Rivetting leading edge to spar - 11/7/2012 - 8h45

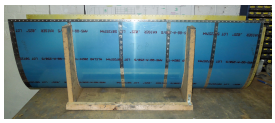
Category: 2.4. Main Wings
Published: Tuesday, 10 July 2012 13:50
Hits: 2345

Another big day of rivetting. The wing starts taking it's final shape.

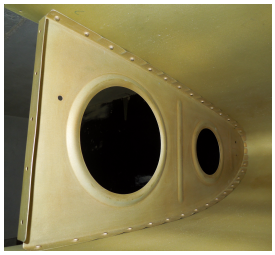
Hugo came by to assist with rivetting of the leading edges to the main spar. It's not the easiest task at hand but with the right tools and some support, it's really not that bad.

First let's go back some days to the finalisation of the rivetting of the leading edge ribs in the leading edge skin.

The inboard leading edge rib takes the lap joint plate with the nutplates to attach the tank.



Nice rivet heads on the outboard side.



And on the inboard side. This iswhere the fuel tank will be attached to the leading edge for good alignment of the skins.

I installed both fuel tank and leading edge temporarily with some 8R8 screws to check on the final alignment.

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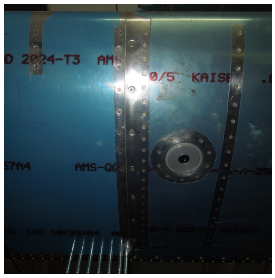
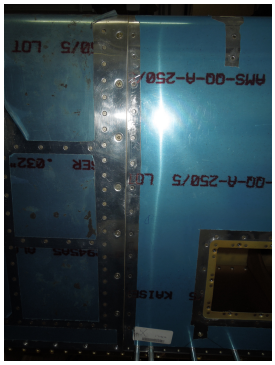
The mating isn't all that bad. I found out that I need to readjust the sag on the spar as adjusting the support under the rear spar makes the joint better or worse.



Bottom side



Then, Hugo made a final inspection on the inside of the leading edges. This is a point of no return. Things start going together permanently now and you better make sure all is in the way it's supposed to be.

I was pretty scared about the procedure of rivetting the leading edges to the spar.

There are 2 difficulties to overcome when doing this:

First, I read on various sites that people have been using cherry rivets because they were unable to shoot the AN470 rivets soo close to the other ribs. The rivet holes of the leading edge ribs are very very close to the ribs of the main structure. This is one of those places where you wonder if it really would have made such a difference if they would have just moved the leading edge ribs 1/8 of an inch. I guess Van had a bad hair day when he drew this part of the plans.

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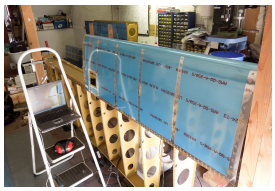
Secondly, the bucking of these rivets is mainly blind. I mean that literally. You can not see what you are doing as you are manoeuvering your arm through the small lightning holes in the main spar.

For both problems, there is a cure.

For the first one, you need to grind down an offset rivet set. Not just a bit, score it really well until you are almost at same height as the rivet head cup. We used this process and combined with heavy forward force on the gun while shooting, we managed to get no smilies in the right spar (which is the main objective) and only a small one in the left spar. (by my own fault of letting the bucking bar dance on the rivet)

For the second problem, there is a neat trick. Use a webcam and a fullscreen webcam viewing application. I grabbed an old laptop and a usb webcam I had from some years ago and installed it next to the leading edge on a small ladder. The webcam goes in the leading edge. You will need a usb extention cable and some additional light inside the leading edge. I had a long tube like led-light available and this worked great because I could lay it across the upper lightning holes of the leading edge ribs while the camera was taped and positioned on the spar towards the rivets. The next picture shows the setup and the image on the webcam.

The refresh rate of the camera should be quite good so that you see immediate reaction to your blind movement inside the spar. If you zoom in close enough, you can position the tungsten bucking bar really well on the rivet.



Look how cool it is...

This is a picture I shot inside the tank while Hugo was blindly checking the quality of a set rivet. You can see here how I taped the camera down with some -easy to remove- painters tape. the bucking bar

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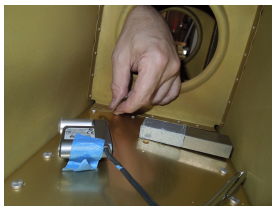
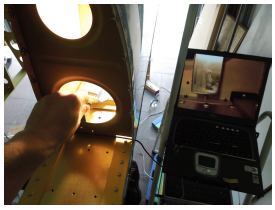
is protected with some duct tape to avoid scratches on the primer while bucking. (just in case of...)



The next shot is a fantastic picture.On the left side I'm holding the bucking bar straight and level on the unset rivet. You can see how well it is positioned on the monitor.



It still took us about 7 hours to get all of them set but it was really a non-event.

I was afraid having to drill out many rivets for bad quality because of the non visibility. In the end, we drilled out one. Just because I did not like it as it was already too flat. But I could as well have left it in place.

Next session will be squeezing the aft row of rivets on the leading edge to the spar.

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