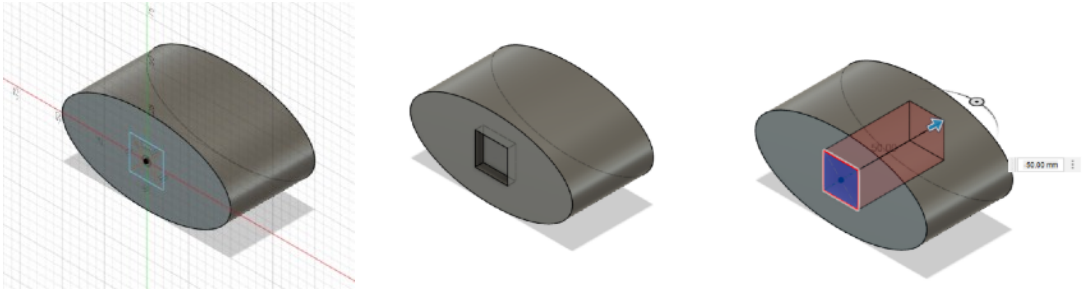
Fusion 360 is very similar to Solidworks. It is essentially a fully-featured commercial Computer-Aided Design system. It lacks a few of the more obscure features in fluid modelling and stress analysis, but we don’t need those for our purposes. In some ways it’s actually *better* for our use than Solidworks or Catia in that it is less fussy about religiously following precisely the right steps to build a model. Fusion 360 can be downloaded from the Autodesk website. One of the restrictions of the free version is that certain functions (like generating STL files for 3d printing) are done through “cloud services” rather than having the software on your PC. So when you want to produce your STL file it sends data to the Autodesk server and a few minutes later the required file is sent back. This can be a little annoying, but it works well enough.

So all these examples will be done in Fusion360. I believe stuff like "Tinkercad" and "turbocad" may do the same things, but I don't know it for a fact.

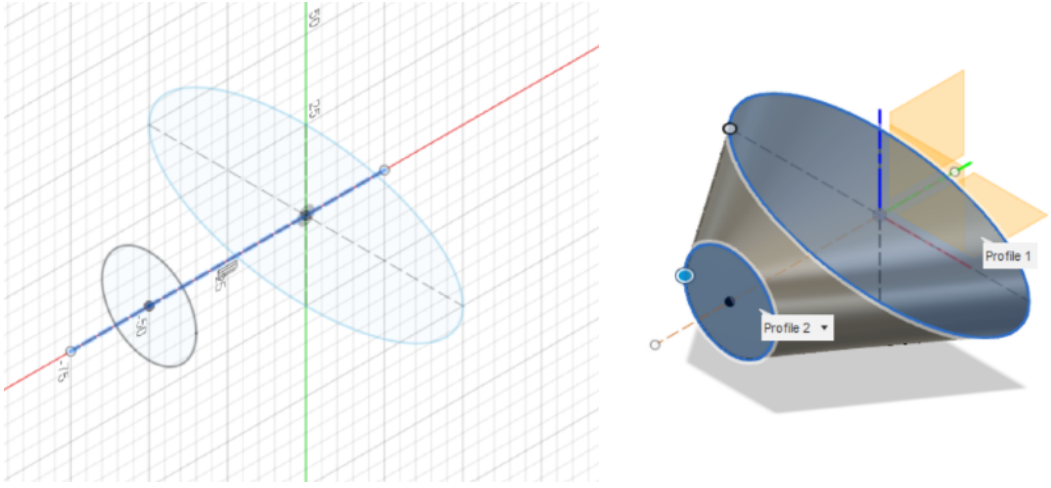
So let's look at these basic operations that we can use to produce designs. We can draw a basic ellipse, and then extrude it:



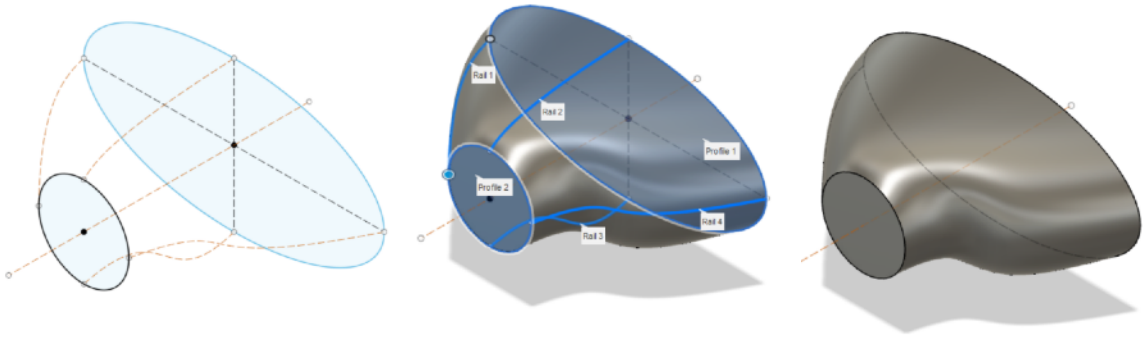
The extrusion can be a fixed distance (as above) or up to a feature, and can be in any direction. You can also extrude along a curved line (think exhaust manifolds etc). You can draw another shape (any shape - let's use a square) on the face of the object. Then you can use that line to extrude a hole or "cut" - again this can be a fixed distance or it can be up to a feature, or through everything. Again, the extruded cut can go in any direction or follow a curved line.



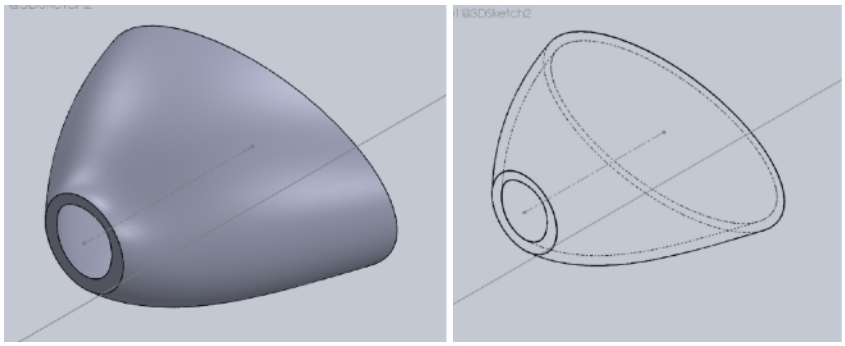
A feature that we use a lot is to make a shape that transforms or blends one cross-section shape into a different one. This uses a technique called "lofting". If you studied technical drawing you many remember this is a painfully intricate process of superimposing the shapes and meticulously measuring to plot the intervening shapes. Well in a CAD system it's a bit easier. You construct the start and finish shapes in their respective positions. Then you use the loft function to create the blend:



It can be a simple straight line or you can add "guide rails" to tell the system to produce more complex compound curves (I've deliberately used weird-shaped guides here to show a flavour of what lofting can do). You can have any number of guide rails (limited by computing power and memory) which can loft some very complex and sophisticated shapes provided that the rails don't cross or produce ambiguous paradoxes in the loft. I've only used



Then there's the "Shell" function. This is similar to the extruded cut, but it takes the solid shape and hollows it to your specified wall thickness (and if you want to get really complicated it can cope with variable thicknesses):

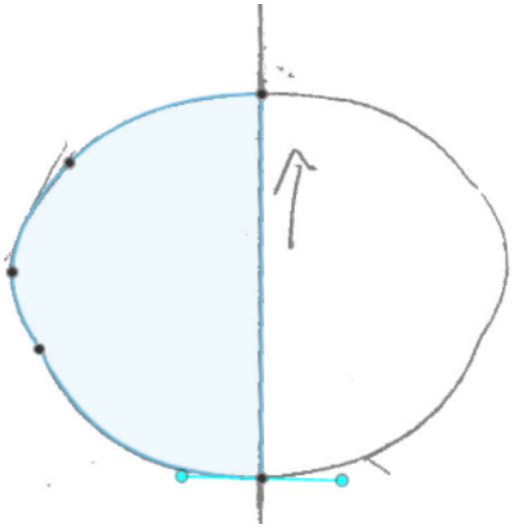


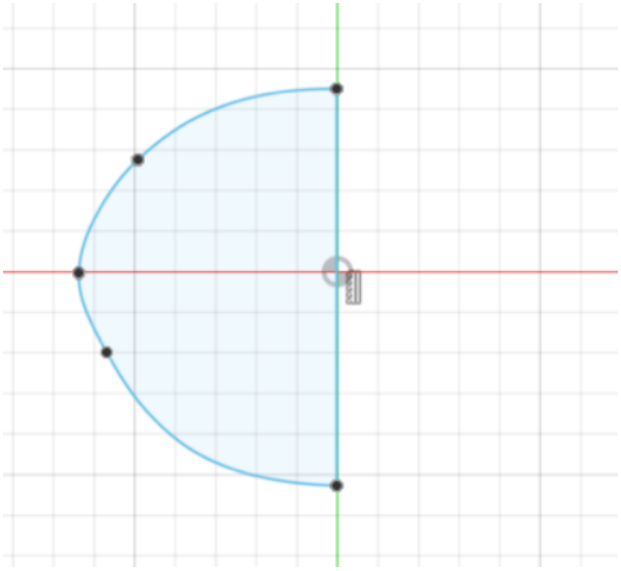
There are lots of other tools, and many of these tools have lots of settings & variations, but I'll leave it at that for now. That was the quick tour - now we get to the real bit of applying all the above to actually make something real. Let’s look at how I used these tools to make a cowling.

This will be a step-by step thing, but it WON'T be a tutorial on how to use the tool (Fusion 360) because its own tutorials do a better job of that and because you may use a different CAD system with different details in how it works. What I'm intending to do is show how you would use the features found in a typical CAD, and how you build up the design because it's very different to traditional 2-dimensional drawing. There are a lot of steps here, but most of them only take a minute to do so it's not as lengthy as it looks! Finally - this isn't the actual cowl I made in the above photos because the original cowl was designed in Solidworks rather than Fusion360. So I had to repeat the deign process in Fusion360 to get the pictures which is why this is a rough copy with different details. For reference – repeating the whole design in Fusion360 took me under 40 minutes from start to finish. End of excuses, so if you're sitting I'll begin...

We start with that scanned sketch of the back face of the cowl. You may note the arrow on the sketch – I put this on my drawings to indicate which way is “up” just to avoid any risk of confusion (good habit to get into). This could just as easily be a section of a plan or plywood firewall put in a photocopier or scanner - it's just a shape.

We import it into the CAD system as a picture and carefully rotate it so that it's centreline is as closely aligned to "vertical" in the CAD co-ordinates as we can achieve, then stretch/shrink it so that it's the right size. It's worth spending a few minutes getting this as close as you can, because the accuracy of everything after this depends on it. Once we have it sized and positioned we copy the outline with curves and straight lines. Or in this case we copy the outline of HALF of it:



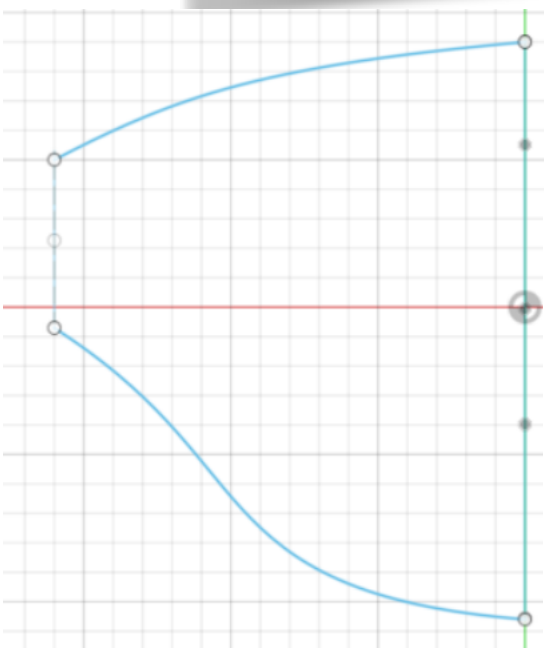


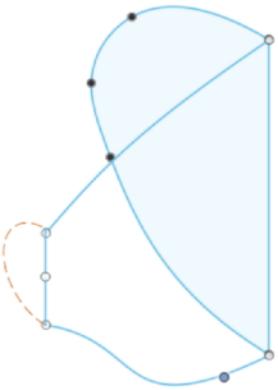
This is why I said previously that having a centreline datum was useful. If you're making a symmetrical shape the best way of ensuring it is symmetrical is to only draw one side, and the let the system make a mirror copy.

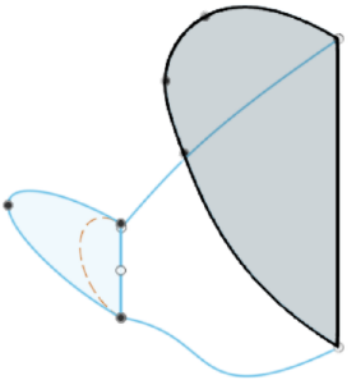
So our shape consists of a straight vertical line in the middle, and the rest is done with a multi-step "spline" curve. Splines are very common ways of making curves of any shape - those little arrows are grabbed and moved around to create the shape (just play with them - you soon get the hang of it). Once comfortable that the shape is copied we can delete the scanned sketch leaving just the shape:

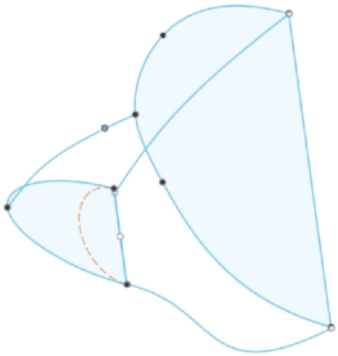
So that's the back defined. Now we move to the side view and work out where we want the front to be. We construct a horizontal reference line that's the length between the back and front face, and at the end of that we ad a vertical line that's the same as the spinner diameter. While we're here we sketch in the upper and lower profiles (again using spline curves):

Next we sketch in the shape for the front of the cowl - I wanted it to follow the spinner at the top & bottom, but with air intakes either side. This was done by sketching a guide semicircle (the broken lines are "construction guides" that don't appear in the actual design) and using that to create the shape I'm after with (guess what) a spline curve. At the back you will see I've also sketched in another curve that's the plan-view shape (yes, a spline):
Now we start getting to the "clever stuff". We have a back shape and a front shape, so we loft from one to the other. That's a straight-line loft, but we want it to follow the outline shapes so we use those profiles as "guide curves" to get a much better shape:









Part two to follow next month

CAA Registration information,

In the early days, a number of members paid for this through the CAA rather than the now more popular route, the BMFA.
I phoned the BMFA this morning to ask if it was possible to switch, and to my surprise they said yes, everyone can pay the £10 through the BMFA.
The possible advantages are:
1. Country Members won't have to deal with the CAA, only the BMFA.
2. Full Members who up to now pay the CAA themselves can switch membership types and become Senior Member (CAA), so the club pays it all.

Regards.
Jeff


G-BPLM

Date:	Event:
Thursday 9th March	Club evening: lecture by Rod Dean - "Flying the Hunter and other things"
Thursday 13th April	Club evening flying - Fishbourne Centre playing fields.

Please Try to leave Porthole as tidy as possible, making sure no fuel is left on site & lock the gate.

30 metres from "uninvolved" persons"

15 metres when taking off & landing, subject to mitigations

Flying alone on Thorney is now not allowed on the grounds of safety

From 1 Jan 21 BMFA Article 16 is law: know the separation minima!

When driving around Thorney be aware of young children on bikes and 20mph speed limit

The Commander at Baker Barracks Thorney and the MOD have decreed that there shall be NO drone flying whatsoever

When flying at Thorney please keep an eye out for traffic(all kinds walkers, horses, bikes, runners, and low flying aircraft) coming from behind the flyers and inform them accordingly

The club Facebook page is now in its fifth year. It has over one hundred members. It contains many contemporary site reports, and has a wealth of photos in its archives.
Administered by Nick Gates. David Hayward & Ken Knox
Here is the link:-
https://www.facebook.com/groups/Chichesteraeromodellers/