

Message started by Shane on 17. Mar 2011 at 09:56

Title: **Small prop and good Cl/Cd - almost a glider!**

Post by **Shane** on **17. Mar 2011 at 09:56**

Hello everyone,

I've just joined this forum, and although I am not building a glider, the model does have a very good Cl/Cd, and we could pretend it might make a glider tug! (OK, its a pusher, so would be rubbish as a tug!)

I am building a 1/3rd scale model of a plane called the EGO -its being designed and built outside Cambridge to conform with the deregulated light aircraft category. Model construction will mainly be moulded glass fuselages, and glass over foam wings.

I have a set of photos on flicker, here is a link:

<http://www.flickr.com/photos/60210304@N04/>

Overall span is 2.6m - not much by your standards but pretty big! I would really appreciate some advice about the spar and wing joiner design.

Option 1 is to let in a carbon fibre tube to act as the spar, and that makes it easy to have another tube fixed to the fuselage that slides into the wing tube spar. But I can't see any way of accurately letting the tube into the Rohacell foam wing.

Option 2 is to build a more traditional spar. I know I can do this, but would appreciate some advice about how beefy this ought to be.

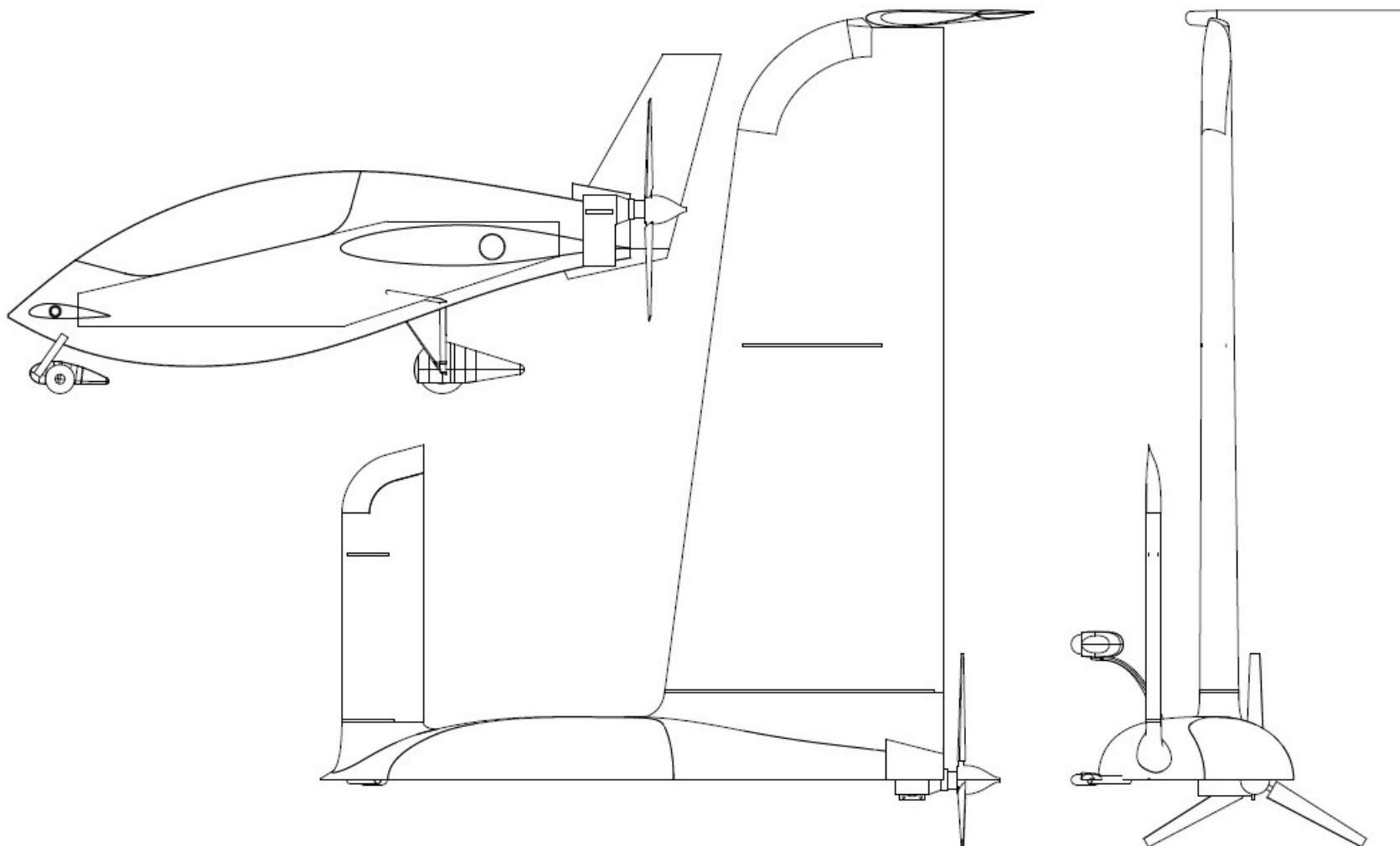
Each wing is about 1.2m span, 60mm thick at the join to the fuselage. If I were to let in full top and bottom spars with ply doublers, that would give me a box section at the root, to let in a metal bar. The bar would be suitably restrained in the fuselage with its own ply box.

Does this sound sensible? My questions are, roughly how big should everything be? Beefy is better than light!

I hope you glider guys don't mind me posting, but this construction forum is one of the best out there for techniques.

cheerio
Shane






Title: **Re: Small prop and good Cl/Cd - almost a glider!**
Post by **Noël Rumers** on 17. Mar 2011 at 23:41

Hi Shane,
This looks very good!!! I think it will soar well too.


have first flown the 1/3 scale model with retractable engine, of course onboard starter the first time I used it, and ever since, 4.24 m span and 1.95 m long. The fuselage was build with honeycomb etc... Make sure the CG is OK on a Canard!!!

Noël

 Model_Solitaire0009.JPG (Attachment deleted)

 Solitaire_Rumers_Noel_2.jpg (58 KB |)



 Solitaire_NR_3.jpg (17 KB |)



Title: **Re: Small prop and good Cl/Cd - almost a glider!**
Post by **Shane** on **20. Mar 2011 at 23:43**

Hi Noel,

I'm a big Rutan fan, but I've never seen that plane before, it looks amazing.

I'm still hoping for some sage advice about wing joiners. I've gone ahead and am using 1/4 x 1/2 spruce top and bottom spars, with 1/16 web on both sides (though on the drawing I've only shown one).

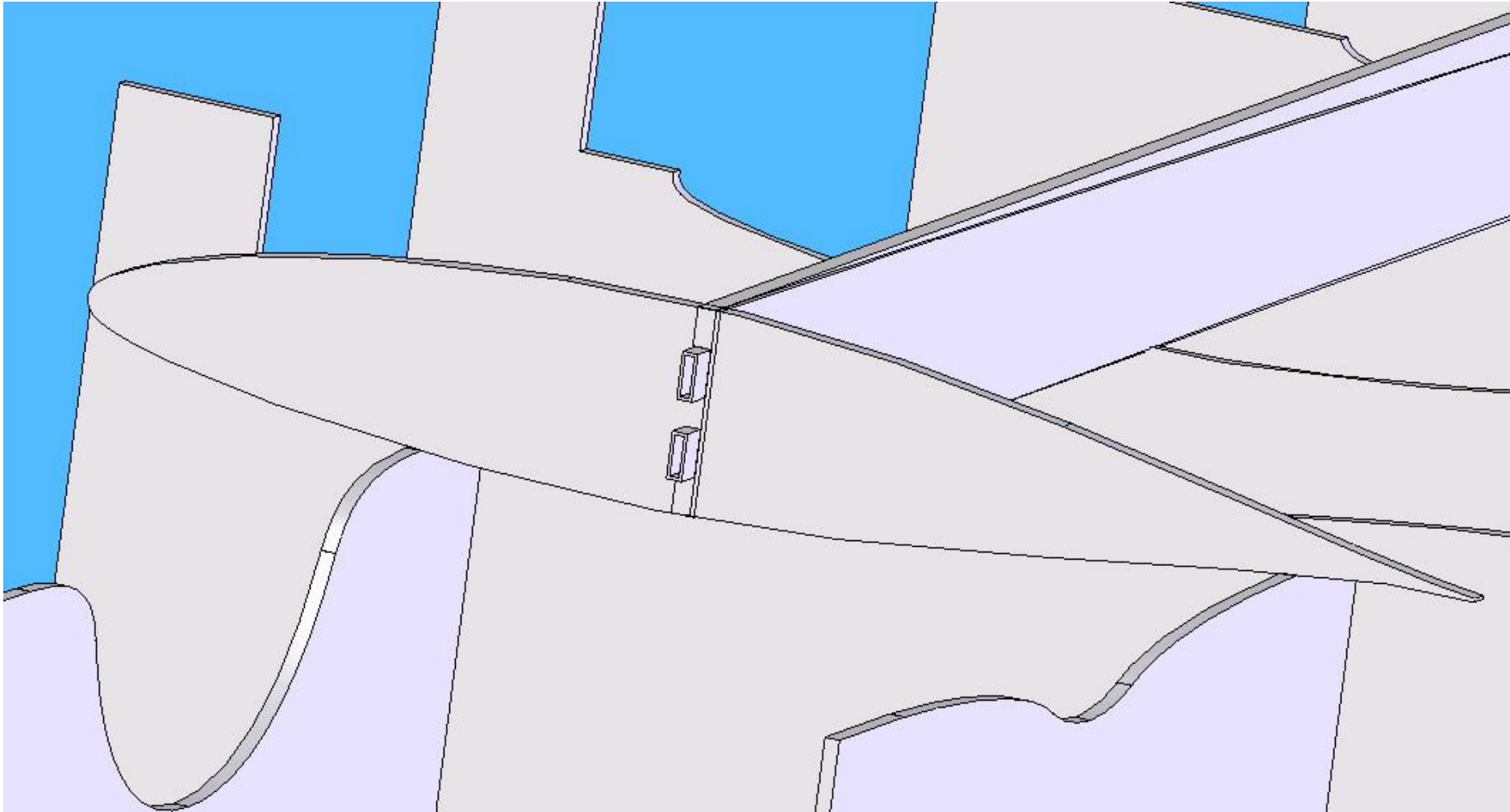
I've also got some 14mm steel and brass box joiner bar. I could fit two of these into the spar box, one above the other. Is this worth while, or would one be sufficient?

Cheers Shane

Thanks

Shane





Title: **Re: Small prop and good C_l/C_d - almost a glider!**
Post by **Shane** on **23. Mar 2011** at **11:16**

Hello!

The CNC'd Rohacell wings were cut longer than I needed so chopping them off to size was the first task. A wing section blank was used to keep the saw in the right place. The pullsaw is amazing for this.

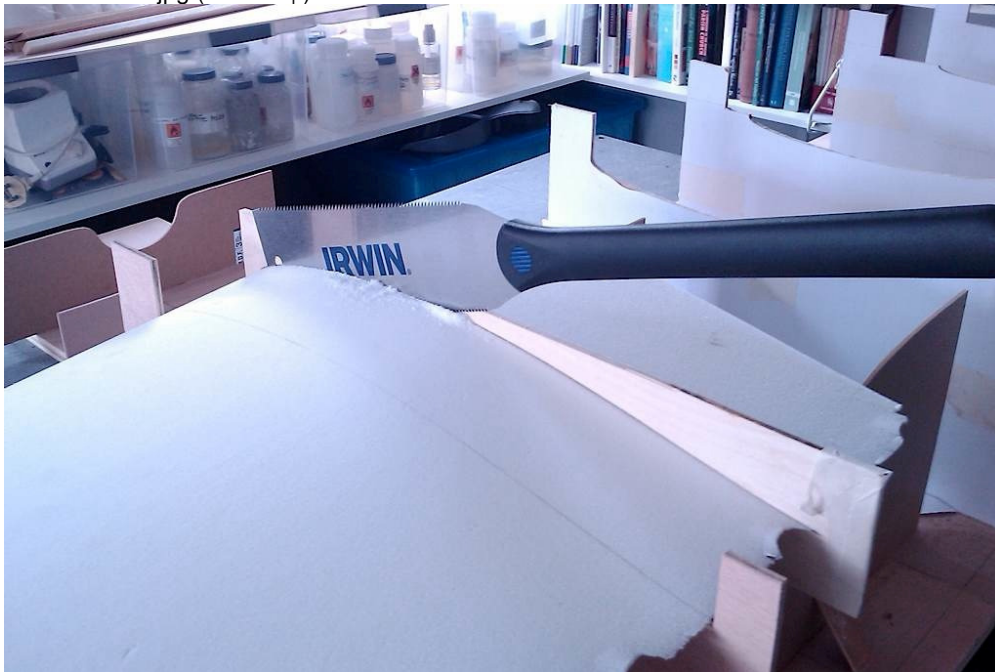
Also I chopped out space for a spar, alignment was achieved using two flat aluminium bars joined at their ends, it means you always get straight lines above and below. Interesting how different are the techniques for wooden construction (building from the inside out) and foam construction (chopping from the outside in). You can see the spruce spars and ply webs dry fitted in position.

Next I'll epoxy 14mm brass joiner boxes one above the other.

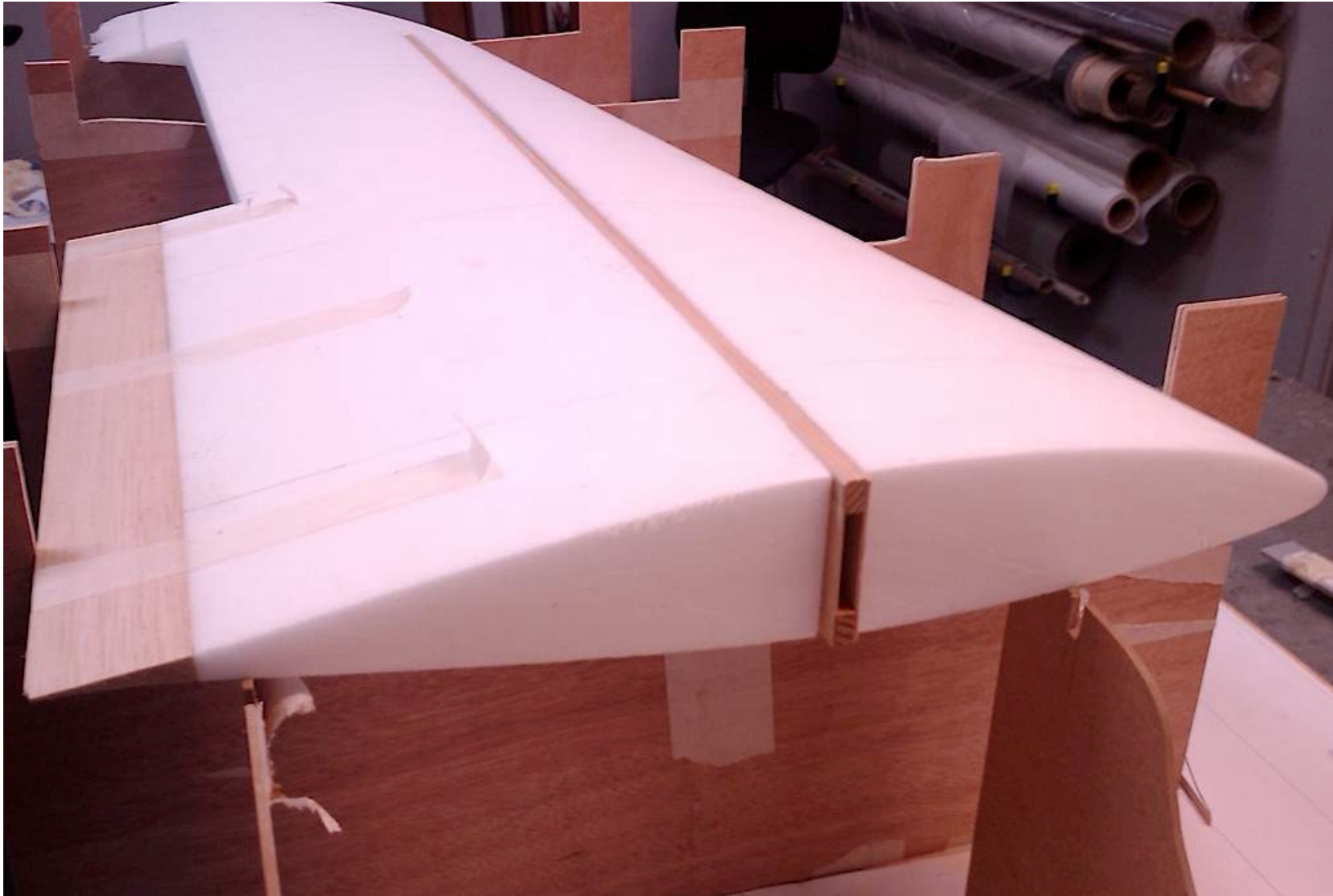
cheers

Shane

 IMAG0259.jpg (109 KB |)







Title: **Re: Small prop and good Cl/Cd - almost a glider!**
Post by **Jolly Roger Brown** on 23. Mar 2011 at 12:00

Hi Shane,

I've used single 14mm strip for gliders up to 5kg. But I fly quite gently and the extra speed of your power unit will increase stress on the joiner. So 2x would be safer.

Well actually I'd probably use a single taller strip to make the most of the depth of wing section - either a decent grade alloy or carbon strip. I sourced some 25 x 4mm pultruded carbon strip a while back from a boat builder. He bought them in 5m lengths and gave me the offcuts. ;) You may find something on t'internet.

Rog

P.S. Your wife knows you are in her studio. It's a sixth sense. :)

Title: **Re: Small prop and good Cl/Cd - almost a glider!**

Post by **Shane** on **23. Mar 2011 at 15:00**

I'd never use it without permission.
Anyhow, its only in the evenings. I still have to work.

I thought about making my own CF joiner bar, but in the end I thought 2x14mm just about fits in anyhow so I'll go with that. Rather committed now!

Thanks
Shane

Title: **Re: Small prop and good Cl/Cd - almost a glider!**

Post by **Noël Rumers** on **24. Mar 2011 at 00:15**

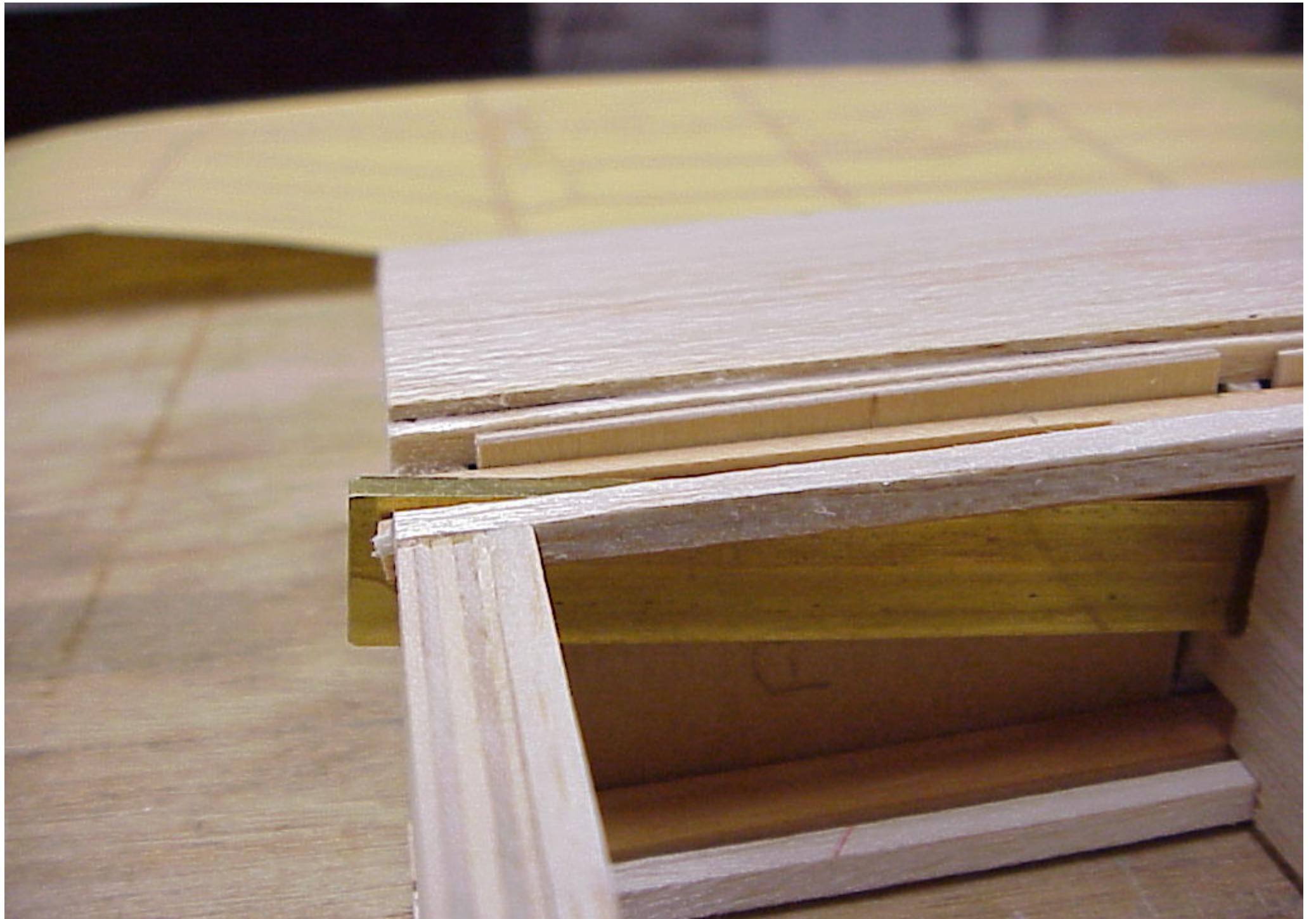
I used in the Solitaire only a single 12x2 mm going only 70 mm into the wing :o
With 4.24 m span and 10 kg not bad I would think.

I used a R-glass (E- glass) spar like the real one. This was build into a kind of gutter in balsa and ply. But no pictures of this build into the Solitaire wings. See the pictures of an other build. I use this method often. The epoxy with the glass will glue all together in a way that it is very strong... The rear webbing was not in at that time. First the wing joiner has to be glued in place with 5 min epoxy and micro balls, here the first two chambers are fully filled with this mixer and closed with the webbing in ply. This ply is only used between the first two or three ribs...the rest is balsa of 1.5 mm. Though in the Solitaire it was only 1 mm both sides of the spar :o.

Noël







Title: **Re: Small prop and good Cl/Cd - almost a glider!**

Post by **Shane** on **28. Mar 2011 at 22:12**

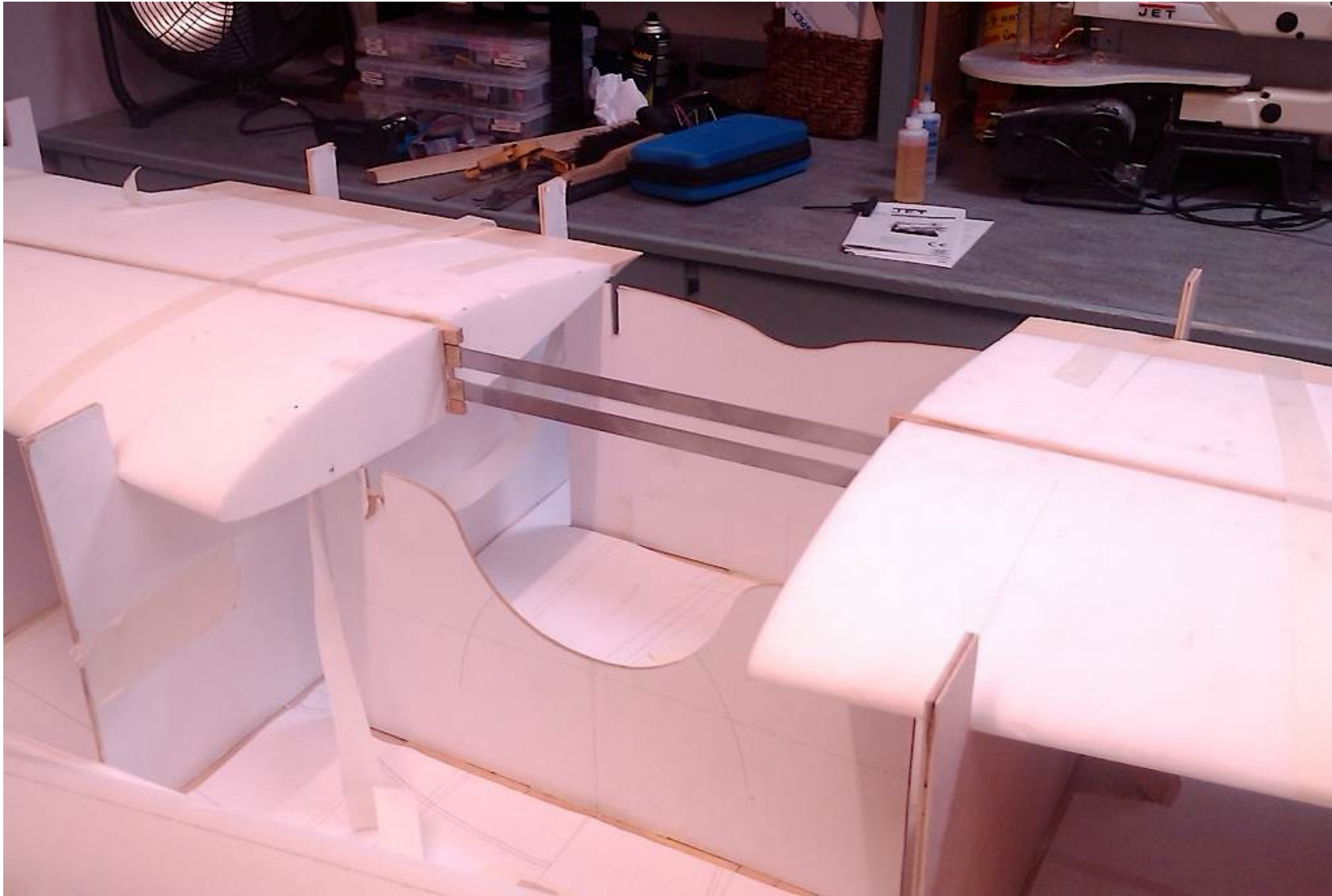
Noel and Roger,

thanks for the tips and enthusiasm.

A little more progress and the wings are together.

I'm keeping her studio so clean, Mrs. Shane even took the photo!







Title: **Re: Small prop and good Cl/Cd - almost a glider!**
Post by **Shane** on **26. Apr 2011** at **12:43**

Hi there,

DEspite the lovely weekend weather I stayed inside and made progress vacuum bagging the wings.

I used the technique from the david thomas book on foam model construction, which is to use a fairly thick layer of polyethylene sheet between the GRP and the bag, which is still flexible to a degree but won't allow small scale imperfections such as between the weave. So you get a very nice shiny surface as a result. Here are some shots in the bag. Its 2m x4m!











Title: **Re: Small prop and good Cl/Cd - almost a glider!**


Post by **Shane** on **26. Apr 2011 at 12:51**

Oops that last one is out of the bag as is perhaps fairly obvious!

Needless to say, I'm pleased with the shine. All these need is some primer, sanding, primer and a few top coats.

Thats months away though. At least the wings are now in GRP - it's been so difficult to avoid dinging them. The amount of filler I've been using to fill in the hanger rash is embarrassing.

Shane

 IMAG0304.jpg (98 KB |)





Title: **Re: Small prop and good Cl/Cd - almost a glider!**
Post by **Barry_Cole** on 26. Apr 2011 at 19:24

All the time CW is building, you never need be embarrassed about the amount of filler you use.

::) ::) ::) ::)

BC..

Title: **Re: Small prop and good Cl/Cd - almost a glider!**

Post by **Shane** on **03. May 2011 at 14:18**

A bit more progress.

Spent much of a long weekend happily wielding a wire cutter while thinking of Kates sister in that bridesmaid dress..... :D

I've cut the elevators and rudders. Elevators were much easier being parallel, but the tapered rudders were tough to do accurately.

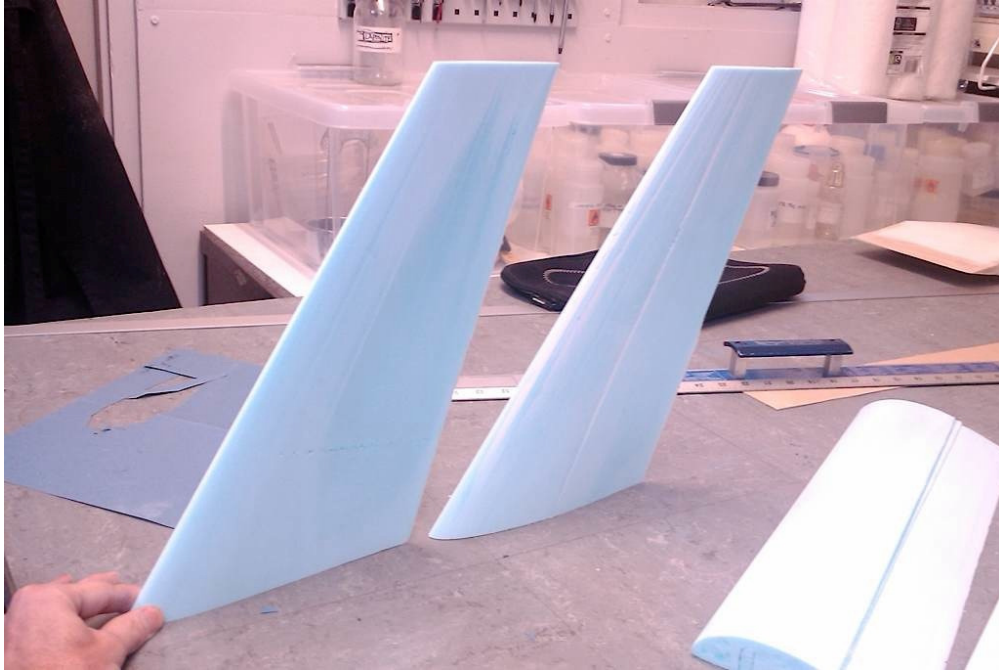
More filler needed!

The elevator to the right has the intermediate piece removed (as it will be when in the air). The drawing called for a decent sized slot, no idea whether this will work correctly on a chord of some 4 inches....

These will need some spars before glassing and bagging.

Need to put some







Title: **Re: Small prop and good Cl/Cd - almost a glider!**
Post by **Shane** on **03. May 2011 at 14:26**

Ailerons!

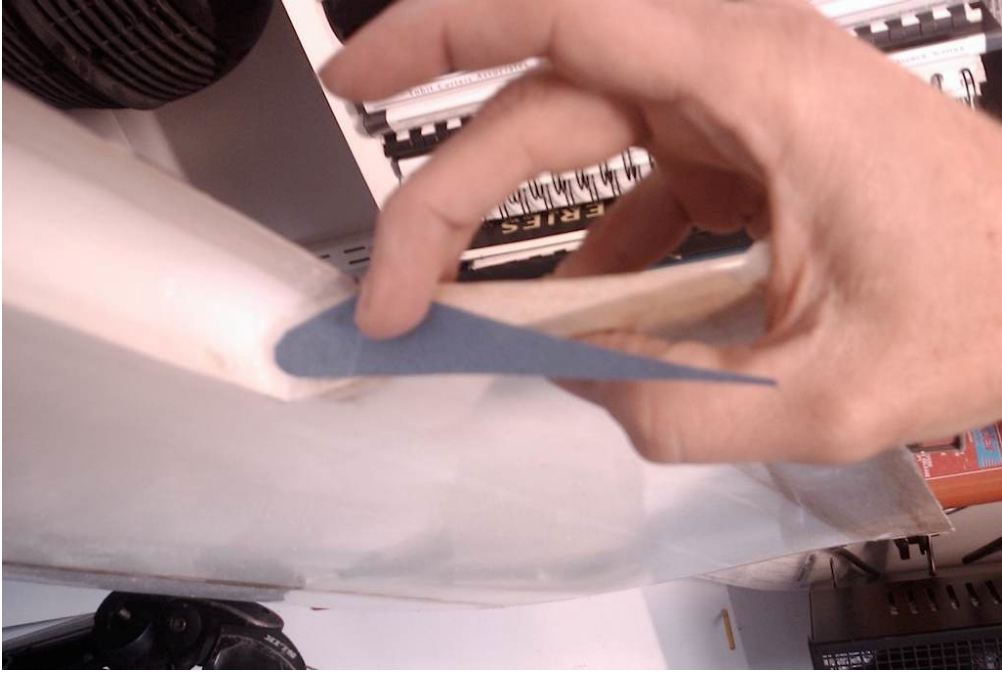
So I misinterpreted the drawing and I made the aileron slot in the wing too narrow.

I did not realise we were having frize ailerons. So to accommodate the aileron in front of the hinge line, I had to chop out some of the balsa and rohacell. I think it worked out OK in the end but it was a worry to cut into the nice new glass surface.

The last image shows how much I cut out. Those black lines are all straight when viewed fore/aft.











Title: **Re: Small prop and good Cl/Cd - almost a glider!**

Post by **Shane** on **05. Jul 2011 at 16:06**

Hello again,

I've been rather busy sorting out the elevators, rudder ect, but here I'll show progress on the fuselage.

After much filler, sanding, filler, sanding, more sanding, polishing paste, then 3 layers of wax polish and two layers of PVA release, the fuselage halves are ready. (Queue photo of shiny surface!)

The glass fibre was draped around it. I used two layers of 183g/m2 twill glass fibre, cut on the bias so that it would drape well.

The photo shows the 2nd side all laid up and drying. (I did a better job on the 2nd side, but I can't tell for sure until it comes off the mould.

The other photos show the 1st side (the one with the black marker pen) having been demoulded. I struggled a bit but it did come out without destroying the original.

Those of you who know what you are doing *unlike me, will be ready to point out that I should have made a female mould from the male, and then the outside of the glassfibre would have looked smooth and shiny, rather than the inside. I'm only making one of these (unless I crash it) and so the extra effort in preparing the female mould was more than I could take. And I was sick of sanding and polishing.

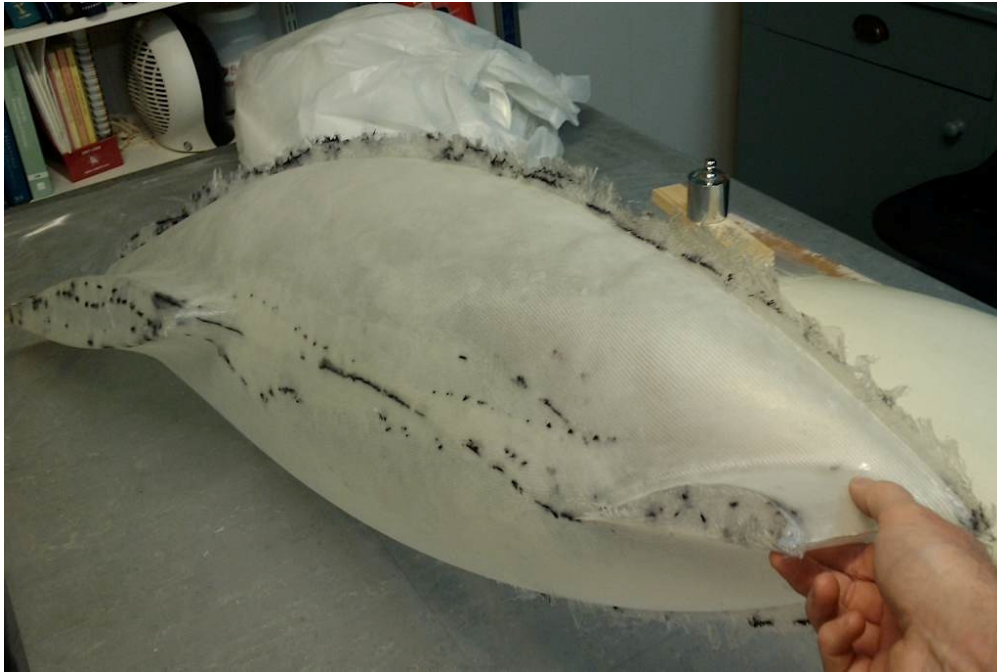
Another update tonight assuming the second side comes off.

S

IMAG0011.jpg (91 KB |)










Title: **Re: Small prop and good Cl/Cd - almost a glider!**
Post by **Shane** on **07. Jul 2011 at 11:58**

The 2nd half came off fairly easily so now I have a fuselage skin! :D

Making some formers now in Solidworks.

This all takes such a long time. :-[

formers.jpg (Attachment deleted)

IMAG0019.jpg (104 KB |)



IMAG0020.jpg (104 KB |)



Title: **Re: Small prop and good Cl/Cd - almost a glider!**
Post by **Chris Wynn** on **07. Jul 2011 at 12:37**

Hi Shane, great stuff. This is a sophisticated version of the 'lost foam' method of one off construction we used the 70's but far more advanced. Best of luck with the rest of the build.
Chris ;)

Title: **Re: Small prop and good Cl/Cd - almost a glider!**
Post by **Richard A** on **07. Jul 2011 at 23:09**

Very neat work Shane. Looking forward to further installments.

Richard.

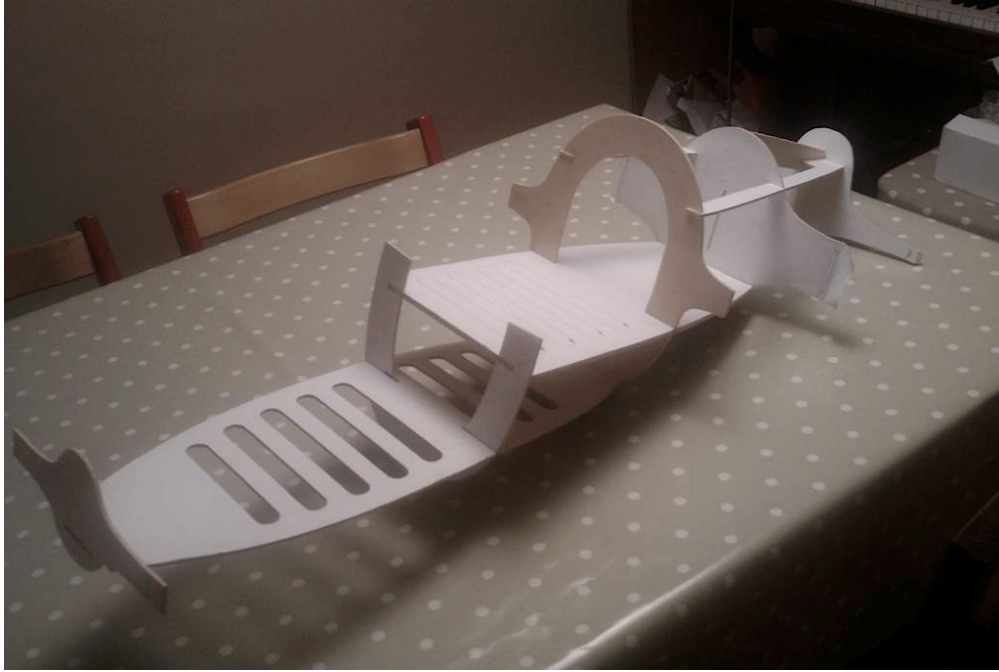
Title: **Re: Small prop and good Cl/Cd - almost a glider!**
Post by **Shane** on **18. Jul 2011 at 10:47**

Thanks for the feedback chaps.

A little more progress. The fuselage structure has been cut out and dry assembled.

Spending a few hours with my scroll saw is a very nice way to spend time - you really see something starting to take shape with fairly minimal effort. With practice, you can even cut straight lines! I got it for this project, and its the best bit of hobby kit I've got.







Title: **Re: Small prop and good Cl/Cd - almost a glider!**
Post by **Jolly Roger Brown** on **18. Jul 2011 at 20:17**

Nice clean work as always Shane.

Rog

P.S. And my 5 year old thinks it looks like a kangaroo having a sleep. ;D

Title: **Re: Small prop and good Cl/Cd - almost a glider!**
Post by **Shane** on **19. Jul 2011 at 10:34**

Its all happening.


So big my little camera phone could not fit it all in.

I sized the engine it needs. 1kW at stall speed (10m/s), 2.2kW at 20m/s (top speed). :o

Scary. Very far from my comfort zone!

Canards going on by the end of the week.
Thanks for the interest

Cheers

 IMAG0037.jpg (134 KB |)





Title: **Re: Small prop and good Cl/Cd - almost a glider!**
Post by **Shane** on 22. Jul 2011 at 11:00

Lots of working till midnights, about to go on holidays but its coming together now.

Strange how you can very carefully do something very stupid. Like using cellulose based primer on blue foam parts. Areas not completely sealed by the glass+epoxy was eaten. Stoopid!


Most parts OK but the elevators will probably need redoing.

I've only just realised that the way I'm building this is one big experiment. The glass surface is quite wobbly, so is the wooden structure beneath. Its only when its all glued together that it stiffens up. And to do that accurately is going to be tricky.

IF anyone has done this before, I would appreciate tips!

Cheers

Shane

 IMAG0038.jpg (144 KB |)



Title: **Re: Small prop and good Cl/Cd - almost a glider!**

Post by **Jolly Roger Brown** on 22. Jul 2011 at 13:29

Looking good. Combining two wobbly structures to make one stiff one sounds like good aeromodelling to me!

When it comes to sticking them together and you've got them really carefully aligned, you could progressively spot tack the ply bits in place using cyano, then reinforce later with epoxy/carbon
tows/micro-baboons/ whatever. This gives you a chance to re-do any spot-tacks if you're not happy with alignment before it gets permanently bonded with epoxy.

When I have scarey jobs like this I put them off for months...years! It's staggering what else gets done in the meantime though. ;)

Good luck,
Rog

Title: **Re: Small prop and good Cl/Cd - almost a glider!**
Post by **Roberto Alonso** on **22. Jul 2011 at 17:05**

Yep, whatever you do, don't forget the micro-baboons! such useful little primates! :D ;D

Only words of encouragement from here, but, have you double-checked your calculations? seems like a lot of power to maintain flight and a quite narrow speed range.

Title: **Re: Small prop and good Cl/Cd - almost a glider!**
Post by **Jolly Roger Brown** on **22. Jul 2011 at 22:44**

Roberto Alonso wrote on 22. Jul 2011 at 17:05:

Yep, whatever you do, don't forget the micro-baboons! such useful little primates! :D ;D

I agree Roberto. Even better than Gorilla glue.

Title: **Re: Small prop and good Cl/Cd - almost a glider!**
Post by **Shane** on **01. Aug 2011 at 12:56**

Hi thanks for the feedback.

I would appreciate some advice about making a canopy.
It will be over a foot long, I will frame the base of it, but can anyone tell me what material/thickness I should use? I guess I'll vacuum form it.

If you can help, then could you also tell me where I can source it from?

Many thanks
Shane

Title: **Re: Small prop and good Cl/Cd - almost a glider!**

Post by **Shane** on **12. Aug 2011 at 10:41**

Hi All,

I've spend a week of my holidays on this but achieving relatively little!

I've had a huge problem fitting the glass fibre shell over the wooden framing structure. The fuselage halves are just not meeting in the middle! After much frustration I've learned some lessons.

One big mistake is that I had two half-fuselage plugs which I mounted on their own parting boards. The rohacell cores had been around for a while and one needed a bit of persuasion to lie flat on its respective board. The result is that the glassfibre surface is too small in some areas and so the halves do not fit together.

What I should have done is glued the halves together and add one separating surface, which is (I understand) the right way to do it.

Lesson 2: just because you have a CAD model and print out parts full size, does not mean it will definately assemble at the right size. I had a part about 5mm out (a result of cumulative tolerances) which caused huge problems. I guess my scroll saw cuts to ca. 1mm tolerance so its always worth checking.

Lesson 3: If you are going to start using CAD, you need to draw everything in CAD. I'd started making it up a bit as I went along (for some the structure) and that was a mistake. I should have drawn everything and make sure it all worked before cutting.

On a positive note everything lines up well, and the original investment in a wing and fuselage Jig has saved me serious heartache.

Enclosed is a photo showing the cutout for the canopy. Its big - over 600mm long. I've never pulled a canopy before. When does the learning stop! :D





Title: **Re: Small prop and good Cl/Cd - almost a glider!**
Post by **Shane** on **15. Aug 2011 at 10:48**

COCKPITS!

Over the weekend I made a vacuum box, bought some 1mm petg, and made a big box as a makeshift oven.

I heat the box from the top with a heat gun on full.

The result from my second attempt is here (first attempt was too terrible to show). Not good enough, but I'm not too disappointed. This thing is 600mm long!

You can see the folds on the side of the canopy. Before I use any more plastic, can anyone tell me how to get rid of them?

What is happening is that I get the plastic to around 130degC, but it does sag an awful lot, easily about 3-4 inches in the middle. So when I try to put it on the plug, the downward sagging plastic is pushed up, and the result is folds in the sides. Can anyone help on how to deal with this?

Should I heat it less - so less sag? But it already cools down very quickly so am worried about doing that.

Please help with any advice, :)
Thanks
Shane







Title: **Re: Small prop and good C_l/C_d - almost a glider!**
Post by **Shane** on 18. Aug 2011 at 13:10

Cockpit sorted.


SO last night I sorted out my vacuum moulding issue, with pictures to show progress. In case anyone comes up with similar issues, I thought I'd give some pointers:

- The plastic had to be allowed to sag a lot to get the temperature right. I had tried removing heat once it got to 130deg, but that did not give enough time for it to mould properly.
- I measured ca. 140deg C with an infrared thermometer. From about 120deg C onwards, sag began. The frame is 600mm x 300mm, and the amount of sag was at least 4-5 inches in the middle (about 100mm easily). Thats 1mm thick PETG.
- This amount of sag is much more than what I've read on other web sites.
- With that I had maybe 5 seconds of working time before the material solidified.
- I placed the mould on a riser, which was about 1/2 the height of the mould. This pulled the very saggy material down and ensured that webbing happened away from the mould.

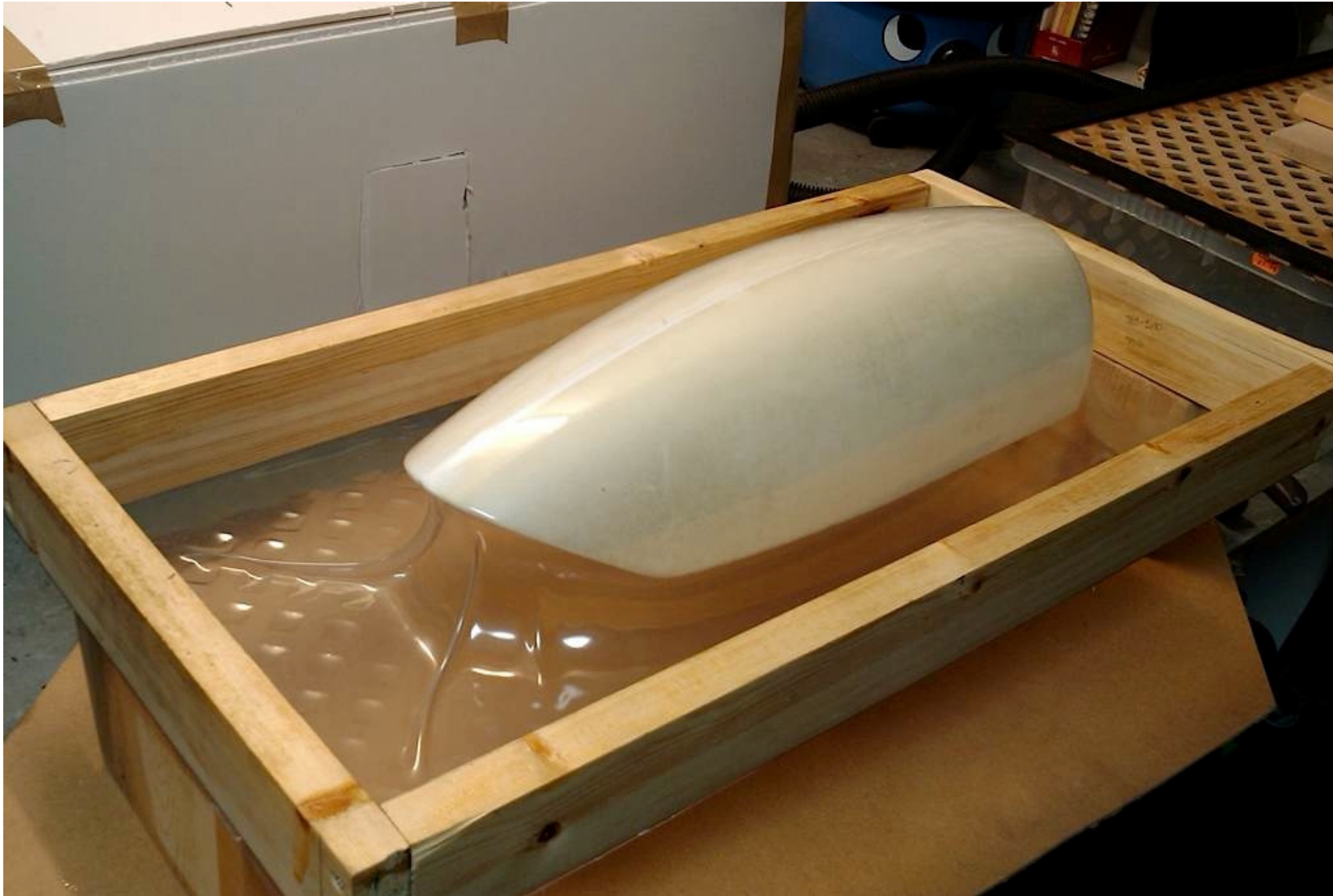
So my conclusion:

- buy an infrared thermometer
- you can evenly heat a big sheet with a heat gun, but it needs to be in a box and you need to keep moving the gun.
- I needed lots of sag, 1 inch of sag for every 2-3 inches width of plastic sheet.

Cheers
Shane

 IMAG0048.jpg (114 KB |)





Title: **Re: Small prop and good C_l/C_d - almost a glider!**
Post by **Jolly Roger Brown** on 18. Aug 2011 at 22:14

Well done Shane - you did it! I admire your ingenuity and thanks for posting your findings.

Title: **Re: Small prop and good Cl/Cd - almost a glider!**

Post by **Elliot Howells** on **19. Aug 2011 at 21:12**

I'll second that !

very interesting, thanks Shane.

Ell.

Title: **Re: Small prop and good Cl/Cd - almost a glider!**

Post by **Shane** on **14. Sep 2011 at 11:54**

A short update.

Cockpit now installed, held on securely with 4 neodymium magnets.

By the way, if you are using the same plastic as I used, then not only is there a peel sheet on one side (white, printed etc) but theres also a transparent one on the other. ;D
ONLY found out when some masking tape peeled some off. ITs looking really clear now. Lovely






Title: **Re: Small prop and good Cl/Cd - almost a glider!**

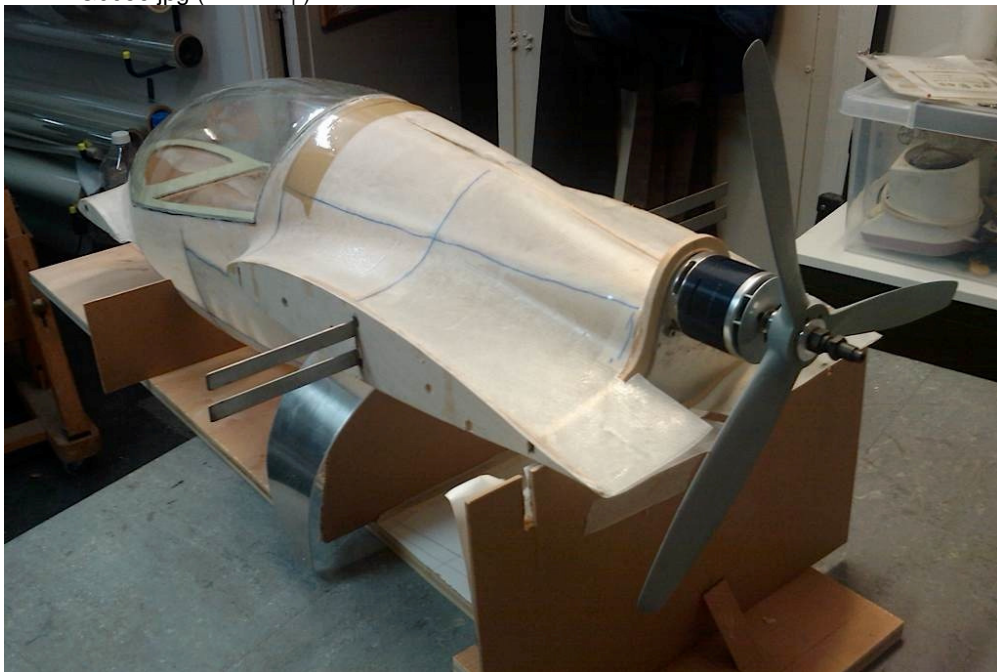
Post by **Shane** on **14. Sep 2011 at 11:57**

And one from the back showing the motor.

Its rated at 2.5kW, with the 3bladed 17x8 prop I've had the power system up to 1.5kW peak. I doubt I'll need much more in normal flight. I expect when flying it will take more current, due to the volume of air going through.

It makes a hell of a noise, because of the blades passing over the nearby fuselage/wing trailing edges.

 IMAG0056.jpg (111 KB |)



Title: **Re: Small prop and good Cl/Cd - almost a glider!**

Post by **Spike Spencer** on **14. Sep 2011 at 19:41**

wrote on 14. Sep 2011 at 11:57:

.... I expect when flying it will take more current, due to the volume of air going through.

Shane,

while the volume of air passing through the prop disc will indeed increase, the inflow from ahead due to forward motion will reduce the Angle of Attack of the prop blades thereby offloading it. You should see lower max current draw in forward flight.

The noise is strongly influenced by the distance between trailing edge and the prop disc (not much you can do about that now !). It might reduce (slightly) if you can find a crescent-shaped prop that would reduce the abruptness with which the TE flow is chopped. Interestingly, the 3-blader may be quieter than an equivalent 2-blader where both blades would be chopping simultaneously if the shaft centreline was at the TE; your motor is well above that level so the noise is less than it could have been. There will certainly be a different passing frequency with a 2-blader (try it ?)

Interesting and adventurous project, well executed. Good luck with the maiden flights. [smiley=thumbsup.gif]

Title: **Re: Small prop and good Cl/Cd - almost a glider!**

Post by **Shane** on **15. Sep 2011 at 09:47**

Hi Spike,

Thats a good point, I've never measured this so I don't know what the result will be but I had expected that when ground testing at high RPM the blade must be mostly stalled so not doing that much work.

Thinking through your point, I think what might happen with a prop at constant RPM on a plane which is accelerating from 0) is that it would start off stalled, then forward motion is enough to unstall the blades, hence W goes up, then as speed increases the blades unload again.
maybe :-?

I fully expect the moderators to remove this thread for inappropriate subject matter!

Cheers for the feedback

Shane

Title: **Re: Small prop and good Cl/Cd - almost a glider!**

Post by **Shane** on **22. Sep 2011 at 10:06**

A little progress. Getting ready for paint.





Title: **Re: Small prop and good Cl/Cd - almost a glider!**

Post by **Jolly Roger Brown** on **22. Sep 2011 at 12:02**

wrote on 22. Sep 2011 at 10:06:

A little progress. Getting ready for paint.

Painting should be no problem if you've read half the books on that bookshelf. ;) Sorry - not trying to be nosey there.

Hands together. Let us spray.

Rog

Title: **Re: Small prop and good Cl/Cd - almost a glider!**

Post by **Shane** on **22. Sep 2011 at 22:54**

You have good eyesight!

My wife is a picture restorer so I get to use her fabulous studio, but I have to leave it clean, clean clean! ::)

She reckons acrylic is the only way to get gloss from water based. But then, planes are not her thing.


Title: **Re: Small prop and good Cl/Cd - almost a glider!**


Post by **Shane** on **26. Sep 2011 at 10:45**


Getting closer.

Currently wrestling with how to attach the wingtip rudders in a reliable manner.

Should I paint the wings, though?

 IMAG0063.jpg (Attachment deleted)

 IMAG0064.jpg (Attachment deleted)

 IMAG0065.jpg (Attachment deleted)

Title: **Re: Small prop and good Cl/Cd - almost a glider!**
Post by **Jolly Roger Brown** on **26. Sep 2011 at 13:19**

It's coming on really well Shane!

Sorry I couldn't suggest how to stick on the rudders without seeing them. I'm sure you'll have a bright idea and execute it perfectly, as with the rest of the build.

Title: **Re: Small prop and good Cl/Cd - almost a glider!**
Post by **chris williams** on **26. Sep 2011 at 21:16**

So, Shane...where are you going put the CG?

Title: **Re: Small prop and good Cl/Cd - almost a glider!**
Post by **Shane** on **26. Sep 2011 at 22:16**

well, I, ahmm, it would be, let me see; roughly.... :-/
..somewhere between the main and foreplanes ;D

I know an X-plane version has been built and I think theres some guidance coming from that.

After all this work, I'm not sure I could take watching it pitch up and porposing down into an early demise from its first flight.
Been there!
Shane

Title: **Re: Small prop and good Cl/Cd - almost a glider!**
Post by **chris williams** on **26. Sep 2011 at 23:45**

Perhaps a simple free-flight balsa chuckie might give you some idea...?

Title: **Re: Small prop and good Cl/Cd - almost a glider!**
Post by **Spike Spencer** on **27. Sep 2011 at 15:42**

I have not checked the Maths but you could try this:
http://adamone.rchomepage.com/cg_canard.htm

If nothing else, a good starting point for the Balsa chuckie to establish a suitable level of confidence before you maiden the big fella.

Title: **Re: Small prop and good Cl/Cd - almost a glider!**

Post by **Noël Rumers** on **30. Sep 2011 at 00:01**

Hi Shane,

Q: did the real one fly?

If so, put the CG there were the pilot would sit, his belly would be spot on. Know that the CG has limitations here. On my 33% or 1/3 Solitaire I had only 25 mm or 1 inch to play with. To far front or back and it was impossible to fly.

I would go for a small model as CW suggested, this works fine. I have done this too long ago.

Know this, a canard plane is special but does fly well if the CG is OK!!!! I did use the middle flight box. Yours will be a fast one ;)

Noël

Title: **Re: Small prop and good Cl/Cd - almost a glider!**

Post by **Noël Rumers** on **01. Oct 2011 at 00:22**

Would these help you??

Noël



Canard_and_CG0004CG_how_to.JPG (Attachment deleted)



Canard_and_CG0005CG_how_to.JPG (Attachment deleted)



Canard_and_CG0002CG_how_to.JPG (Attachment deleted)



Canard_and_CG0001CG_how_to.JPG (Attachment deleted)

Title: **Re: Small prop and good Cl/Cd - almost a glider!**

Post by **Shane** on **05. Oct 2011 at 22:32**

Thanks for the advice. I hear and obey.

Chuckie made. Seems to fly OK with a bit of weight up the front - though need a calmer day to make sure as the glide path in the living room is not very long!

Noel, the full size is not made yet. The plan is that this model helps identify any problems before a man is committed to the full size which might be flying next summer.

cheers

Shane





Title: **Re: Small prop and good Cl/Cd - almost a glider!**
Post by **Jolly Roger Brown** on **06. Oct 2011 at 13:39**

Dumb question, but I see nobody bothers with airfoils on their CG test chuckies - is it insignificant at these tiny Re. numbers?

Title: **Re: Small prop and good Cl/Cd - almost a glider!**

Post by **Shane** on **07. Oct 2011 at 09:52**

Quite right, Re too low, so at the leading edges the air is very likely to separate from the surface (rather than stick a little longer if it were turbulent flow). So the profile makes very little difference.

Worth pointing out that on the 1/3rd scale model the canard is going to have turbulators on it so that we can get closer to matching full size reynolds numbers. It's also a bit safer, as the flow will be more turbulent and hence less likely to detach suddenly.

Turbulators sounds a bit posh, a piece of rough sandpaper in practice!

Title: **Re: Small prop and good Cl/Cd - almost a glider!**

Post by **Spike Spencer** on **07. Oct 2011 at 17:01**

Turbulators - hmmm.

Don't always work as envisaged ! Sandpaper may even be 'huge' compared to the Boundary Layer thickness. I have known the lightweight Free-flight glider boys use cotton thread, 5 thou Mylar strip or even 'pinked' tissue.

I remember an accident report of a homebuilder of a Rutan Canard who frightened himself fartless by failing to get airborne in the takeoff distance predicted by Mr Rutan. Turned out that the slick vinyl graphics he had added to his flying surfaces before the Maiden flight had unexpectedly but adversely modified the laminar flow characteristics.

Fences, Slats, Notches, Turbulators and such like tend to be indications of aerodynamic 'problem-solving'. You sound as if you are in the Re know, Shane. Nevertheless, unless you already know you have a problem, I would consider flying the basic airframe 'raw' then changing only one thing at a time to determine handling improvement (or otherwise) 8-)

One of my research subjects (the AW52G) failed as a fullsize project because it was impossible to maintain the required laminar flow once introduced to the real world with dust and flies on the surface. :-[

Title: **Re: Small prop and good Cl/Cd - almost a glider!**

Post by **Noël Rumers** on **07. Oct 2011 at 19:43**

Hi Spike,

This is 200% so as you point out.

I have been building and flying Canard planes for so time in the past. The one thing to remember is that raindrops on the canard would be a problem as well.

However I have flown the Solitaire for about 10 years. It never failed me.

Noël

Title: **Re: Small prop and good Cl/Cd - almost a glider!**

Post by **Shane** on **07. Oct 2011 at 22:11**

Hi Spike,

thats good knowledge, I had heard about the difficulty of maintaining laminar flow on full size planes.

I have the opposite problem. With the small chord on the canard, the flow around the leading edge will be laminar. More prone to a vicious separation and stall, and not like the real thing at all.

I remember trying to make a small tiger moth model fly; it was quite impossible until I stuck some thread to the leading edges. Still a twitchy model, but it behaved much better. Thats the kind of thing I'm looking at.

I've set a deadline of getting all the controls installed and working by next thursday so I can show it off to the guys making the full size. :(

Oh. dear.

If anyone knows and can tell me how to programme outward only moving wingtip rudders on a Multiplex cockpit SX, I would be in your debt. i.e. left stick means right tip rudder stays where it is, left tip rudder moves out...

and I also need to mix that to the nosewheel. :D

on on!

Shane

Title: **Re: Small prop and good Cl/Cd - almost a glider!**

Post by **Richard A** on **08. Oct 2011 at 11:54**

Hello Shane it's been an interesting build to follow. I don't know how the Cockpit Tx works, but do have a 3030.

On the 3030 you assign the Tx and RX channels you wish to use, have some preloaded mixes and a user-mix capability.

So assuming the canard is fixed:-

Assign motor throttle control, elevator, rudder and ailerons as per normal for your mode.

Assign spoilers to a slider switch.

Nose wheel servo is rudder operated to give ground control.

The elevon servo takes input from a user-mix.

The rudders are assigned as flaps and are slaved to the elevons. The end points will take care of the movements you need.

Crickey..... hope this may help with the Cockpit programming issue - probably entirely different! I am off to lie down.

Richard.

Title: **Re: Small prop and good Cl/Cd - almost a glider!**
Post by **Chris Jesshope** on **11. Oct 2011 at 10:43**

On the cockpit the control assignment is fixed but there is still a solution with a no-flap set up. Use channels 6 and 7 for your rudders. Channel 3 normally rudder you can use for your nose wheel and then you can use two of the free mixers to mix rudder movement to asymmetrical movement on channels 6 and 7.

Title: **Re: Small prop and good Cl/Cd - almost a glider!**
Post by **Shane** on **11. Oct 2011 at 15:38**

Dear Chris and Richard,

Thanks both. I'm afraid that my brain put Richards response into the "too difficult to process now" category, and so I've avoided thinking about it too much and busied myself with other jobs on the plane.

However I was just writing down how I might match the controls to the inputs and Chris' mail makes sense because its in Cockpit speak.

The fullsize does use outward moving rudders as air brakes, I wonder if its possible to mix that to channel 5?

Thanks
SHane

Title: **Re: Small prop and good Cl/Cd - almost a glider!**
Post by **Chris Jesshope** on **12. Oct 2011 at 13:12**

Without looking at the manual, I think you run out of mixers for that. The default mixes on the spoiler/throttle stick are to ailerons and flaps with elevator compensation. That means you would want two more free mixers to control the two rudders on the spoiler stick. I think there are only three free mixers but I may be confusing that with my JR radio.

Chris

Post by **MikeA** on **12. Oct 2011 at 13:58**

Shane

If you post this question on the 'Multiplex' page on <http://www.rcmf.co.uk/4um/index.php?board=182.0> you will no doubt be given the appropriate advice as to your setup.

Mike

Title: **Re: Small prop and good Cl/Cd - almost a glider!**

Post by **Peter Chaffe** on **12. Oct 2011 at 16:34**

This bears a resemblance to a full-size home-build I know about, unfortunately the name escapes me but I could find out more if it would be of any help! The one I know is more or less the same layout as yours with the exception of being high-wing.

CofG is 10 inches in front of the leading edge of the main wing at root (slight sweepback).

The forward control (wing) is a lifting section, designed to lift a certain % of the main wing.

Done about 10 flights so far stall speed s very low...

Title: **Re: Small prop and good Cl/Cd - almost a glider!**

Post by **Peter Chaffe** on **12. Oct 2011 at 21:16**

Quote:

Shane, remember this: "If the designer has done a good job, than the CG should be where the pilot sits!!!" He has to be there and not more forward or backwards. Spot on!!!
Noël

Noel, I wonder if the lifting front canard is meant to desensitize the CofG ? The aircraft I know can carry a passenger (tandem) without any modification!

Title: **Re: Small prop and good Cl/Cd - almost a glider!**

Post by **Richard A** on **12. Oct 2011 at 22:54**

Hope you get it all sorted Shane. I use spoiler/drag rudder air braking on my Horten 3f. It is useful to have the mixer capability available for all these things as the 3030 does.

Interesting to see what the response is from Cockpit Control on the web. All this seems like a necessity to me. Must take care when I update my system.

Richard.

Title: **Re: Small prop and good Cl/Cd - almost a glider!**

Post by **Shane** on **14. Oct 2011 at 09:39**

Hi Richard,

Its looking a little doubtful that the requirements can be met by the Cockpit SX. A shame as I really like the simple interface.

Is the 3030 the next step up from the cockpit?

Thanks

Shane

Title: **Re: Small prop and good Cl/Cd - almost a glider!**

Post by **sky man (Iain)** on **14. Oct 2011 at 11:05**

Hi Shane

would it be possible to have the rudder servos move all the way (full travel) so that full movement only moves the rudder the req amount?

Or perhaps some programable digi servos and restrict there movement

:-/

Title: **Re: Small prop and good Cl/Cd - almost a glider!**

Post by **Richard A** on **15. Oct 2011 at 12:28**

Hi Shane,

The 3030 is no longer produced. A shame as it is a very capable Tx with all the mixing capability that most people would require. It is this mixing capability that you need here - an easy job with the right Tx.

I don't know what Multiplex will replace it and the 4000 with. Barry is normally a good source of information on this. Where are you Barry?

Richard.

Title: **Re: Small prop and good Cl/Cd - almost a glider!**

Post by **Shane** on **17. Oct 2011 at 11:43**

Hi Guys,

Thanks for all the input. While I'm figuring out what new radio to buy, and replacing all of the rubbish servo's I bought (see below), I did assemble it and had it taxi 6 feet down the very bumpy garden! The pride! ;D

We used a bathroom scales on the nose, powered it up and think it generates over 10kg of thrust. I promise I won't try to prop hang (hey I bet thats the first time on this gliding forum anyone has mentioned that!)

Pictures coming soon.

If anyone has advice on a good radio system with telemetry then please let me know. I'd like battery voltage and airspeed to be transmitted live, as well as a GPS for position, to be logged and downloaded after landing.

* Power XL-16HM servos. All 6 that I bought have some slop straight from the box. V dissapointed. Looking for some Hitec's now. I guess you get what you pay for.

Title: **Re: Small prop and good Cl/Cd - almost a glider!**

Post by **MikeA** on **17. Oct 2011 at 12:40**

Hi Shane

IMHO you can't go wrong with MPX gear. The Royal Pro would be an obvious update from the Cockpit (cue comments from BC ;)) and my Royal Pro16 has been rock solid since I upgraded to M-link last year. You get what you pay for in this hobby.

As far as servos go, I've had issues with Hi-Tech's as have most of the model fraternity if you read the RC forums. My most recent servo was a Savox and I've been very impressed with it, well built and good value.

Mike

Title: **Re: Small prop and good Cl/Cd - almost a glider!**

Post by **Jolly Roger Brown** on **17. Oct 2011 at 14:50**

I agree with Mike's broad comment that quality normally costs. Although for fairness I should also say that whilst I'm a big Mpx fan, I've had 1 out of my only 4 Mpx servos fail, and 0 out of over 50 Hitec. Hmmm. Maybe I've just been lucky with the specific Hitec servos I've used (HS81,85,625,645).

And of course next time I fly I will crash due to a Hitec servo failure. ;)

Rog

Title: **Re: Small prop and good Cl/Cd - almost a glider!**

Post by **MikeA** on **17. Oct 2011 at 16:44**

..you can't beat planning ahead can you Rog? ;)

Title: **Re: Small prop and good Cl/Cd - almost a glider!**
Post by **Jolly Roger Brown** on **17. Oct 2011 at 17:24**

MikeA wrote on 17. Oct 2011 at 16:44:

..you can't beat planning ahead can you Rog? :)

ALWAYS ALWAYS REMEMBER TO PLAN AHEAD

;)

Title: **Re: Small prop and good Cl/Cd - almost a glider!**
Post by **Shane** on **17. Oct 2011 at 21:00**

Hello all,

Given the wallet tightening cost of decent radio systems (I'll leave my 2.4Ghz rant to the next post), I thought I would give my Cockpit SX a proper hearing and try V hard to get it to work.

And it does. For reference (and I guess some of glider fans may want to implement outboard mounted drag rudders if they model those lovely Hortens), then on the cockpit what I've done is:

Set up model in acro mode:

- 1: L Aileron
- 2: Elevator
- 3: Rudder for nosewheel steering
- 4: Power
- 5: R aileron
- 6: L Rudder
- 7: R rudder

Channel 6 is preassigned the spoiler channel so we have to mix rudder into this and into 7, and then mix the spoiler into 7.

SO the three mixes are:

- 3-6 (one sided mix only so that the L rudder only moves out)
- 3-7 (one sided mix only so that the R rudder only moves out)
- 6-7 (to mix the spoiler into the R rudder).

I've just saved myself lots of money. Sorry I ever doubted you, cockpit!

Ta
Shane

Title: **Re: Small prop and good Cl/Cd - almost a glider!**

Post by **Shane** on 17. Oct 2011 at 21:11

My 2.4Ghz rant.

I'm still on 35MHz, and while researching 2.4GHz, I could not believe the lack of interoperability between systems.

Now I know that obsolescence is usually built into systems these days, and I know that 2.4 has advantages so OK it may be worth upgrading, but the locking in of radio users to particular makes of receiver is shameful.

Nothing more than a licence to keep prices high and to pick pockets. I'm happy to pay good money for a well engineered system (and Multiplex came very close just now to having me as a new Royal Pro 9 owner) but to be locked into their onboard systems forever? Spektrum; Futaba; MPX: they all work, they are all safe, they could have been engineered to a common standard. And the more telemetry and onboard equipment that comes out, the more locked in you are.

I really hope FR-SKY, who do very nicely priced modules, are shown to be as reliable as the big manufacturers.

Rant over. Now back to normal programming with a 1st photo of it all in one piece.

 first_assembly.jpg (60 KB |)



Title: **Re: Small prop and good Cl/Cd - almost a glider!**

Post by **chris williams** on **17. Oct 2011 at 21:59**

Excellent job Shane, we look forward the flying shots ;)

Take a look at the 2.4 Cockpit SX, it's hardly a wallet breaker (And MPX are doing a buy-two-get-one-free deal with the rx's)

http://www.phoenixmp.com/acatalog/Multiplex_Sets_and_Transmitters.html

Title: **Re: Small prop and good Cl/Cd - almost a glider!**

Post by **Shane** on **17. Oct 2011 at 22:31**

Hi Chris,

MPX telemetry range is very poor, and not getting better quickly.

In contrast, Spektrum have a very good range of telemetry products.

So now I have the problem of finding a spektrum module for the cockpit SX (anyone?) or buying a spektrum system >:(.

For a whole 2 hours, I was convinced I did not need a new radio. It was a happy time!

Title: **Re: Small prop and good Cl/Cd - almost a glider!**

Post by **Chris Jesshope** on **18. Oct 2011 at 08:15**

Hi Shane,

Nice build... when will you be towing up gliders with it ;D

Well its nice to see faces as well, which of those in the background is yours. I am guessing the one on the right as there is a certain amount of well deserved pride showing.

Also on the 2.4 issue, I am sticking to 35MHz. In fact I just bought another Tx 8 channels and more memories for less than the cost of some of the 2.4 receivers I saw via Chris' link. As far as I am concerned the only problem with 35 used to be sharing frequencies but now we are in the minority its not a problem. Also you can pick up receivers 2nd hand for a song as everyone seems to think they have to convert.

OK so the telemetry is an issue but for gliders on the slope its a distraction 8-)

Chris

Title: **Re: Small prop and good Cl/Cd - almost a glider!**

Post by **Chris Jesshope** on **18. Oct 2011 at 08:16**

p.s. nice to see you managed to get the Cockpit to do everything you wanted!

Title: **Re: Small prop and good Cl/Cd - almost a glider!**

Post by **Noël Rumers** on **18. Oct 2011 at 22:03**

Hi Shane,
This is looking good!!! And things that look good will fly as well!!! :D
I use the Weatronic system on my MC24 with great success too.
Look at their site they also do telemetry etc.
Next year a new transmitter will be coming out too!!
I am waiting for the first flight!!!
Success,
Noël

Title: **Re: Small prop and good Cl/Cd - almost a glider!**

Post by **Shane** on **20. Oct 2011 at 12:32**

Hello all,

some photos!











Title: **Re: Small prop and good Cl/Cd - almost a glider!**
Post by **Shane** on **20. Oct 2011** at **12:34**

Some more photos!







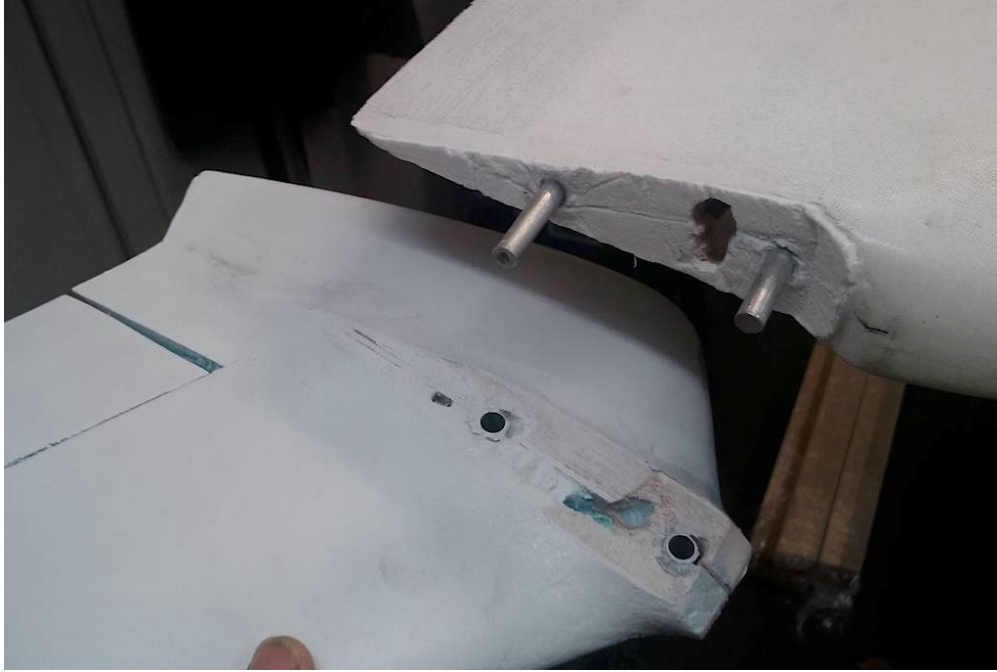




Title: **Re: Small prop and good Cl/Cd - almost a glider!**
Post by **Shane** on **20. Oct 2011 at 12:37**

Even more! getting tired now!!











Title: **Re: Small prop and good C_l/C_d - almost a glider!**
Post by **Shane** on **20. Oct 2011 at 12:41**

and, I'm spent!

and for those paying attention, yes I'm the beardy guy on the right of the photo from a few posts ago.

Planning to do some taxi tests at waterbeach club (near Cambridge) in 3 weeks time (in case anyone wants some early morning entertainment!)

cheers

Shane







Title: **Re: Small prop and good Cl/Cd - almost a glider!**
Post by **Noël Rumers** on **31. Oct 2011 at 11:45**


Hi Shane,
The do test runs, is a must with the special planes. And I know you will have knee shaking test flight in due time!!! :) But the result for all the efforts will be there as well!
Noël


Title: **Re: Small prop and good Cl/Cd - almost a glider!**
Post by **Shane** on **19. Dec 2011 at 18:54**


Flight at last!


Hi All,
after lots of ground runs, a broken prop, an aborted attempt to takeoff on grass, and 4 redesigns of the front steering leg, the model has flown.
Some pictures below, plus a link to a movie, which I hope works.

Many thanks to those of you who helped with design questions/suggestions and who offered encouragement. It was beautiful to see it fly.
Shane

 BournFly1_m_.jpg (Attachment deleted)

 BournFly2_m_.jpg (Attachment deleted)

 ModelBournRnw2_m_.jpg (Attachment deleted)

 ModelBournRnw1_m_.jpg (198 KB |)



Title: **Re: Small prop and good Cl/Cd - almost a glider!**
Post by **Shane** on 19. Dec 2011 at 18:56

OOps ::)

<http://tinyurl.com/mini-e-Go-firstflight>

ta
Shane

Title: **Re: Small prop and good Cl/Cd - almost a glider!**
Post by **Chris Jesshope** on 19. Dec 2011 at 19:04

Way to go Shane :)

Title: **Re: Small prop and good Cl/Cd - almost a glider!**
Post by **chris williams** on **19. Dec 2011 at 21:09**

Excellent result Shane, well done. [smiley=thumbup.gif]
(Cracking video too)

Title: **Re: Small prop and good Cl/Cd - almost a glider!**
Post by **sky man (Iain)** on **19. Dec 2011 at 21:12**

Great!!!!
You must be well **pleased with all your effort**
well done :)
ps will pm you soon for info on your canopy method

Iain

Title: **Re: Small prop and good Cl/Cd - almost a glider!**
Post by **Richard A** on **20. Dec 2011 at 22:12**

Hello Shane.

I have been really impressed by your methodical engineering approach to solving all the problems as they arose and have found this a most interesting thread. Good luck to the fullsize development team. Please let us know how it progresses.

Richard.

Title: **Re: Small prop and good Cl/Cd - almost a glider!**
Post by **B Sharp** on **21. Dec 2011 at 12:53**

Hi Shane.
I have been following your build with interest and have found it entertaining as well as inspiring. Congratulations on your flights as I suspect that tensions were high with an unusual layout like this. I am most impressed - I think I would rather like one of these myself.
Brian. :)

Title: **Re: Small prop and good Cl/Cd - almost a glider!**
Post by **Jolly Roger Brown** on **21. Dec 2011 at 21:49**

Richard_Alford wrote on 20. Dec 2011 at 22:12:

Hello Shane.

I have been really impressed by your methodical engineering approach to solving all the problems as they arose and have found this a most interesting thread. Good luck to the fullsize development team. Please let us know how it progresses.

Richard.

...just what I was about to say. Well done Shane + the team.

Rog