07/06/2019 - Drilling elevator horns pushrod holes - 6h30

Category: 3.11. Empennage mounting
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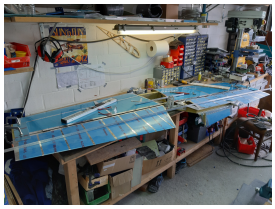
Hits: 1109

After scratching my head for some days, I came up with a way to verify the edge distance on the elevator horns.

As mentioned in the previous blog post, the aft horn is the horn to start on, but the problem in my case is that the forward horn is higher. So the risk exists to have problems with edge distance when measuring the dimensions on the aft one as mentioned on the plans.



The procedure I followed is the following :

First of all, I took the caliper and measured the edge distance at 2 diameters from all edges and made markings on the inside face of the horns. That gave me already a visual clue on the positioning of the hole for the bolt for the elevator push rod.

In the picture you see how thight it gets. the black top line is edge distance from the bottom of the pushrod (in image top as is inverted). Below you see the circular form of edge distance in relative distance to the lightning hole.

The space in between is where you have enough edge distance for the AN3 bolt.

Then I measured on the aft horn -as per the manual and plans- the distances on the horn and marked an initial point for drilling.

Now I had to make sure that the perpendicular projection of that point would still have good edge distance on the other horn.

I used a straight aluminum angle normally used to fixate wood parts that you can purchase in any home depot. As this angle is absolutly 90° straight, I used it as a kind of projection tool. and cut one leg of to exactly the distance between the horns.Then I aligned the long arm of the angle against the elevator horn with the top of the angle

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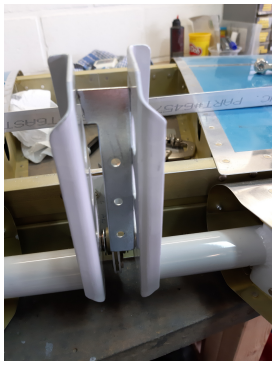
on the spot measured on the aft horn and now you can read the projected spot on the other horn as you can see in the image below. Then you slightly relocate the initial spot on the aft horn so that both sides fall within your measured edge distance lines. It's not rocket science, but at least it give you a point that ensures edge distances with both the vertical and horizontal displacement of the horns.



In the next image, you see that I slightly displaced the angle position from on the measured spot.

Looking now on the other side, you see the spot on the other horn and see that it's within the edge distance lines.

Now that I defined that point that is ok on both sides, I marked a red dot on the aft horn. This will be my pilot hole center point.

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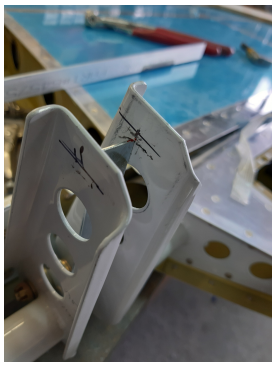
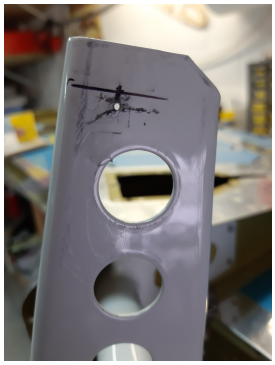


U removed the forward horn elevator and drilled carefully pilot hole on the aft horn at the red dot location.



The edge distance to the center point of the hole for AN3 bolts is 2 times 3/16" which is in decimals : 0.375 inch
I put this distance as a reference on the caliper and measured on all sides around my pilot hole if edge distance was ok.

In the images below, you see the distance from the lightning hole, from the bottom edge and from the side and all read well withing edge distance.

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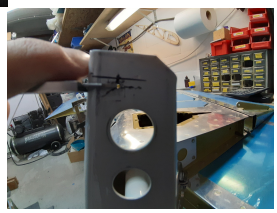
Distance according to plans from the forward edge is 1/2" or 0.500. Same exercise on the caliper and good distance here as well.



Then I enlarged the hole to #30 as per the manual.

Then I wanted to mount the horizontal stabilizor to the fuselage but noticed that I forgot to notch the attach bars. I remember at that

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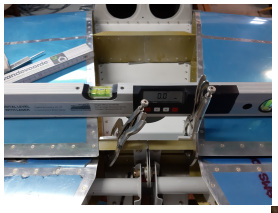
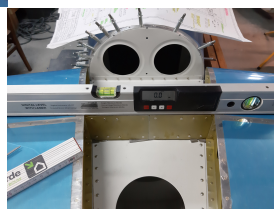
point I was thinking: why would I take that metal off ? I all see when I'm mounting the stabilizor if it's realy necessary. I want all the strength here so the full bar is better than a notched bar". Wrong thinking... Vans always has a reason to do things which are not only weight saving. The top of the bars interfere with positioning the stabilizor top skin so they really need to have that metal taken off. Measured it and used the vixen file and scotchbrite to shape it correctly. Also needed to re-apply primer. In short: do what the plans tell you to do and don't try to be smarter. Save yourself the hassle later."

Then installed the stabilizor and positioned it level front and aft and also re-attached the elevators.





Then I clamped the two surfaces of the elevators with pieces of angle and ensured again the level reads 0.0.

This looks easier than it actually is.

How to ensure the top faces of the elevators are really level.
Vans has you clamp the counterweight arms to the stabilo and that should be it but I have a significant difference in height meaured from a leveled bar on the ground to the trailing edge of my elevators

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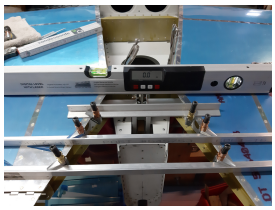
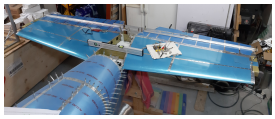
left and right.
Hair scratching time again. The best i could come up with is that the two faces of the elevators should be as level as possible. to clamping them together can't harm. I do notice a difference in the elevator counterweight balance arms doing so.
Problem is the tapered shape of the elevators which don't allow you to fixate an angle over the full length and ensure it's level. So clamped it the best I could and tried to get the level to read 0.0.

I'm probably being anal again here but this is a control surface so I want to be precise.



As I was getting tired and not yet fully satisfied, I decided to stop at this point and come back to it with a fresh mind.



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