Final Tank Prep Work - 11/02/2012 - 9h

Category: 2.5. Fuel Tanks
Published: Saturday, 11 February 2012 20:08
Hits: 1837

A very productive and long day in the airplane workshop today. There were still many miscellaneous things to do on final preparation of the left fuel tank before I can even start to think about rivetting.

First of all, I continued the drilling of the nutplate ear connect holes for the nutplates on the bolt side of the z-brackets. The center AN3 holes were already drilled so I used 3 sacrifice nutplates and some short AN3 bolts with plenty of wascher to secure the nutplates in place.

Then put them in a vise under the drill press and supported them with some wood blocks. Drilled one side of the nutplate ears to #40. Then put a cleco in and drill the other holes.
This is your best guarantee to have good fitting nutplates.

When all were done, they looked like this. Remember that the most inboard nutplate does not need the nutplate on the z-bracket. Here the nutplate will be on the spar.

Then started working on the inboard rib, fuel tank cover and fuel tank stiffener ring.

I am installing flop tubes so there are quite some deviations from the standard fuel pickup instructions on the plans. One of the changes include that the standard fuel cover R-708 is replaced by a close plate T-411 (available in van's catalog)

First started deburring the inner and outer sides of the stiffener ring and tank access plate. The whole idea on this cover is to allow for an inspection hole in the tank in the compartment where the fuel pickup resides.

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To make this, you need of course to cut a hole in the inboard rib. This is a scary operation as it involves usage of the most feared 'flycutter' drill.

A fly cutter consists of a standard drill in the center, an adjustable offset arm and a sharp cutting knife on the end of the offset arm. Some basics on using this dangerous tool :

1. Never ever use it in a manual operated drill ! Always use a drill press.
2. The RPM should not be higher then 500RPM. So use your lowest setting. I found out on my drill press that I can adjust the driving belt in different drive ratio configuration)
3. Use low pressure on the knife as it starts cutting in the material. No rushing !

I started by laying out the deburred stiffener ring on the outboard side of the rib (because this is the easiest side to cut (flanges remember).
Then used a ruler to connect the opposite centers of the screw holes and drawn lines. The intersecting lines tell you exactly where the center of the flycutter drill needs to come.

I used a center drill to make a pilot hole for the center drill of the fly cutter.

I noticed that the drill press I have starts shaking heavily by the swinging motion of the'off-center' fly cutter.
Yes I know, it's cheap stuff and not that good at all, but it does the job.

So I called in some assistence. Peggy helped holding the top of the drill press stable while cutting. Muchio gracias for risk of loosing limbs so close to the fly cutter.

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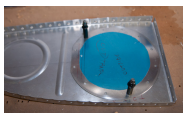
Then started slowly cutting the hole. Not a big deal. But scary as hell.

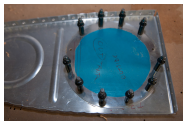
And finally, you end up with a nicely cut center hole in the rib. Be carefull with the cut out part. It's sharp as a knife edge and will easily slice open your finger.

Then mated the fuel tank cover T-411 on the rib. The little straight cut out has to be aligned with the rib extreuded linear section.

Drill two holes and secure with clecoes for #19, the black ones.



Keep drilling the rest and cleco as you go. Really a no brainer.



Then replace the cover by the stiffener ring and put clecoes all over the place and start drilling the nut plate ears using the stiffener ring as drill guide.

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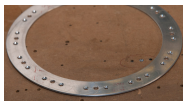
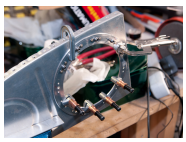
Now dimple the rib for the nut plate ears. Be carefull and make sure you got the correct side. The stiffener ring will be on the inside of the tank so the dimples will extrude on the opposite side of the flanges.

Next step, countersink the stiffener ring. I first countersunk the holes flush for #40 rivets. Had to go over 3 more times and you will see you will need to be 3 to 4 clicks over for the ring to sit flush to the rib if you are using tank dimples. It is important that the ring sits flush to the rib. check before you rivet.



Now attach the stiffener ring to the rib and use crock cleco clamps to secure it in place.

Clamped the rib in the a vise and starte rivetting the nut plates. You can do these now as the stiffener to inner side of the rib do not have to be sealed. The cover plate will go over this using a cork ring. Some people use sealant on the cork ring and it's an open debate whether to do this or not.



All done... looks great. Feels nice having done some rivetting after a long time. Rivetting is the finalisation of long process of prepping deburring dimpling scuffing... It feels like something has been finalised and it's like you get one step closer to the end.

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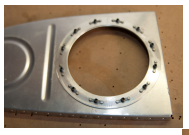
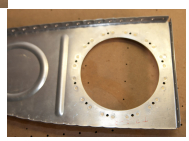
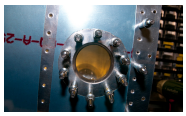



Next stop on the busroad, matchdrilling the fuel cap.

The fuel cap has two slight bends in the flange of the cap to fit to the skin curves.
I can't really give you any advice on how to do this, but it's a lot of testing and trying. First put the cap on a flat bench and try to find where the curvature is highest and what is it's center point. That will be the top side closest to the leading edge of the tank (as the curvature is highest there). Clamp in place, try the fuel cap, look at the distance to the edge. I use the andair fuel caps. These get pro-sealed in place in the traditional fuel cap flanges delivered with the kit. Just check if the side distance from cap to skin edge is equal everywhere. Then drill the first hole #40.

Drill all. after having done 2, it's really a walk in the parc.



Fuel cap temporary in plac. Looks like a good fit !.

Next step, mae the fuel tank attach angle. The tank get's attached to the side of the fuselage using a "funky" looking angle.
All that van's gives you are these two drawings and some dimensions and a piece of stock angle.

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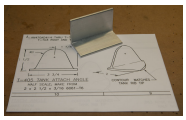
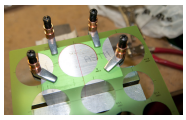
This is a 'do it yourself' section in the build process. First I cut the angle to a bit more then the required 3 3/4" length.



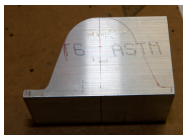
The height and width are already correct with the stock angle, so don't worry about that. All you really need to measure is the length and make sure you got the longest side for the attach part to the fuselage (not the part where the rib meets).
I used a circle template of 2" to drax the upper curvature of 1" radius after having drawn a centerline.Extend the centerline also to the other side of the angle. You'll need it later.



The enlarged the drawing using a copier on the plans 200% and cut out the form. You can measure it as well, but i'm lazy.
The drawing on you part will look like this:

First use an iron saw to cut out the rough form close to the edges. (the bench grinder with scotchbrite has a tough time getting through this size of material).

Then use the grinder with the scotchbrite to bring it to final size. Make sure all is smooth.



I called it a day after this first side. More to come tommorrow. Now it's time for a beer. Very productive day and one step closer to rivetting the tank.

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