

It's saturday afternoon and Hugo showed up to help me out with the now almost world-famous 'checkoway method' for drilling the fuel tanks to the spar.

What's so special about this method is that it completely ignores the manual from the mothership (Vans).

Most of the time, you have to have really a cautious attitude towards builders that deviate from the plans. But in this case, go for it. Thrust me, it works brilliantly.

I mentioned before the section in the plans where Vans calls to 'elongate the holes' if the skins don't fit. The idea alone makes me shiver.

Using this Checkoway method, there is no way you can mess things up and it ensures perfect alignment.

The Checkoway method got it's name from builder Dan Checkoway. His website is unfortunately taken offline and for some mysterious reason, he does not like his website to be distributed anymore.

I guess some issues with other builder or with Van's but nobody really knows the real reason. I guess this is what makes the whole method even more legendary.

I learned meanwhile that he wasn't the first one to do things this way and that he also found the idea from another builder who is until now unknown.

Standup, thy noble inventor and claim your fame !

Fortunately, there are many builders that applied this technique and documented the process the same way as Dan did on their website. The one that explains it best and that I followed is on the site of Jason Beaver. You can find it [here](#).

Hugo is building an RV-9 and is a few (cynical remark) steps ahead of me. He's currently building the fuselage. He already went through the process of assembling the fuel tanks so it was a welcome help on mine.



First thing we did was strap the fuel tank to the spar. We created some wood blocks to hold the straps away from the rear spar. The skin goes deeper then the rear spar so you cannot just pull a cord on

there. Some wood blocks need to keep the cord away from the rear end of the skin. Also use a wood block support to keep the ratchet away from the skin as you tighten them. Also, make sure that the straps are near a rib to avoid failing skin under the pressure.

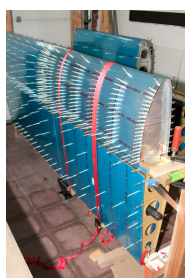
At first fit, the fuel tank edge and the outboard leading edge skin fitted perfectly. Also the front side in the bend. No need for pulling there.

On the aft side of the tank (where the fuel tank skin meets the spar), there was a small 1mm gap between top skin and fuel tank skin. On the bottom side of the wing, it was even less.

When Hugo started tightening the straps, the bottom side quickly joined up. The front side got better on the outboard side but kept on showing a small gap on the inboard side where the wing walk resides.

We added another strap on the top side, to increase the pull on the top side. The outboard was completely seamless. A half mm gap remained and could not be closed. I also noticed that the top skin was not fully aligned on the inboard side on the holes between spar and top skin. Hugo told me he had a similar problem and that everything pulled together nicely when final rivetting was finished. It makes sense. I just hope that I didn't have a mismatch during matchdrilling. (I can't see how that could have happened as the top skin was all the time fully clecoed when matchdrilling). Questions that will be answered later.

The picture below shows the straps and the wood blocks at the bottom.



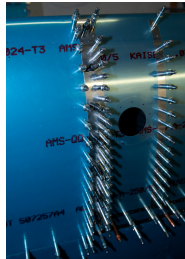
Once we were ok with the alignment of the tank, first thing we did was to drill the joint plate attach plate holes.

The plans call for this later, but we were so happy with the alignment that we decided to do this first. Once this is drilled and clecoed, it won't move anymore.

First used the existing holes in the fuel tank skin to drill with a #28 drill. Then enlarged them to #19 for the 8R8 screws.

The black clecoes are the drilled holes. These will actually be

nutplates on the back of the joint plate. The joint plate serves as mating piece that holds outboard leading edge skin and fuel tank skin aligned.



After that, we matchdrilled the whole fuel tank skin on both sides except for the horizontal line near the spar where skin meets the rivet row of the fuel tank baffle.

This should be done off the spar as it is too dangerous to accidentally drill into the spar. On the outboard side, it is not a problem, but on the inboard side, the reinforcement fork of the spar is within a mm behind the baffle. There is no way you can drill that safely so don't even try it.

Then starts the real work of the Checkoway method.

First step, drill the rib to baffle to z-bracket attach holes #30 using prepunched holes in the wing as drill guide.

This will not work with the normal short drill bits as the distance between the hole and the web is quite small.

Many people use a 12" drill bit directly in the air drill and then bend the drill bit during drilling. This creates an elevated risk for oval drilled holes.

Hugo had a brilliant idea. We installed the 12" drill in the angle drill and the angle drill in the air drill.

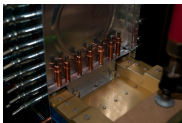
That allows to keep the 12" drill bit as good as perpendicular and allows to put light pressure on the bit. (see picture below)

Protect the web of the ribs with duct -gorilla- tape to avoid accidental scratching.

Use a drill stop on the long drill bit and later on the shorter ones when drilling perpendicular towards the spar !

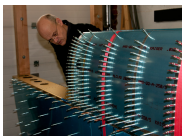


First 5 holes drilled inboard side

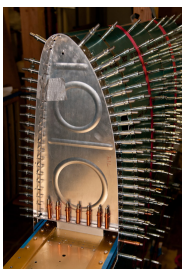


The next step is to remove the outboard leading edge skin and ribs. Since the fuel tank is strapped in place, and the inboard side is clecoed, the whole assembly is fixed in position.

By removing the outboard leading edge, you now have access to the outboard side outer fuel tank rib to baffle to z-bracket.



Apply the same procedure with the 12" drill bit on the outboard side. 5 more clecoes are in. Note the piece of duct tape still on the rib to protect the web while drilling.



Now that both sides are matchdrilled and clecoed, the tank baffle is secured in place and can't move anymore.

This means we can safely remove the fuel tank skin and inner ribs

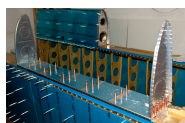
without the risk of moving the tank baffle and losing alignment.

Hugo is inspecting the position of the z-brackets through the prepunched holes in the baffle.

Draw some center lines on the z-bracket top flanges before attaching the tank. You will then see the lines through the prepunched holes. (I forget to do this)



Once the inner ribs are removed, drilling the remaining holes is a piece of cake.



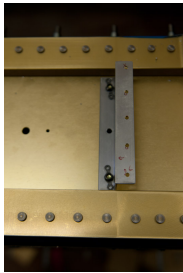
The z-brackets are now matchdrilled. All holes nicely round and tight. No elongating. I wonder how much longer it will take until Vans change their plans and adopts also this method.

You can now remove the baffle and ribs from the spar and start deburring.

Time to inspect the z-brackets.

A few articles back, on the article about 'Z-Brackets drilling'. I had some doubts on the instruction on many websites to drill 1/16" away from the web. My ideas got confirmed that the offset leads to holes that are below minimum edge distance for the pop rivets attaching to the baffle. The ones where I went back to 1/32" offset had finally better results with sufficient edge distance. However, I should not exaggerate. Only 2 of the 7 brackets have values below nominal and it is minimal (0.180" instead of 0.1875" from edge to side of hole) Not something to worry about, but if you still have to start, don't do the 1/16" but go for 1/32" of the center line.

The picture below shows my bracket with the least edge distance on the top. Plenty of space and Vans support also confirmed some weeks ago that these holes don't take excessive forces.



All brackets



Thanks to Hugo for the help. Had a great afternoon.

Next up is matchdrilling the baffle to skin. Since the skin is already matchdrilled. I can cleco the ribs on off the spar and fire away. But that's for next time. Time for a beer now to celebrate the success of the day.