Shay - Boiler Cosmetics - Part III

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The task here is to finish the domes.

Steam Dome: The steam dome was tackled first because it rests on the straight part of the boiler making it easier than the sand dome which sets on the sloped part of the boiler.

The first step was to chuck the dome and rough bore the inside so that it would fit over a wood mandrel. The underside of the top lip was also smoothed.

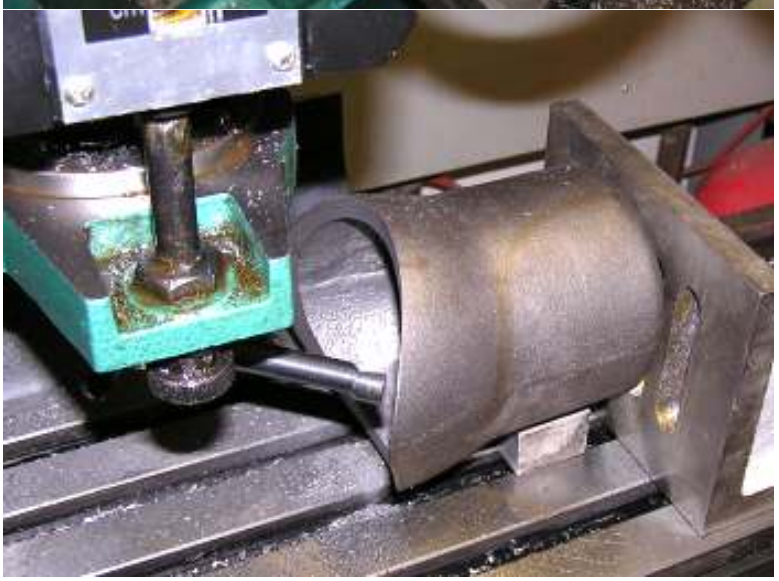
The lathe in the photo is a 12"X36" unit that replaced my old Maximat V10P.

Ken said he used a large washer inside the dome and bolted the dome to an angle to hold the dome on the mill table. He then used a fly cutter to machine the radius to fit over the boiler.

A scrap piece of aluminum served as a washer inside the dome.

This shows how the dome was bolted to an angle plate that was in turn bolted to the mill/drill bed. That's a new mill/drill too. (Both the mill and drill are Chinese and were on sale at Harbor

Freight.)



The fly cutter previously used to machine the radius on the smokestack base was used to mill the bottom of the dome. (The fly cutter proved too much for the Maximat milling head resulting in toothless gears. The belt drive on this 700 pound mill/drill absorbs the impulses without damaging anything.) A speed of 200 rpm was used and fine cuts (~0.01") were taken with a very slow feed. It took about 3 hours. Not a pleasant task but better than mowing the lawn.

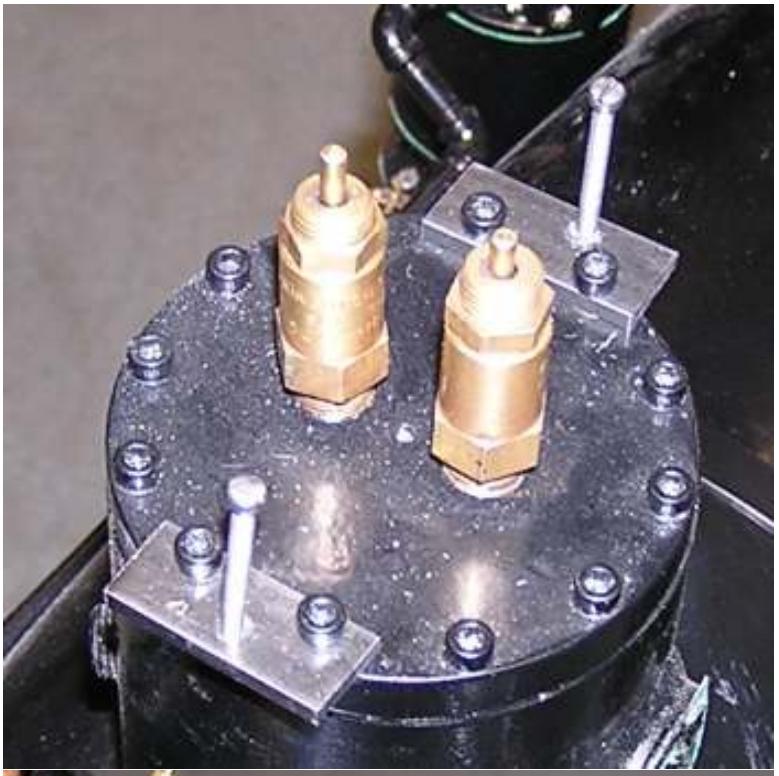
The base fit nicely on the boiler --- a just reward for the boring labor.

The square hole for the steam pipe was cut next. The only way I could figure to cut the hole was to drill a bunch of small holes, then enlarge the holes and then finish with a file. That took another hour or two.

A mandrel was made from a piece of 4X4. It was turned to be a force fit inside the dome. (Hope she doesn't miss her landscaping timber.)

The dome was forced on the mandrel and then the inside of the top finished with a boring bar. That boring bar is the same one used to finish the inside of the dome and is clearly overkill for this job ---- but it was already in the tool holder.

The outside was smoothed with a course file and then 50 grit sandpaper. This is the partially smoothed dome. There were quite a few pits from air bubbles. Most the pits were removed and then the dome was powder coated.



Ken said he used a couple studs to hold the dome down. The studs were threaded LH on one end and RH on the other so that they could be tightened from inside the dome.

I choose a less sophisticated approach to retain the dome. A pair of plates were secured under the screws that hold the top on the steam chamber. The long screws go through holes in the top of the dome to hold it in place.

The dust specs in the photo came from the inside of the dome when it was test fitted.

This shows the finished dome. The heads of the two screws securing the dome are clearly visible. They will be painted black to make them less noticeable.

The light colored specks are dust. There are however numerous small pits still visible. Some are visible in the photo on the top near the rear screw hole. If one is using regular paint, the pits can be filled with auto body filler before priming or auto body putty after priming. Neither the body filler nor the putty is compatible with powder coating. I've since learned that there is a metallic filler that will work with powder coating. I'll order a can and if the pits still bother me in a few weeks I'll strip the dome, fill the pits and then powder coat it again. (The pits became less noticeable after thinking about all that work.)

Sand Dome: The outside of the sand dome was tackled first. The top of this dome is too rounded to grasped in a chuck so I wasn't able to smooth the inside. The wood mandrel used on the steam dome was turned down to match the inside of this dome and the dome was forced on the mandrel. The outside was then smoothed with a course file followed by 50 grit sand paper. The photo shows the partially smoothed outside. The aluminum disk and live center retain the dome on the mandrel.

The inside of the top hole was carefully finished with a boring bar and then the top filed and smoothed with sandpaper. Finishing the outside took a couple hours and was a dirty operation ---- the abrasive and iron dust made in into my coffee cup about 10 feet from the lathe --- guess I got my iron for the day.

The setup used to machine the base was similar to that used on the steam dome. An angle vise was used to hold the dome at about 13 degrees off the horizontal. That's a 1/2" bolt that runs from a large washer inside the dome, through the vise jaws and

through a large washer on the bottom side of the jaws. The jaws were also tightened on the bolt to hold it steady.

The alignment was pretty much done by eye and realigned a bit after the radius was nearly completed.

This photo shows the fly cutter at work. The dome is really hanging out there but seemed to be pretty stable. The cast iron doesn't tend to grab the tool bit which helps. After the base was about 50% machined it was removed and tested on the boiler. The angle was increased slightly and the job then finished.

This setup threw chips about 20 feet. Some even made it to the kitchen. (I'll blame the workshop cat for dragging them up there. Fortunately, she can't say much except meow.)

This setup was also used to machine bases for the sand dome retaining rod and for the bell.

This photo shows test positioning of sand dome, bell and generator. The bell and generator hadn't been assembled at this point. The bell was held together by masking tape and the generator by a rubber band. The masking tape under the sand dome was to protect the jacket paint from the sharp bottom edge of the dome. It also kept the dome from sliding and made a nice surface to mark the desired position of the dome.

The dome came with a cast top. Unfortunately, after I machined the inside of the hole, the top was too small. A new top was made from the excess shoulder sawed off one of the bevel gears about a year ago and a 5/8" rod. The two pieces were silver solder together.

A 13/64" hole was dilled on each side of the dome near the bottom for 3/16" diameter sand pipes that run down the side of the boiler to the truck. The pipe will slide into the hole in the dome and be held in position by a bracket near the truck.

Ken has suggested holding this dome in position with a stud into the top. I was concerned that the dome would be free to slide around so the alignment fixture shown in the photo was made. The threaded rod is 1/4"-20 that goes into the spacer that was welded to the boiler There is a short length of 1" diameter aluminum rod under the rectangular piece of aluminum. The bottom of the rod was machined to the correct radius and slope using the same setup as for the bottom of the dome. The rectangular piece was pinned to the rod to keep it from rotating and both pieces held against the top of the boiler with the nut and washer. The four holes for the bolts were tapped 1/4"-28. The bolts were adjusted to the irregular inside surface of the dome. Once in place and secured by the top the dome is rock solid.

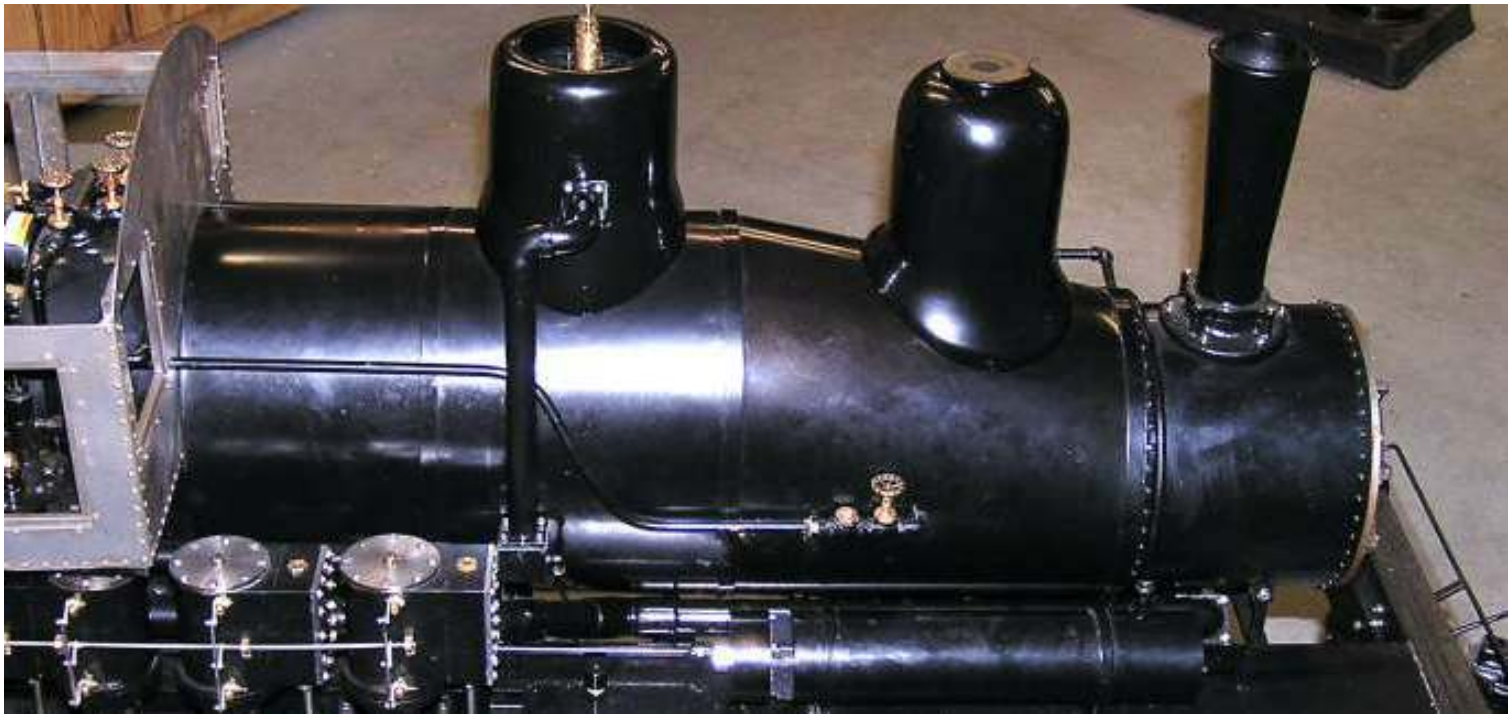


Photo above shows the finished domes. Note that the two pieces of metal that make up the sand dome top are clearly distinguishable in the photo. The two pieces are not noticeable to the eye. (This might explain why some more mature woman are camera shy.)

Things still needed to be done on the boiler include:

- Assemble and mount the generator
- Assemble and mount the bell
- Make and mount the headlamp
- Install handrail stanchions and handrail.

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