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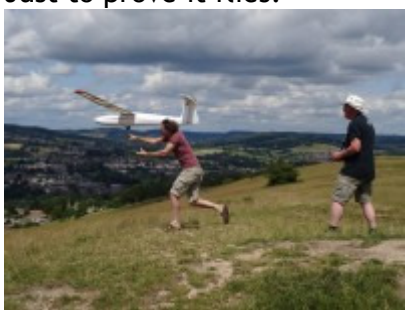
SZD30 Pirat

https://scalesoaring.co.uk/phpBB3/viewtopic.php?f=12&t=1903

Re: SZD30 Pirat

by **Richard Farrer** Posted: **04 Sep 2019, 21:37**

Just to prove it flies!



Just to prove it flies!

Re: SZD30 Pirat

by **wookman** Posted: **25 Mar 2019, 00:33**

Nicely done Rick.

Re: SZD30 Pirat

by **Richard Farrer** Posted: **24 Mar 2019, 21:15**

It seems a long time ago since I started this build but it is now finished and I await a suitable day to heave her off a local slope. I love the shape of this glider and look forward to seeing her in the air.
Including 860g of lead in the nose she weighs 4.4kg, a whole kilo lighter than my previous Pirat despite trying to build her to be strong.
Whilst I am pleased with the outcome of this build I must repeat that the plan is inadequate in many respects. It might have been better to have bought a kit especially as they were on offer shortly after I commenced my build.

Lovely day today so photographs in the garden. With hindsight I could have maidened the Pirat today but flew my tried and tested ASW24 instead.

Re: SZD30 Pirat

by **Richard Farrer** Posted: **19 Feb 2019, 12:27**

Another good point, I hadn't thought about that one.

Quick check and, phew, all Ok with this wing section.

Re: SZD30 Pirat

by **RobbieB** Posted: **17 Feb 2019, 00:53**

Richard,

A cautionary note about incidence gauges - or more precisely, the mounting mechanisms for them.

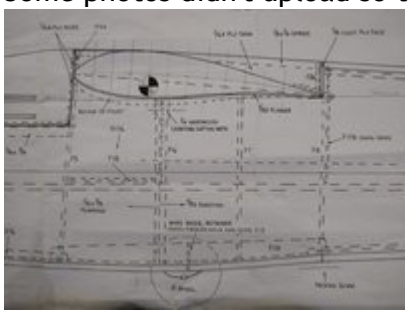
Unless the LE of the wing is fully symmetrical about the chord line, which it is only with a symmetrical section, and most are not, you can have some inaccuracy in your measurement when using a 90º cut-out in the mounting frame on the gauge.

I do like that inclinometer for the phone - must have a look at that.

Re: SZD30 Pirat

by **Richard Farrer** Posted: **16 Feb 2019, 20:53**

Some photos didn't upload so try again.



Some photos didn't upload so try again.

Re: SZD30 Pirat

by **Richard Farrer** Posted: **16 Feb 2019, 20:49**

This is all interesting stuff. Thanks everyone for joining in. I have done as suggested and drawn the camber line of the Pirat aerofoil and attached two photos. I don't know if the camber is defined as the maximum distance that the camber line deviates from the chord line but if it is then this aerofoil has 2.7% camber.

Incidence

Incidence

The next thing I did was to measure the decalage with my amazing incidence meter and surprise, surprise with the tailplane at zero I have 2 degrees incidence on the wing. Built to the plan which shows 5.5 degrees; it must be my inaccurate building. Photos show incidence meter in place on tailplane and the wing. Checked it twice same result.The wing is a snug fit on the fuselage so I am happy with that. I will fix the wing with the locating tongue at the back and two nylon bolts at maximum wing thickness.
This exercise required first assembly of model so I had to include pics of that.

Re: SZD30 Pirat

by **RobbieB** Posted: **16 Feb 2019, 19:07**

The balsa planking might be an issue but not convinced. My Skylark is 0.8mm ply back at the main wing former with the fuz covered in Diatex and glassed internally.

Not clogging the thread up John, all interesting stuff.

Re: SZD30 Pirat

by **SP250** Posted: **16 Feb 2019, 18:22**

Robbie

The Skylark 4 I had from Vic was almost the same wing fixing arrangenment you show for yours. There may well have been a stuctural issue in that the angle ali brackets and 1/4 ply formers were too stong for the former to balsa planked fuz joint - hence the formers and planking coming off second best each less than perfect landing (and I've yet to do one of those).

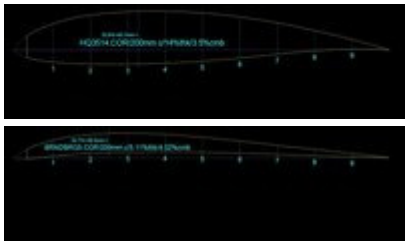
Sorry to clog up the Pirat A of A aerofoil discussion with Skylark 4 stuff.

John M

Re: SZD30 Pirat

by **RobbieB** Posted: **15 Feb 2019, 19:51**

.....and now back on track with the Pirat aerofoil issue:



To demonstrate how misleading the appearance of an aerofoil can be, the two examples below only have 0.5% difference in their camber value.

Re: SZD30 Pirat

by **RobbieB** Posted: **15 Feb 2019, 19:44**

Surely John, there is a serious design issue there for the attachment system to be so fragile.

My Skylark emulates the full size almost exactly and has had more than its fair share of less than ideal arrivals without any issues relating to the wing attachment. At 5.2 M and the attachment points only 6.5cm apart, that's one heck of a moment arm (this will be the Kiss of Death, of course).

Re: SZD30 Pirat

by **SP250** Posted: **15 Feb 2019, 12:54**

Brian

Ah, so that's where the Pirat came from.
Ray did a mass group of "A" tests once, whilst we were all on our annual week long soaring holiday at Cim Farm on the Lleyn peninsular.
Your Pirat got passed around about 5 people one day for the tests, as it was the easiest to fly of everyones models.
They all wound me up to do it with an ex Vic Steele Skylark 4 though, which I tried to "strain" through a chain link fence on the landing approach - my depth perception is not what it used to be!
Needless to say 5 people got their A tests and one didn't on that day.

The only issue I can see with a 3 piece C/S mounted like the Skylark, is that however you do it make provision for a frangible attachment.
The Skylark, like the full size, had two wire pins engaging in aluminium angle brackets below the wing and locating through two 1/4 ply formers front and rear.
Even the lightest touch of a wingtip on a tuft of grass when landing twisted the whole wing and tried to break out the formers from the fuz sides.
I spent too many hours repairing the sides and formers in the fuz, and landing in heather at Long Mynd or Clwyd did even more damage, so I sold it and will not have another scale glider with that type of wing mounting again.
John M

Re: SZD30 Pirat

by **B Sharp** Posted: **15 Feb 2019, 10:48**

Spot on Robbie. A much better explanation than I could manage.
The problem that I had with my Pirat was the F/G fuselage which had totally flat wing mounting area. As I had no reference, I mounted the wing with the under surface and the trailing edge both in contact with this flat surface. I later built up the flat surface to accommodate the undercamber and LE profiles.
After the first flight I modified the wing seat and packed up the leading edge of the tailplane. I suspect that I still got it a bit wrong as the model, while flying perfectly, always had a slightly nose-down sit in the air.(in these days I didn't have an incidence meter.)
Having said all that, it flew well for many years before being sold on to Ray Jones to use as a trainer in the Clwyd club.
Brian.

Re: SZD30 Pirat

by **RobbieB** Posted: **15 Feb 2019, 02:37**

Richard,

The physical appearance of an aerofoil is not always an accurate indication of its camber.

Also, the thickness of an aerofoil and the point of maximum thickness can deceive you into seeing a distorted camber. Any thickness form can be 'bent' around a particular camber line.

First impressions of the aerofoil on the Pirat the camber doesn't appear to me to be particularly excessive and anyway, camber produces a nose down pitching moment under normal conditions of flight and consequently, increased camber..... etc etc.

To find out better what it might actually look like, draw a straight line from the LE through to the TE then, at various points along that line draw lines vertical to that chord line you have just drawn. Draw those lines to the top and bottom of the aerofoil at their respective positions; they don't have to be equally spaced. On each of those lines mark the mid point between the top and bottom of the aerofoil then draw a line through all those points, that is your mean camber line. Do that and post up another photo showing the camber line.

That said, far more important is that 5.5º of decalage – far, far too much and will result in a model that is not very nice to fly. As Brian has already commented, 1.5 degrees will be so much better. Too many model designers have copied full size rigging angles in the past and down at our scales is not appropriate.

Rectifying this you will need to consider carefully how you are going to go about it. Just cranking up the leading edge of the tailplane is likely to give the model an unnatural 'sit' in the air with a pronounced nose down attitude and will just not look right. You might want to consider a re-adjustment of the main wing incidence to correct this. If it was me, I would aim for: rear fuselage top at 0º, tailplane at 0º with the wing aerofoil chord line at +1.5º. If you are too far on with the construction for this to be possible then the tailplane it has to be. Whatever, removing that 5.5 degrees is the important thing. Before you do anything, once you have your incidence meter up and running check what the main wing is set at in relation to the top rear fuselage set at 0º.

……...and no, you don't need to know the zero lift angle of the aerofoil for this exercise. Without knowing exactly what that aerofoil is, that would be extremely difficult or impossible to do anyway.

Re: SZD30 Pirat

by **Richard Farrer** Posted: **14 Feb 2019, 23:47**

Following Brian Sharp's account of a near loop on first launch of his Pirat I have looked closely at the plan and the longitudinal dihedral, or should it be the decalage, is 5.5 degrees. This is the angular difference between the chord lines of the wing and tailplane. The tailplane is symmetrical so no problem there as the zero lift line is the chord line. The wing section, however, is fat and undercambered, see photo. Can any one help me with the calculation of the zero lift line of the wing? Do I in fact need it?

Pirat wing rib
Brian suggested 1.5 degrees of incidence would be sufficient. If that is the angular difference between chord lines then serious packing up of the tailplane leading edge will be required to avoid the same problem Brian had. Any input would be welcome.
I am now in the process of making an incidence meter using a protractor/clinometer app on my smartphone. I will then be able to check that the actual model conforms to whatever setting is ultimately recommended.

Re: SZD30 Pirat

by **chris williams** Posted: **14 Feb 2019, 14:51**

In the words of Jack Reacher: 'hope for the best, plan for the worst'. On the Skylark, Super Javelot, and the Eagle, I used two bolts on the centre section, with a hatch for the front bolt in the thickest part of the wing. To alleviate the shock of a hard landing, I used the MPX wing retaining system. This worked quite well, although you constantly find yourself knocking the wings back into place. (As an aside, a bolted on centre section allows the use of a D-connector to speed up the rigging process)

I didn't want to bring this up, because I'm still in therapy, but I made the mistake with my 3.5 scale Duster of taping the outer wing panels to the centre section to assist the MPX retainers. Halfway through a perfectly smooth landing, one of the wings caught on a clump of grass, and resulting rigidity half wrecked the centre section. I have yet to come up with an ideal system for fixing a 3-piece wing to a fuselage: the best you can hope for is that the bolts break off and the wing is surgically removed from the fuselage with as little damage as possible...

Re: SZD30 Pirat

by **Richard Farrer** Posted: **14 Feb 2019, 13:59**

The Pirat is quarter scale. There is a plywood tongue at the trailing edge that locates in the fuselage former and at the front two plates, one on the wing, the other in the fuselage. They clamp together with horizontal bolts accessed from canopy. One of the plates is slotted so the bolts can remain in place. Friction between the plates increased by sandpaper. Not keen on this arrangement.
Should I use nylon bolts instead of steel so it is not too rigid?
Thanks for further info Chris.

Re: SZD30 Pirat

by **Nigel Argall** Posted: **14 Feb 2019, 13:54**

Thank you - that is really helpful. By 'three piece wing' you mean something like a Slingsby Skylark with a big centre section? I fly 100% slope so need to take this on board.

Re: SZD30 Pirat

by **chris williams** Posted: **14 Feb 2019, 13:46**

Nigel, it all depends on how and where you intend to fly...If you are going to fly solely from aerotow, then you will presumably always be landing on a nice, smooth surface. If you are going sloping, then the chances of a hard landing are that much greater. For a model, say, 10lbs or under, you should be able to get away with using a couple of plastic bolts as the main wing retention method. Anything heavier and you might have to go to at least one metal bolt, with an ali bracket , both in the wing and in the fuselage. The huge advantage of shoulder-mounted wing with rubber band retention, is that the the rubber absorbs nearly all the forces when things go divergent on you.
Another method for a top-mounted wing is to make up a wing joiner box, bolt it to the fuselage, retain the wings with rubber bands, and hide the whole shebang with a detachable fairing. (A la Topaze) That only works for a two piece wing setup, though...

The bottom line is: 3-piece wings suck!

Re: SZD30 Pirat

by **Nigel Argall** Posted: **14 Feb 2019, 11:58**

Chris, I'd love you to say a bit more on this. Pretty much every power model I have ever owned (and a good few of the smaller gliders) has had some variation on the dowel-at-the-front-and-plastic-bolt-at-the-back type of fixing. Why is this not suitable for larger models? Is it the structural strength or simply that you are looking for a bit of 'give'? (Maybe a lot of give?). I have noticed on your videos that there is often a lot of movement at the wing root – i.e. the gap opens up as the model loops. In other words is the practice of holding wings on with shock cord as important as the type of mounting?? Hope all this makes sense.

Re: SZD30 Pirat

by **chris williams** Posted: **12 Feb 2019, 23:33**

Richard, what scale is the model? I ask because rigidly fixed wings on the top of a fuselage can be very susceptible to the loads experienced in a cross wind landing...

Re: SZD30 Pirat

by **Richard Farrer** Posted: **12 Feb 2019, 23:04**

Hi Brian, Thanks for that info. I will check the incidence thoroughly. As you will recall the wing section is thick and undercambered. When setting the incidence what would you consider to be the zero incidence line for this aerofoil? The tailplane is symmetrical so no difficulty there.
I have now finished sheeting the centre section after much concern over the strength of the resulting structure. Now to construct a wing fixing system that doesn't rely on clamping together two alloy plates with sandpaper glued to them! Some M6 Stainless steel bolts straight through the wing into a big juicy ply/balsa cross member in the fuselage will suffice, I think. Cheers Richard

Re: SZD30 Pirat

by **B Sharp** Posted: **07 Feb 2019, 11:23**

That is coming along very nicely Richard.
Many years ago I purchased a similar Pirat on Ebay. When I picked it up the fuselage was a glass

moulding in poor condition and all the flying surfaces were effectively scrap. I purchased the plans that you have and constructed the wings tail and rudder from them. I wholeheartedly agree with your comments as I had to do a lot of mods before I was happy with the results. Although it looked ok the tailplane incidence was wrong resulting in a near loop on the first launch. (It may be worth your while to check this on your model - 1.5 degrees should be about right) I accept that this was my fault and I inserted a fair chunk of packing. Having said all this the Pirat flew very well and gave me a lot of pleasure for many years.
Brian.

Re: SZD30 Pirat

by **Richard Farrer** Posted: **07 Feb 2019, 00:36**

I see that over a year has elapsed since I posted a progress report. Although the build continues I keep being diverted to build other models. I had to wait until the weather warmed up to glass the fuselage but that has now been done and it is painted. I have built the second tip section and started on the wing centre section which is a couple of centimetres shy of two metres long. It is a huge plank being of parallel chord. A lot of soul searching has gone into the construction of the centre section to ensure that it has adequate strength. My previous Pirat, bought secondhand, suffered wing failure across the airbrake cut out so I didn't want that to happen again!

I consider myself to be an experienced builder but I have found this build very taxing and I would not encourage anyone else to build from this plan as it is inaccurate and lacks important detail. The wing joiner detail in particular is misleading and has caused the burning of much midnight oil.
I can see the end in sight however and am hopeful that a maiden flight will take place this summer.

Re: SZD30 Pirat

by **Richard Farrer** Posted: **20 Jan 2018, 18:29**

Nearly a month has gone by and the winter weather has kept me in the man cave. This is my first quarter scale build and I am staggered by the number of hours I have put in to get this far. The fuz is planked up and ready for its glass epoxy covering. I finished the tail feathers and when I received the natural Solartex I just had to cover them to see what it would look like. I have also built one outer wing panel. That was difficult as the plan seriously lacks detail in the aileron department. The accompanying magazine article is of little help as it emphasizes applying scale details rather than how to build the thing. The wing tips were finally made by laminating soft balsa either side of a ply core. The result is pictured.

There will be a long gap before the next post as I am off to find some Portuguese sunshine in my motorhome accompanied by a brace of slope soarers. Its a hard life being retired!

Re: SZD30 Pirat

by **manolo** Posted: **23 Dec 2017, 20:01**

They clean them and order them just to make the photo ...

Re: SZD30 Pirat

by **Nigel Argall** Posted: **23 Dec 2017, 19:03**

Is the jig in the background for the Pirat or something else? Also, how come everyone else has such incredibly clean and tidy workshops??!

SZD30 Pirat

by **Richard Farrer** Posted: **23 Dec 2017, 18:45**

Well I promised you a build thread and now that some significant progress has been made here it is. First photo is of the assembled parts then a photo of the fuselage ready for planking with the jig in the background and the half finished tailplane in the foreground.

Before planking I am preparing the radio installation, fixing the tow release in position and epoxying in a precautionary 500g of lead.