

Time for the final steps in the construction of the rudder.

The proseal has cured for three days. It was not so hard to remove the excess proseal by using acetone. I already did that Friday to speed up work today.

Two remaining jobs to do on the rudder construction, first rivetting the trailing edge, secondly the rolling of the leading edges to specs.

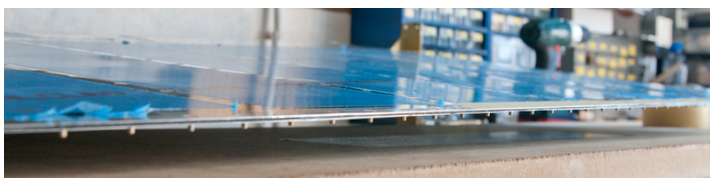
Constructing the trailing edge of the rudder is one of the most difficult tasks in the construction of the empennage. It is important to make sure that the trailing edge of the rudder is straight... straight straight.

If not, there will be consequences that are influencing aerodynamics and feel of the flight controls... not to speak about rudder-flutter.

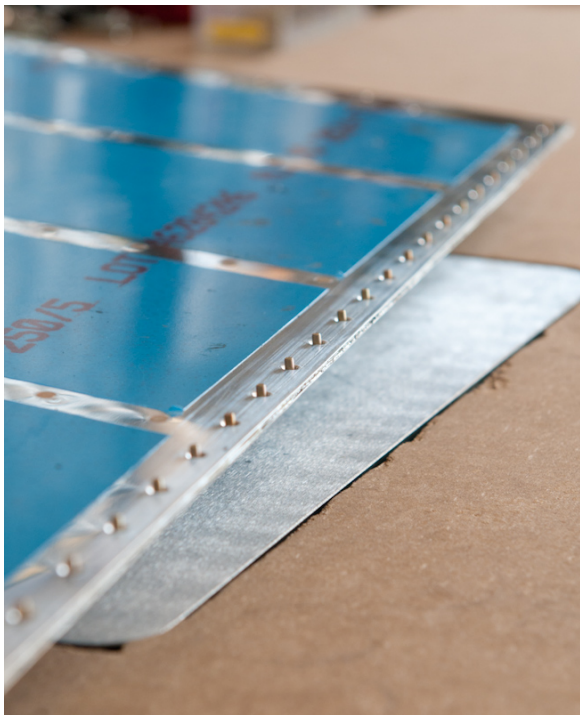
Van's tells you in the manual to make sure that the trailing edge does not vary from a straight line for more than 0.100".

Make sure your proseal is fully cured. Don't get in a rush to continue building. When removing the cleco's also make sure the dimples on both sides and the holes for the rivets are fully clean.

First insert all rivets in the trailing edge and put masking tape or rivetting tape over them. Just to make sure they stay nicely in place.



Then flip the rudder over and slide it over the backrivetting plate.

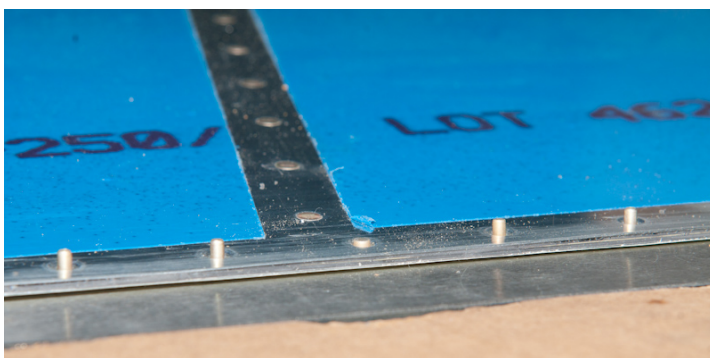


First set every 10th rivet just enough so that it fastens. From there on set every 5 or 6th rivet half way.

I used the following technique. Rivet from center first, then move to the top of the rudder leaving every 5th open. Then do the same down.

After doing one sequence of every 5th, stop rivetting and check the rudder trailing edge for straightness.

Always set them just about half way.



Don't backrivet at the angle of the rudder, keep the backrivet gun perpendicular to the rivet tail.

Category: 1.3. Rudder

Published: Monday, 29 August 2011 15:04

Hits: 1861



Then take the middle between two set rivets, set it and move again to the next 5th rivet which brings you in the middle of the next block. Stay always in the middle of the backrivet plate and ask some assistance to weight the edge down.

Keep checking for straightness every batch.

When all rivets are set half way, flip the rudder over again and change to the flush swivel head rivetter.

Do the same sequence all over again but now set the rivets completely. Giving it 6 to 8 ticks should already bring the remainder of the shop side in the dimple.

A little tip. You won't see here which rivets are already set to final size and which haven't as the shop head are now on the bottom side and from the top, all looks the same. Mark them with a sharpie pen on the rudder.

Category: 1.3. Rudder

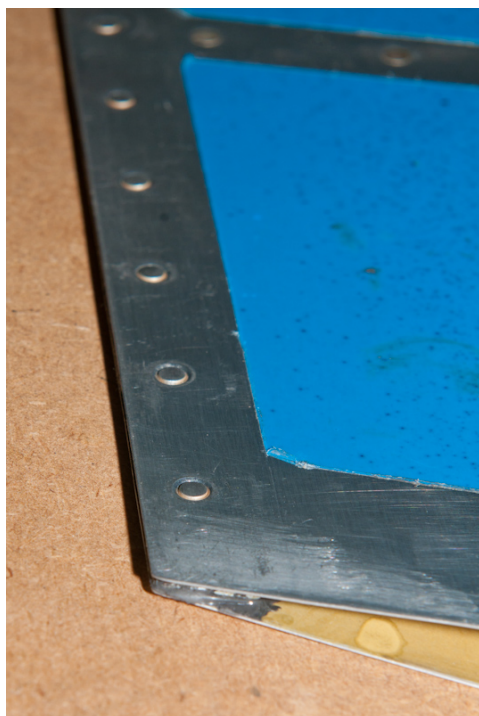
Published: Monday, 29 August 2011 15:04

Hits: 1861



Also on this side, keep checking every batch for straightness. You don't want a bad hook.

The shop heads look like in the picture below. Really nice and smooth. I'm really happy about this job.



The trailing edge is almost completely straight. There is just a bit of

a bend right in the last 3 inches of the bottom side. It looks a bit exaggerated in the picture by the zoom factor of the lens.

I will try to get that fixed but I have to think about the safest way to do this without making it worse then it is.

Total deviation is less then 0.1" so according to Van's, it should be ok. But you start knowing me by now... Things have to be perfect... And this is not.



Rivetting the trailing edge was a job I postponed for a long time, but it really went well in the end. As usual, follow the plans and manual and you will be ok.

Second task of the day: rolling the leading edge of the rudder. I allready rolled the elevators and the rudder skin is thinner then the one of the elevators so this is much easier to roll then the elevators.

I used the same PVC tube as for the elevators.

Roll one section at a time. It makes the job much easier and controlable.

Category: 1.3. Rudder

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Hits: 1861



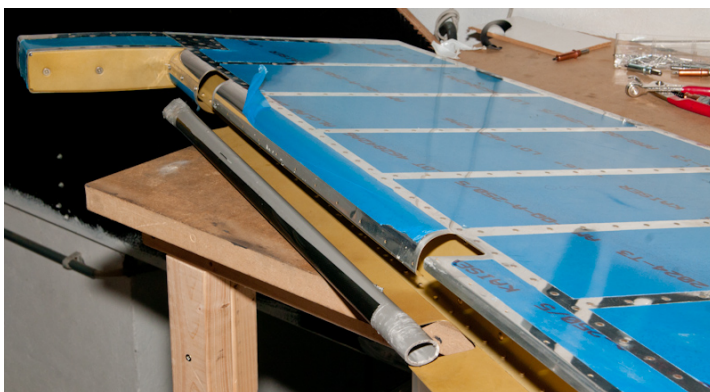
Once both sides are rolled, cleco them together with 3/32" cleco's and drill them to #30 replacing each cleco by a 1/8" cleco. Make sure the skins attach well when drilling and setting the poprivets.

Then pull the AD-41-ABS pop rivets. Make sure they mate well with the surface of the skin.



Rolling the second part (outside skin) is always a bit more difficult as the other skin tends to get in the way.

When rolling them, once relaxed, the last portion of the skin should sit more or less perpendicular to the rudder, or parallel to the spar. Apply force on both side using pliers and while rolling, apply force to the table and backwards as if you are pulling the skin back and down.



Use some duct tape to keep the parts together as you remove a cleco to drill or rivet.



This is how it looks when both sides are rolled. The inside skin is not fully down. For the bottom side where there is more crucial this is ok. It would be more difficult if it was like this near the top where there is less skin, it would not be rolled enough.

The outer skin is slightly over-rolled. This makes sure there is a nice joint to the bottom skin. If the joint still has some problems or dents of not attaching flush to the other skin. You can either roll a bit more or if it is only very local due to some draping of the skin or small dent, use a small plier and adjust the last couple of millimeters to bend it down evenly over the required surface. Be gentle and do it evenly or you will increase the problem instead of reducing it.



And finally, the rudder is completed.

Rudder finishing - 25/08/2011 - 5h

Category: 1.3. Rudder

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Hits: 1861

