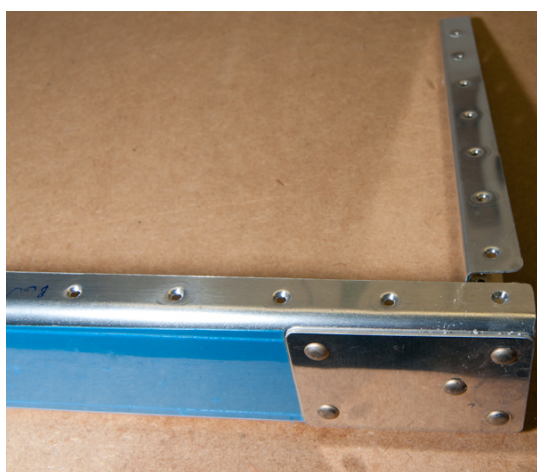


Another 8 hours of experimenting with basic techniques. I managed to finalise the control surface project in a total of almost 15 hours.

The day started with disassembling the clecoed assembly where I left of yesterday. First deburring all drilled holes. Then dimpled the skins to 3/32 with the c-frame.

Then dimpled the ribs using the handsqueezer. The ribs worked fine. Then I dimpled the spar. The spar is 0.04 aluminum and is hard to dimple. At first sight, the dimple works fine and the rivet seems to fit in.

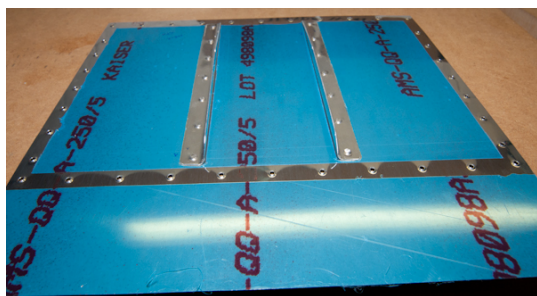


However, later on when I assembled the pieces together again, it seemed that the rivet was not even with the skin surface. Next lesson learned: follow the advices on the instructions in the plan. The plan says to dimple the 0.04, then use the hand deburring tool to manually countersink by eye. After doing this, the rivets where nice and flush.

Then I countersunk the trailing edge and the two corner intersections on the spar where the rib, skin and spar connect. You can safely countersink the spar here as is lays interlocked between skin and rib (according to the manual).

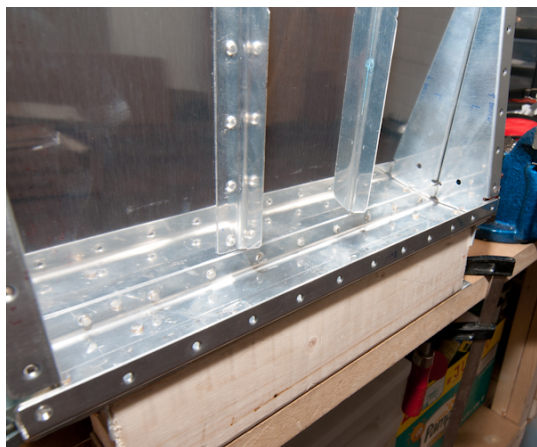


skins dimpled



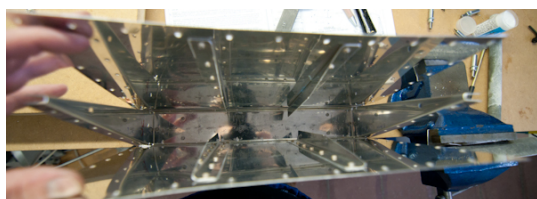
The manual advises to make a small fixture to facilitate the working process while rivetting. In the image below, the project is attached to the jig and I just finished rivetting the 3-3.5 flush rivets. For some reason these did not go well in the beginning.

I was not pleased with 2 of them so I drilled them out and did it all over again.



Then it's time to put the second skin on and that is where the first misery of the day started. To rivet the other side, you have to stretch the already rivetted bottom skin and manage to hold the bucking bar in between. It worked in the end but a lot of time went by just to try to get the right grip. It's also more difficult to measure the rivets to check the correct setting so I may need to get that little mirror after all.

The picture below is how it looks like with both skins rivetted on the spar.



The next step was setting the 3-3 rivets on the ribs. This was done

with the hand squeezer and my small rivet yoke. (thanks David for the good advice to buy this right away) .
Squeezing these was like a walk in the park. Real fun to do and always resulting in a nicely set rivet head.

The last rivet near the narrow end of the rib was a bit of a pain. I managed to use the squeezer on one end. But the other end did not give enough clearance. I used the backrivetting technique as shown on the eaa side but still I found it very difficult. (Maybe I have to buy a smaller steel plate for this next time). Once it was set half way, I managed to get the squeezer on and it set perfectly in the end.

Then came the rivetting of the trailing edge. This is done with the 3-3 rivets set on the backriver plate. Then backrivet them with the mushroom flush head right on the rivet. I thought this would be difficult but it seemed to be one of the most easy things to do on the entire project. You cannot really overdrill these as they form in the dimple. The only difficulty is that the trailing edge has to remain straight during this process. I guess this is even more true with a large version of this control surface.

What is still unclear is to find out what to do if it is not straight. The manual doesn't give any advice for this.

Once the rivetting is done, it's time for the bending of the leading edges. I think this was the most difficult part of the training project. I executed the actions as in the manual using a linch pipe and duct tape and forming the bend by putting backpressure on the pipe and literally rolling the aluminum on the pipe avoiding that it bends near the spar. This worked reasonably well.

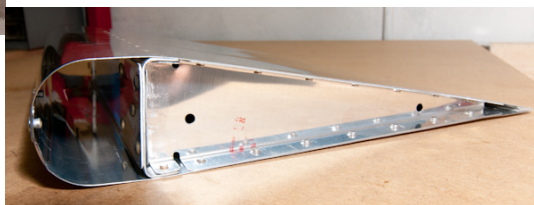
Before doing the bending I had used the roller tool to make a small bend in the edge of the overlapping skin. Of course I did this too lightly so that once I put the skins together, it showed some nasty gaps between the places where the rivets would end.

Once the aluminum is bent... it is impossible to use the edge roller tool again so I had a bit of a problem. I drilled the holes in both skins and clecoed together. Then uncoupled them and started bending the last bit of the edge using a small cleco clamp (sounds funny I know, but I really tried with a lot of other stuff. The edge straighten vise didn't work). Making small bends near the end, and trying numerous times, I finally managed to make some nice fits between the two skins. showing no gaps. Next time, I really need to make a nice bend before bending the skins !

Once that was done, it was a piece of cake to pull the pop rivets in

place.

Here is the final product.



Mistakes made:

- Drill dents (visible in the picture) near 4th rivet from trailing edge on bottom stiffener
- I may have oversized a hole in the spar when drilling out one rivet. Drilling out rivets is something I'll have to practice.
- Not enough bending on the leading edge of the top skin
- 0.5 mm alignment difference in bend joint between top and bottom skin probably by bending difference between top and bottom skin
- small gaps between rib flange and spar after setting rivet. Rib sits straight against spar but tips of small flanges curl after rivetting. small but beauty error
- Don't drill in your fingers ! It's stupid... I did...

I feel more confident about starting on the real thing then I did some

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days ago. Some attention points to work on but I think I mastered the basic techniques. It wouldn't be bad if someone could comment on my rivet sizes.