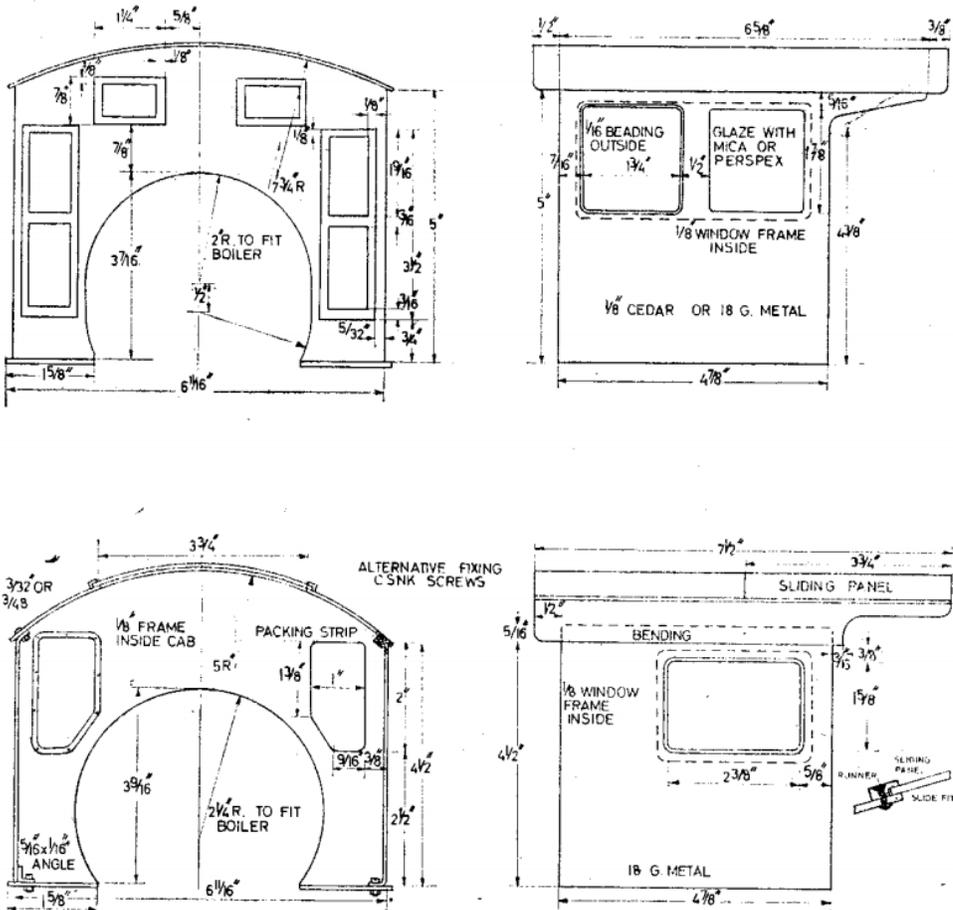


I have decided to go with the old style cab look; the 2-inch radius for the boiler will give me a good 1/8 inch of clearance between the cab and the boiler, assuming of course that my measurements and my sub-assemblies are in their correct positions. Finally, a little sheet metal design work, this might be fun. As I recall I had to modify the boiler, that 2 inches may not be enough.



Top left and right: Old-style cab front and old-style cab side. Bottom left and right: Cab front for larger boiler, modern cab side and roof, and section of runner

Figure 1: Cab Dimensions from LB's article.

I decided to start with the front of the cab. I noticed in LB's drawing of the cab that the 6-11/16 dimension is from the running board on the left side of the drawing to the outer edge of the cab on the right side of the drawing. He then also pulls a dimension from that same side on the running board and gives the running board width as 1-5/8. My first thought is that he is giving us an edge to start with.

There does appear in the drawing to be a reveal between the cab and the running board, though I have no idea what that distance is. For me personally I see no reason for a reveal at all, unless of course there happens to be an issue with the attachment hole placement in the running board being too close to the edge.

LB does suggest leaving an extra 5/16 of an inch along the top and bottom of the cabs sheet metal to make the attaching flange, but again he specifies no bend radius and no flange width.

A few things I will keep in mind when making my flanges are:

1) Bend Radius- As a rule, inside bend radius should be equal to material thickness. When the radius is less than recommended, this can cause material flow problems in soft material and fracturing in hard material.

2) Hole-to-form-distance from hole-to-form—to avoid hole distortion, place holes no less than 2.5 times the material thickness + bend radius from the bend itself.

Number 2 of course depends on procedure, and by that, I mean your order of operations. Are you drilling your holes before or after you bend the part, maybe your punching the hole?

3) Hole to edge clearance – A good rule of thumb for hole placement is to keep the hole at least one material thickness away from any edge. If the hole gets too close to an edge a bulge can form. I believe this is mainly for use with a punch operation.

Also, note, if the hole used for fastening two pieces together, extra web should be used to account for the added stress. I.e. the hole to edge clearance should be greater than the material thickness.

LB suggests using 18 or 20 gauge sheet metal to make the cab from, I chose 18Ga. 18 Ga sheet metal has a thickness of 0.0478", 20Ga has a thickness of 0.0359".

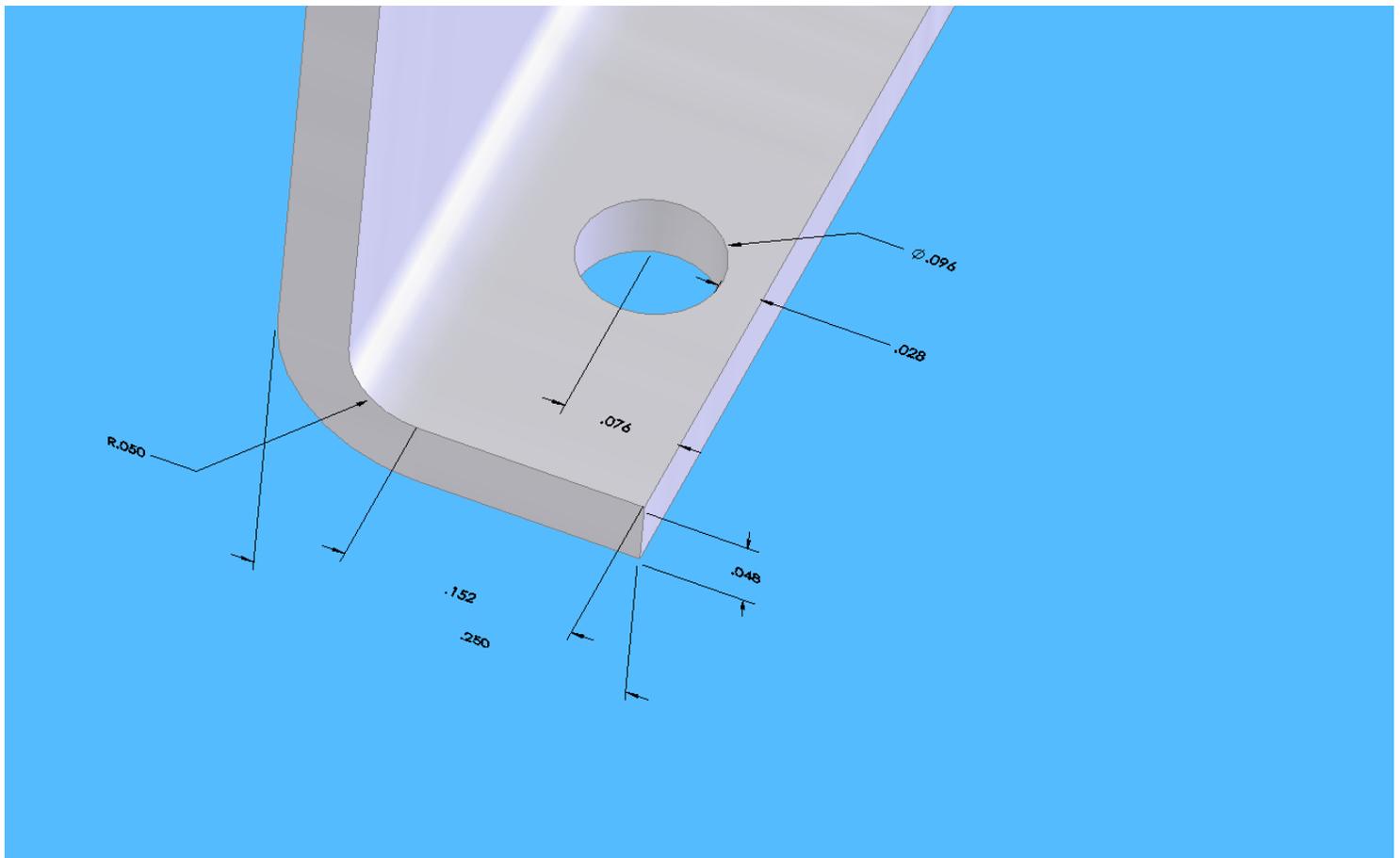


Figure 2: Lower mounting flange of the front sheet metal piece of the cab.

From LB's suggestion of adding an extra 5/16 of an inch to the height of the piece for making the mounting flange, I figured having a flange with a width of 1/4 inch would suffice. However, when I placed the mounting holes which are #41 or 0.096 in diameter directly in the middle of the flat I noticed I had a hole to edge clearance of only 0.028 inches. Our material thickness is 0.048 the edge clearance for the hole is 0.028, not good, I will have to make the flange a little bit wider, and 3/8 should suffice.

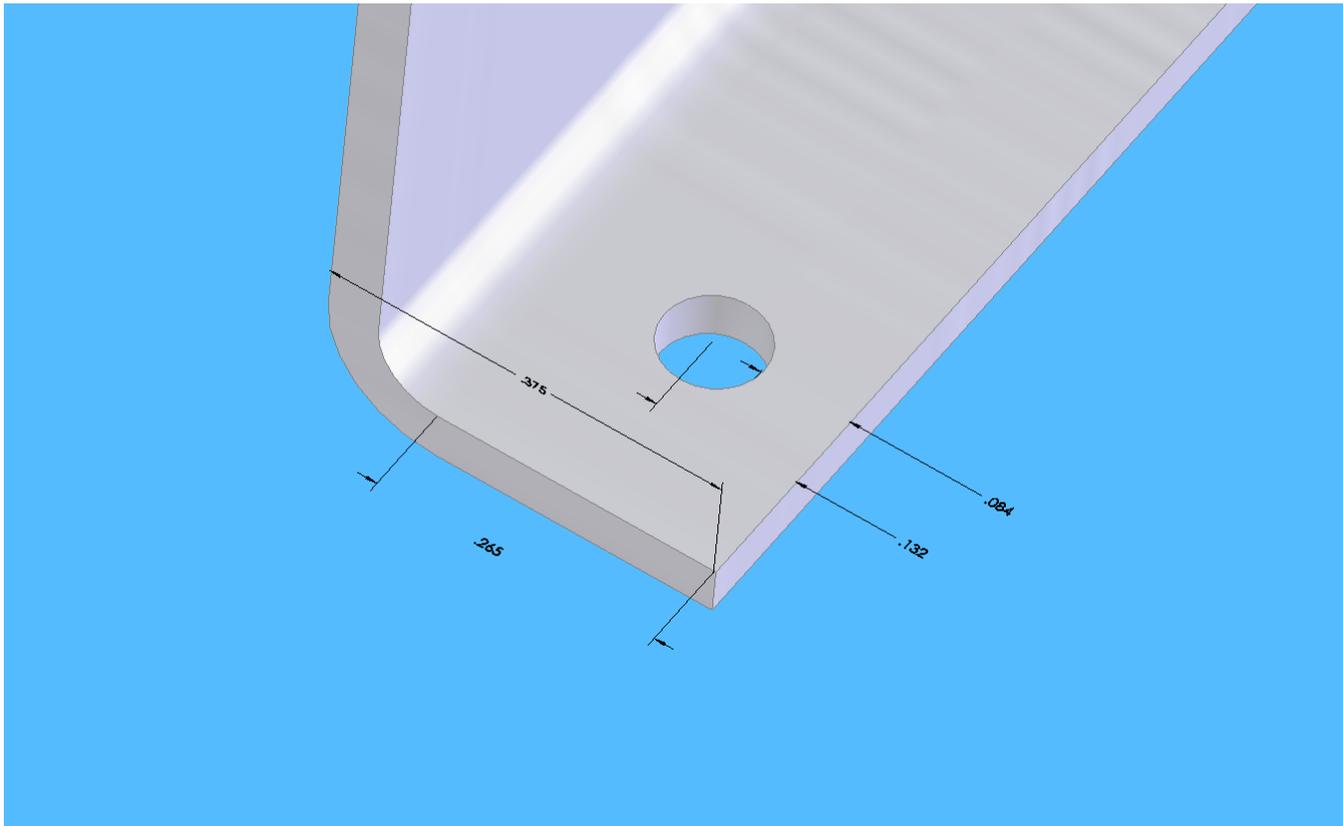


Figure 3: Bottom flange with a 0.375 width and much better hole to edge clearance.

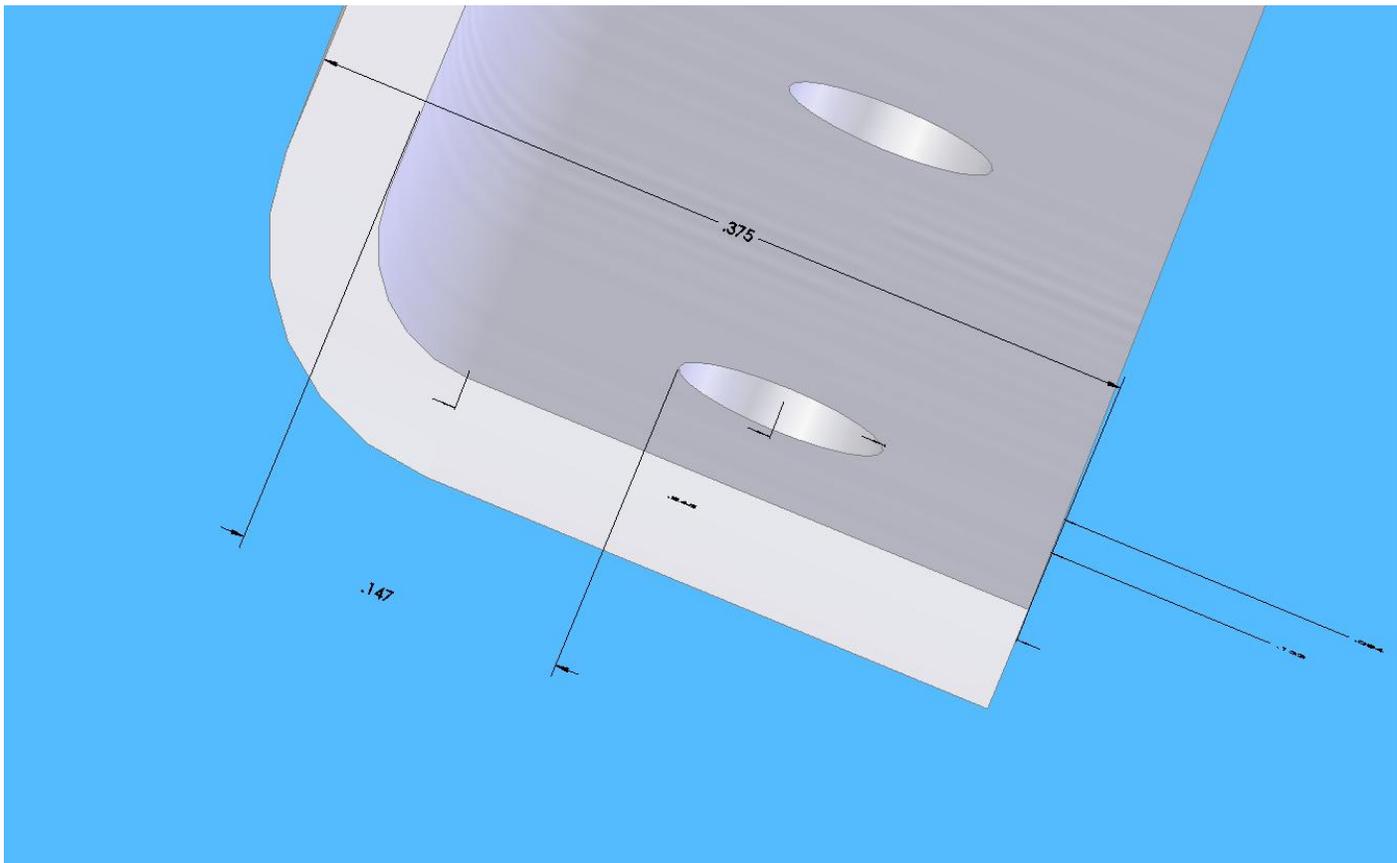


Figure 4: Hole to form distance shown at 0.147 inches.

The hole to form distance equation for a slot or a hole is $D=2T+R$, this is the minimum distance to resist distortion. I have $2*(0.0478) + 0.05 = 0.1456$. I have confidence now that no distortion will occur in the hole after bending.

Figure 5 shows the hole to form distance at 0.084 with a 0.250 flange width, distortion of the hole will occur if the hole is drilled before the bending operation.

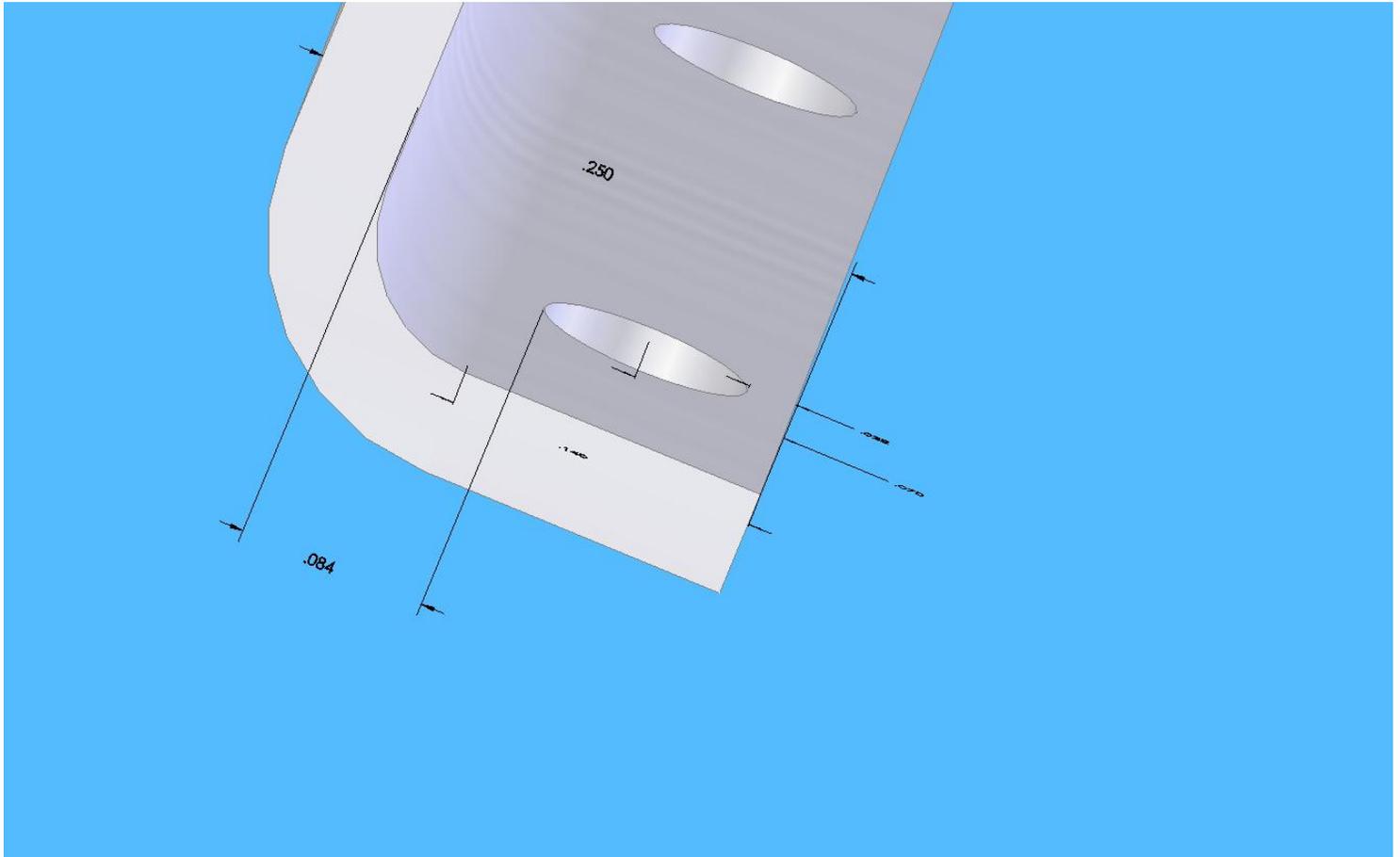


Figure 5: Hole to form distance shown at 0.084, minimum distance should 0.1456.

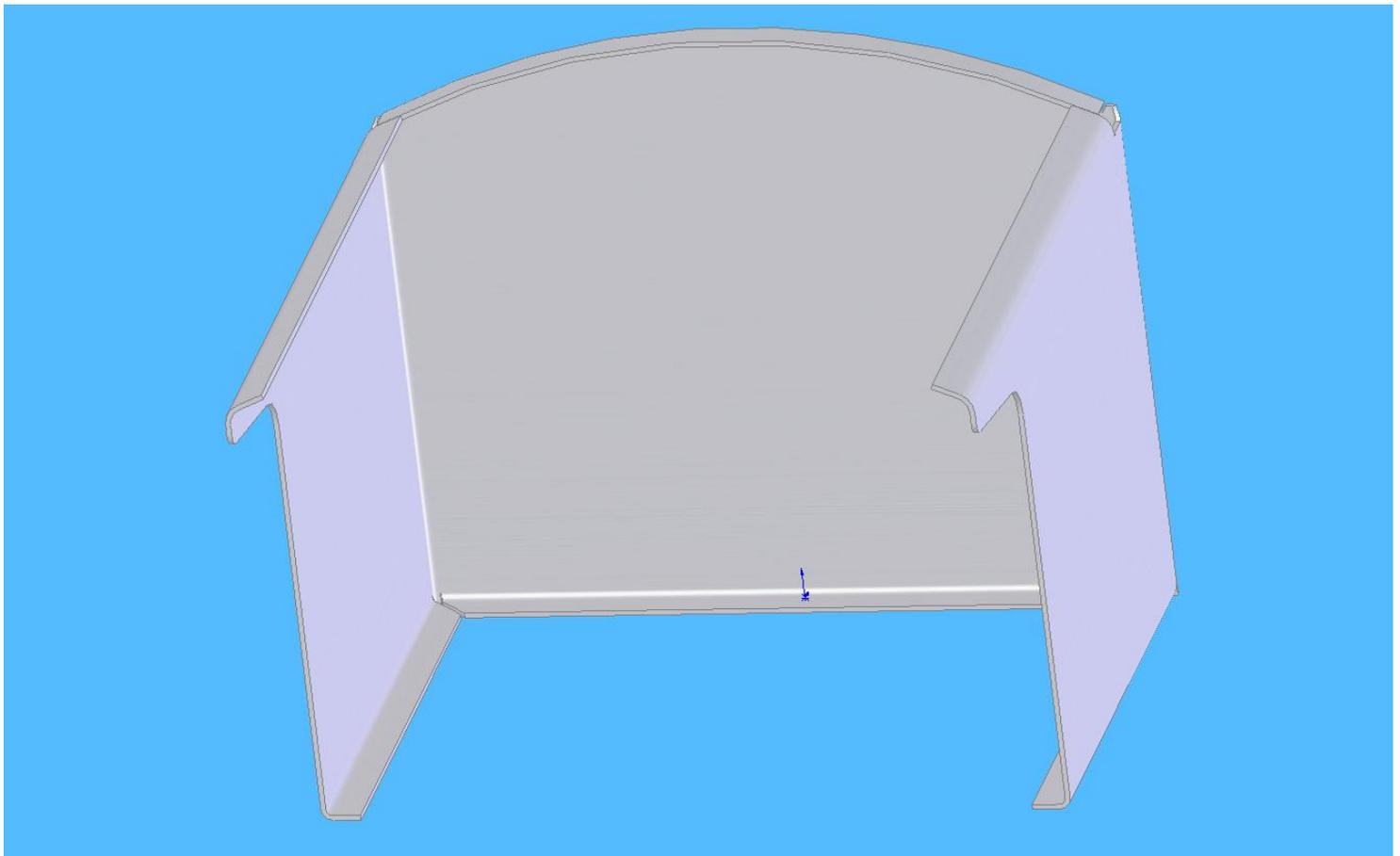


Figure 6: One-piece cab sides.

Figure 6 shows a one piece of sheet metal for the cab sides. This was not that easy to create and took me several tries to get, but as Figure 7 shows it does flatten making a great pattern with the bends lines. Therefore, it is possible to have one piece of sheet metal for all three sides; now all I have to do is add the windows and the holes in the flanges for mounting to the running boards as well as to the roof.

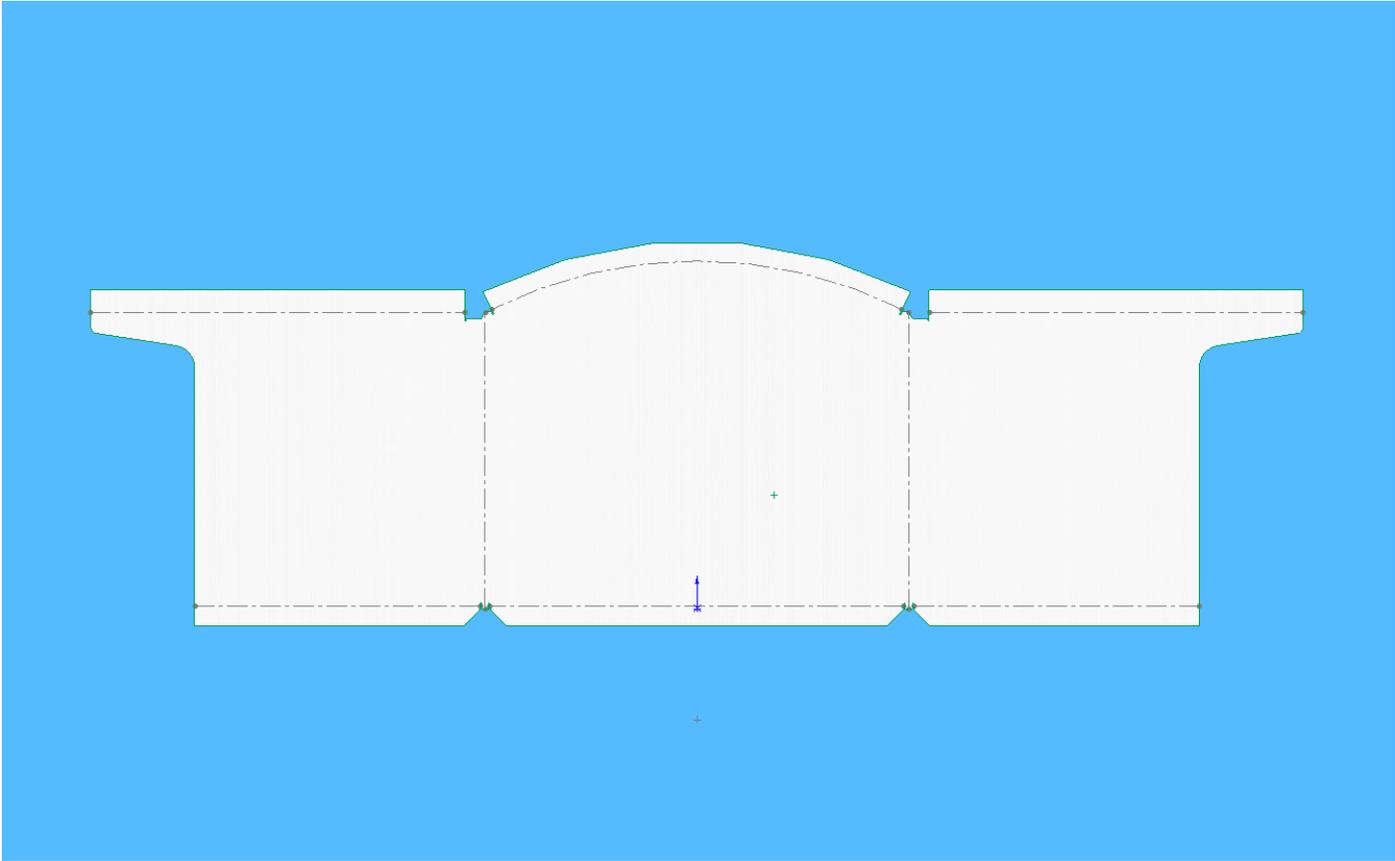


Figure 7: Flat pattern for one-piece cab sides.

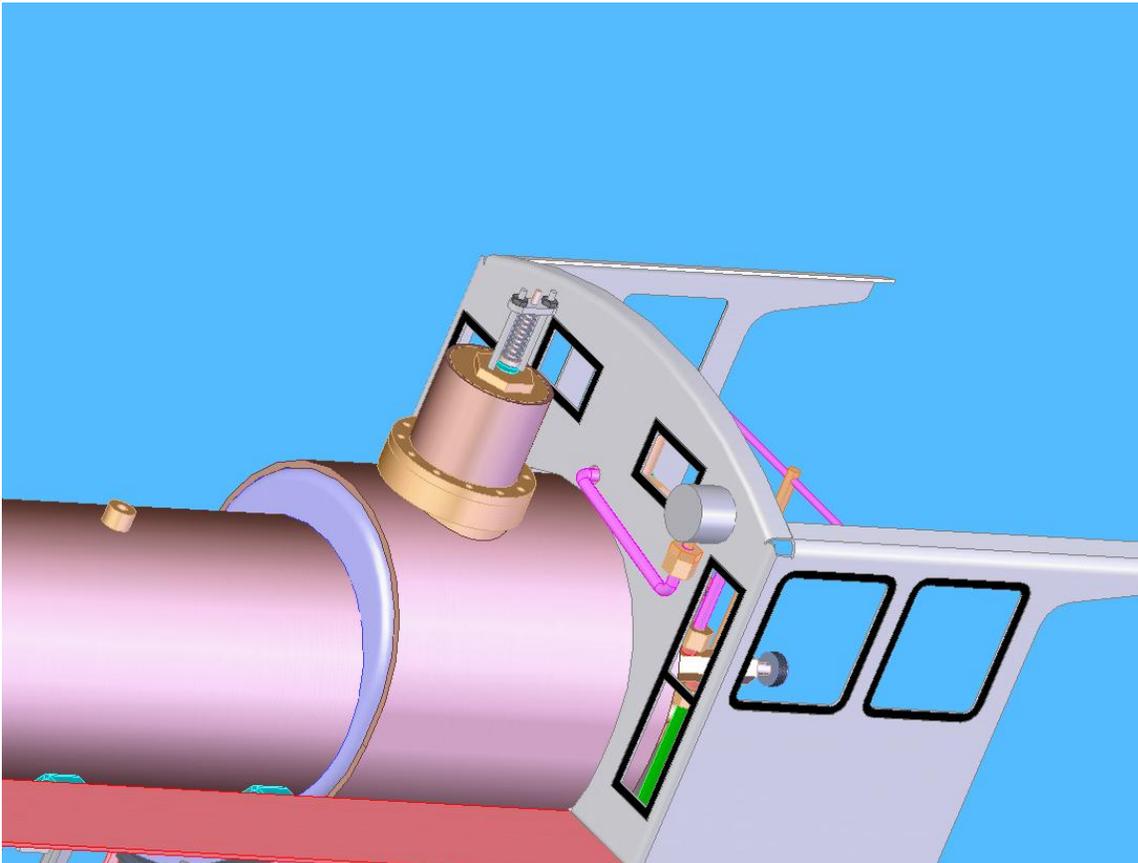


Figure 8: Pressure gauge placement problem.

When I placed my cab down on the running boards and lined up the back edge of the cab with the back edge of the running boards, I ran into a problem with where the pressure gauge was coming out of the turret. There is not enough room inside the cab for the pressure gauge. What I wound up doing, as Figure 8 shows, was to drill a hole in the front part of the cab to let the pipe out from the turret and then I drilled another hole in the upper left part of the cab to mount the gauge. If the cab can be extended forward enough, I may be able to get the gauge inside, but for now, this will have to do, as I have not yet modeled the throttle dome so I do not know if there is enough room to move the cab forward.

Next was on to the roof of the cab, this should be very easy to model, I will shoot for about 1/4 inch over hang on all sides of the cab to give a drip edge. Figure 9 shows the completed cab with logo.

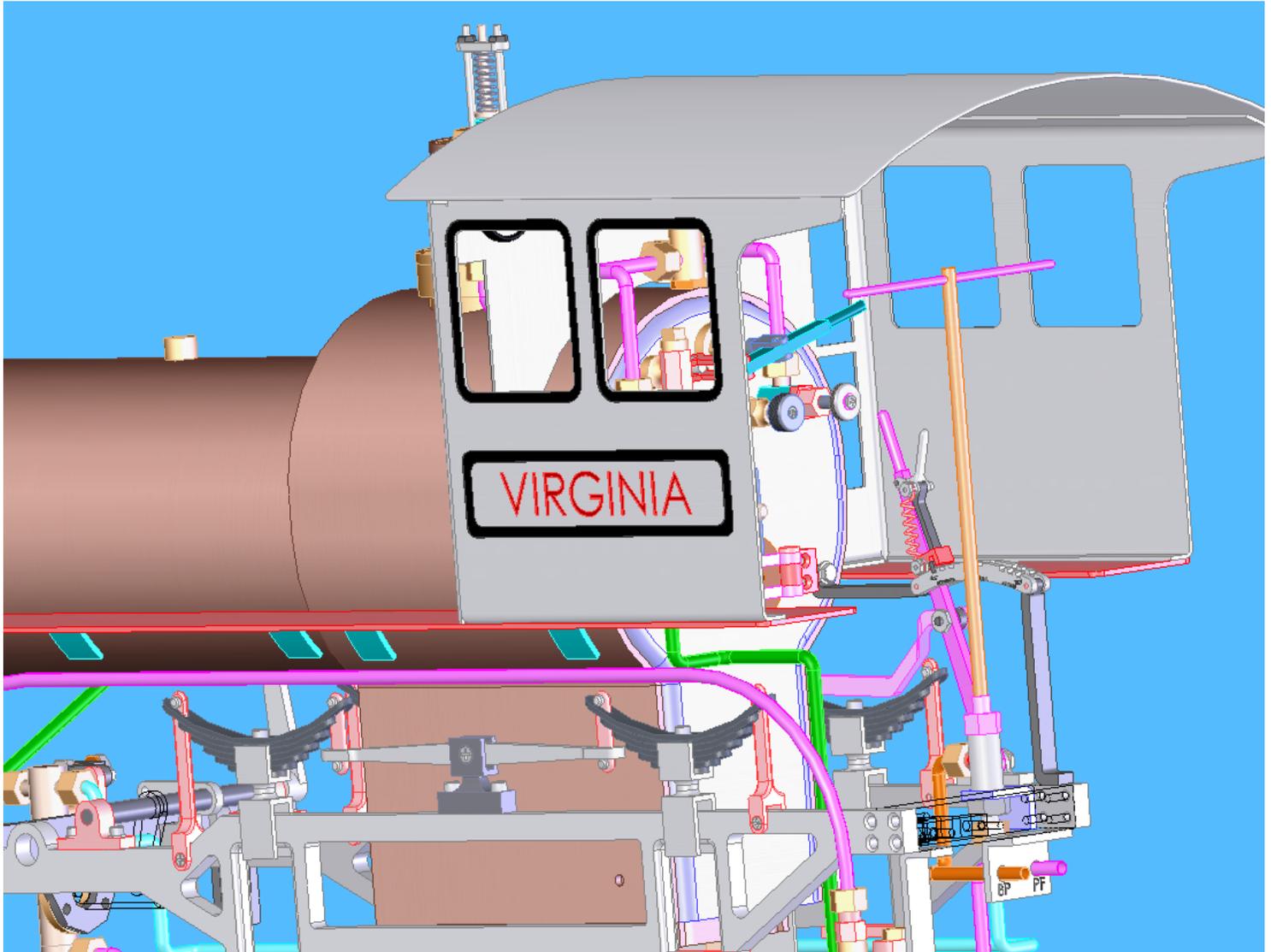


Figure 9: Completed cab set in place with logo.

Next was the cab deck, as Figure 10 shows I will have to make some adjustments in the deck to accommodate the piping as well as the reversing lever and the hinge for the firebox door. SolidWorks makes it so easy to modify exiting parts in an assembly. Without going into detail, all I did was do my editing “in context” to the parts that were already there. This allows for a very precise fit to the existing parts in the assembly. One must be careful though when using this technique. For instance, I had to make a hole for the bypass valve in the cab deck. What I did was edit the cab deck “in context” of the assembly, by doing it this way I was able to convert a circular line of the bypass valve directly to the cab deck exactly in the same spot where the bypass valve lies in relation the cab deck. I can also isolate these components so that nothing else is in the way and I have a clear view as to what it is I am working on, very, very slick.

With that said, I must advise caution when using this technique. Since you are doing this “in context” that means that you are using other parts or sketches or what have you, to make changes to the part you are editing, if something changes in one of the parts that you converted a line from, the part you edited will change also. For instance, since I used an outside circular line of the bypass cylinder for the basis of my hole in the cab deck, if I ever change the outside diameter of the bypass valve, the hole in the cab deck will change as well.

Like anything, this does have its benefits as well as its drawbacks and it just depends on what your “design intent” is for the part or perhaps the assembly. There are ways to remove the “in context” relations from the feature you created. Usually, when I do this I am working in the sketch mode, so I just go back thru the line relationships and look for something with an arrow attached to it. The arrow is the symbol (>) for “in context”.

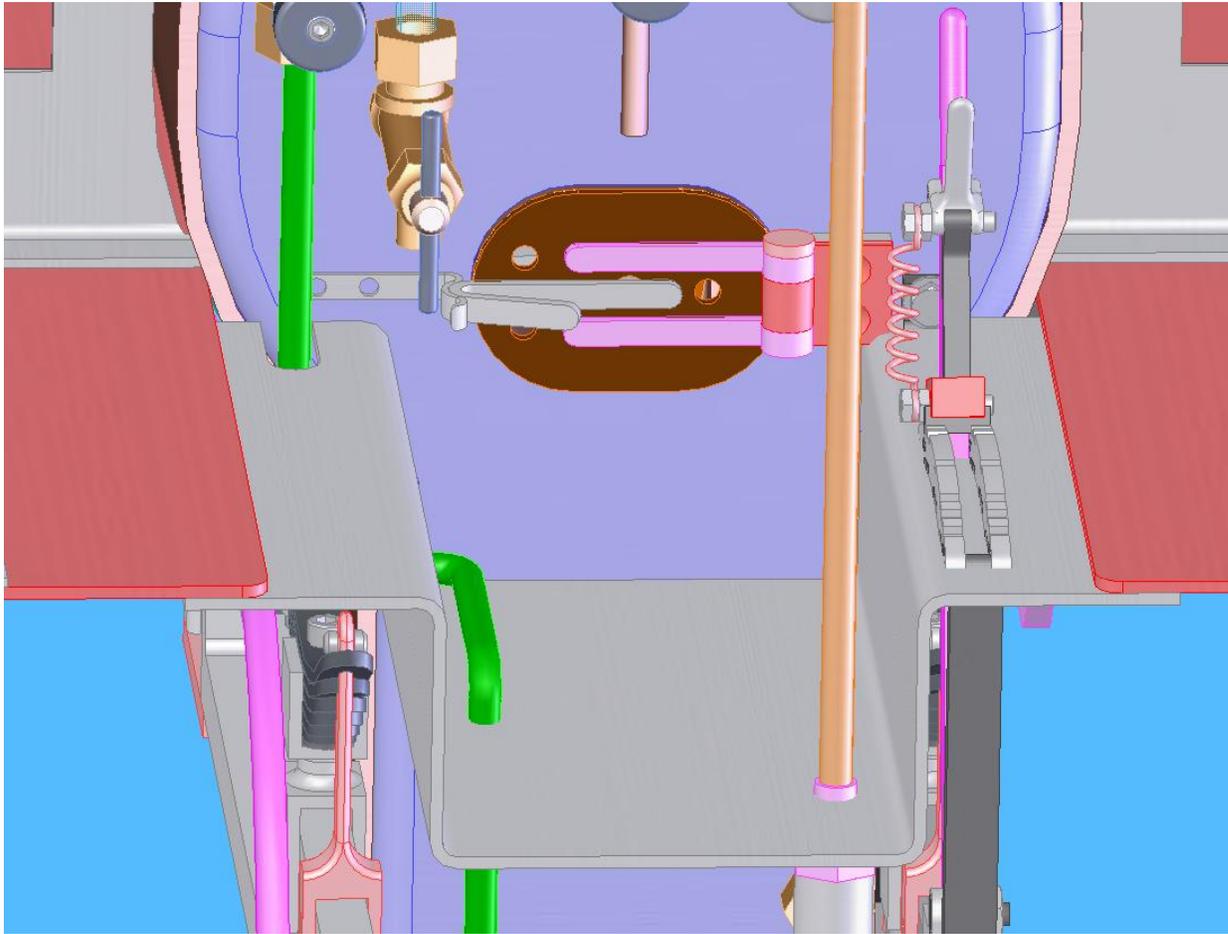


Figure 10: Cab deck in place with interferences to account for.

Figure 11 is showing that I made quite a few modifications to the cab deck. I had to increase the depth of the well because of my prior modifications to the boiler to accommodate for proper bends in the sheet metal. I also had to increase the height of the reversing lever and then I rerouted the piping from the injector steam valve to the injector. Instead of being on the inside of the cab, it now runs along the outside, a much cleaner look for sure, though things are getting mighty tight piping wise on the left side now.

The apron was modified as well and while I was doing that, I decided to make a double flange on either side of the apron to support not only the cab deck but the running board as well, Figure 12 shows the double flange.

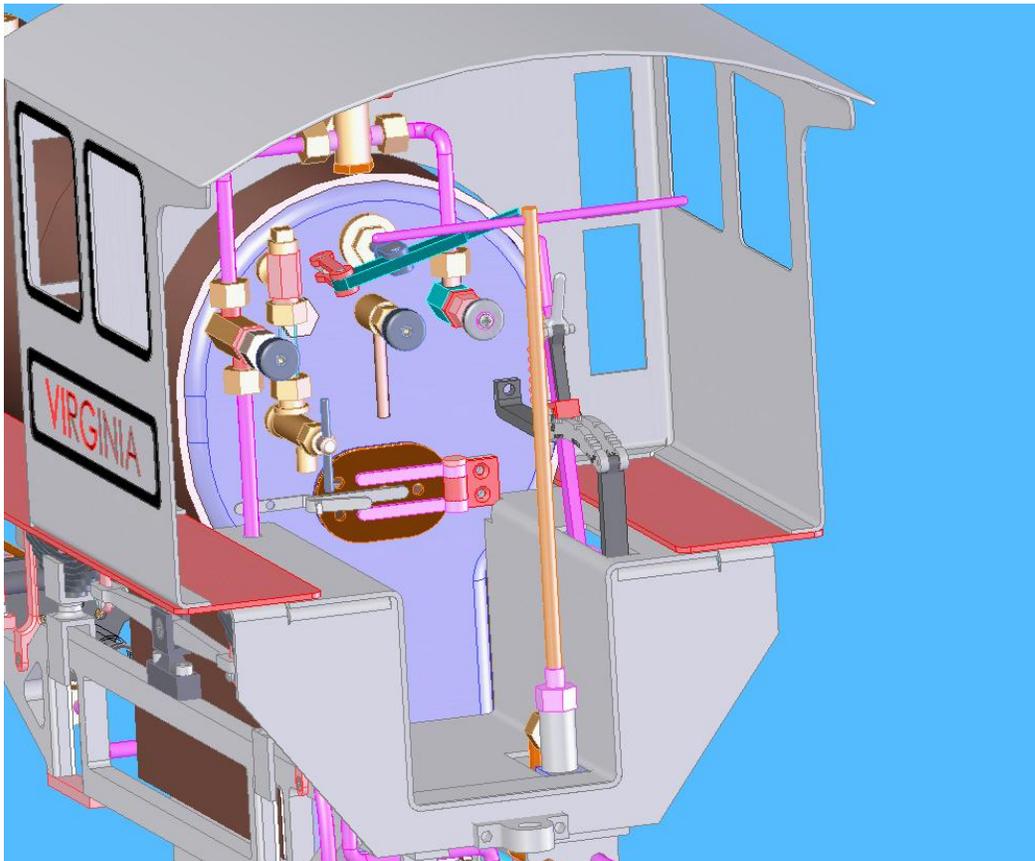


Figure 11: Modifications to the sheet metal cab deck for the bypass valve, piping, the reversing lever, and mount to firebox, as well as the hinge for the fire door.

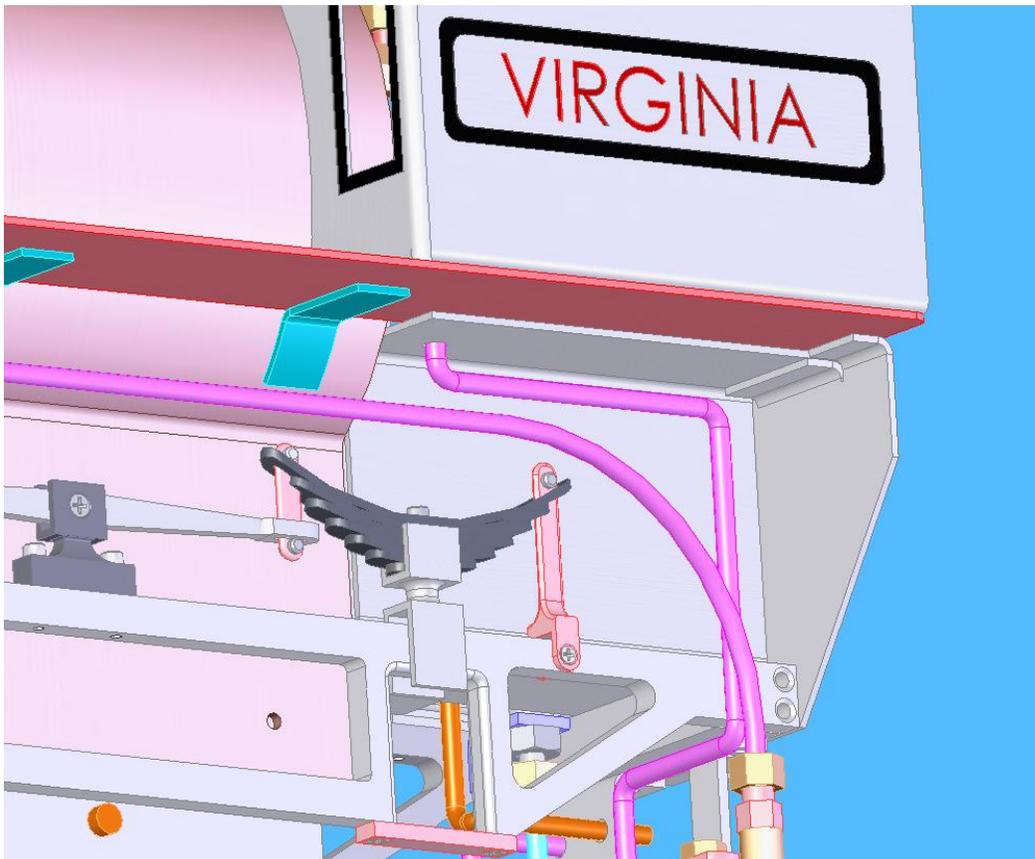


Figure 12: Support edge flanges on apron for the cab deck and the running boards.

Whistle.

I was going to use Jim Cooks whistle that I found on the IBLS web site, but as luck would have it after I modeled it up it was excessively big and I could not find a way to scale the whole assembly down. What I wound up doing was to create my own crude looking whistle 2 inches long and ½ inch in diameter. I then put the whistle where LB said to under the right running board. After that, all I did was run a route to the respective connection points.

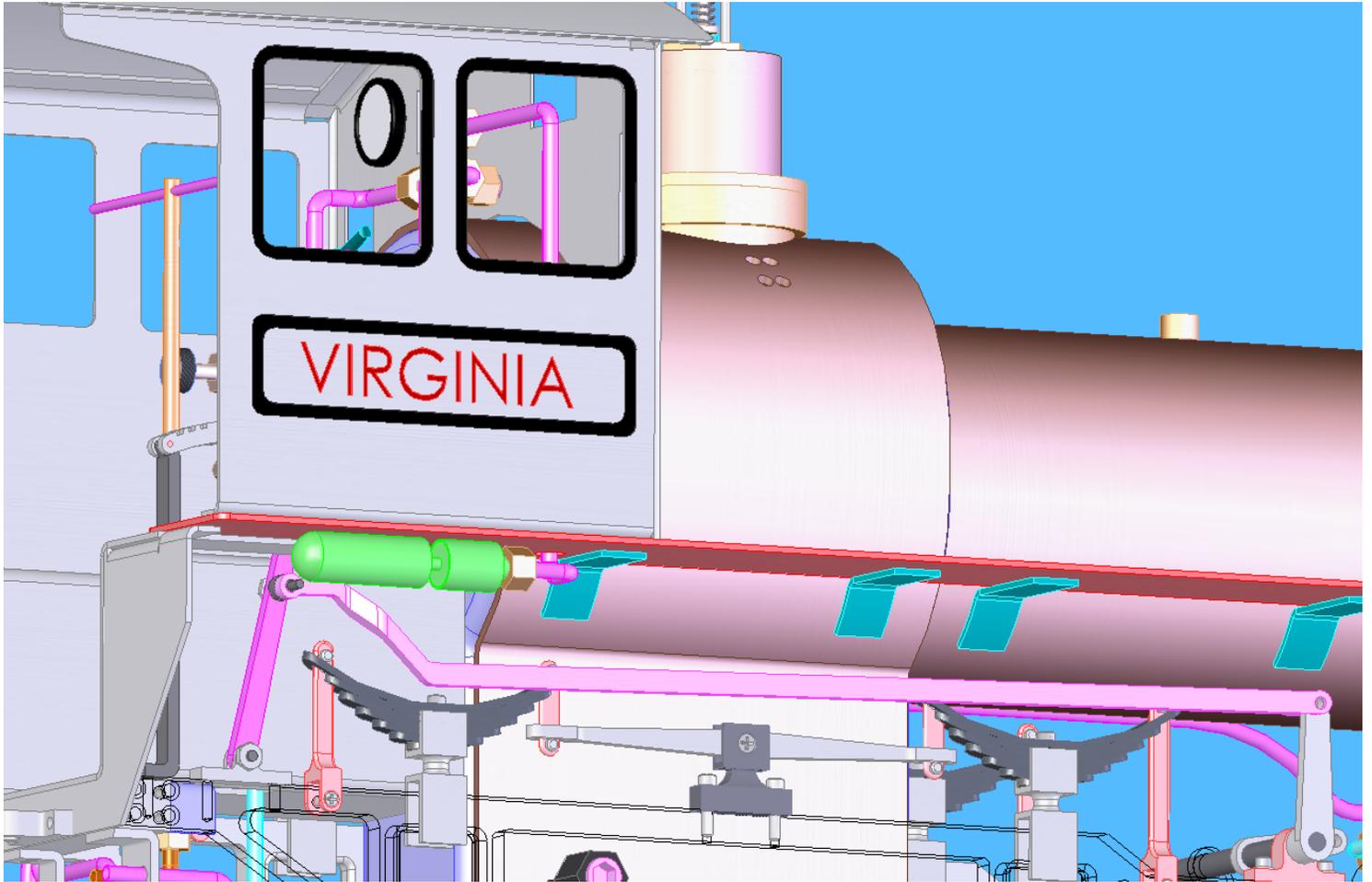


Figure 13: Whistle in place under the running board and piped shown in green.

Cowcatcher and domes will be next.