



West Wiltshire Society of Model Engineers Newsletter

Issue No. 6 May 2019



Calendar

May

- 4th - Saturday Steam Up. 10am-4pm
- 5th - Open Day. 1pm-4pm
- 18th - Saturday Steam Up. 10am-4pm

June

- 1st - Saturday Steam Up. 10am-4pm
- 2nd - Family Day. 11am-4pm
- 15th - Saturday Steam Up. 10am-4pm



News

Roller Rebuild (Part 3)

By Dan Jones

'Rebuilding an Aveling and Porter Steam Roller No. 11296 of 1925'

With the "chassis" of the roller now sat in the yard, the last of the components were to come off. The brass bands were unbolted and removed, allowing the painted cladding sheets to be removed and exposing the wooden lagging underneath. The wooden lagging had been wrapped in tin foil, I can only assume the foil was liberated from the kitchen without the significant other knowing about it (fig 1.).



Figure 1 - Cladding sheets removed exposing tin foil wrapped boiler

There was no point in retaining the wooden lagging for reuse so that was pulled off to help with firing another engine having its steam test. The steering scroll was then unbolted along with the cast brackets holding up the steering worm and chains. The headstock (the big ornate casting at the front which is supported by the front rolls) was next to be removed. The headstock is bolted to the smokebox with ten 1 1/2" Whitworth bolts, five on each side arranged in a "star" formation. These were unbolted after a fair amount of effort and the bolts were knocked through into the smokebox with a 20lbs sledgehammer. These took an enormous amount of effort to knock through, with 2 of the bolts shearing which rang some alarm bells- these bolts should not break under

compressive/shock loading. One of the bolts remained stuck in the headstock and had to be burned out with the acetylene torch. Once the bolts were out, the headstock was lifted off the boiler barrel/smokebox with the forklift and a small strop, leaving a bare boiler and cylinder block (fig 2.).



Figure 2 - Bare boiler

With the bare boiler sat out in the yard, we were able to make a quick assessment of the work to be completed. It was apparent when I purchased the roller that a minimum of a new firebox and new front tube plate would be required. The only other obvious thing that would need to be addressed at some point was a patch of weld on the throatplate next to the flange into which the barrel is fixed.



Figure 3 - Smokebox off and tube nest/tubes out

As said above, the tubeplate was scrap and therefore the tubes would be scrap. The easiest way to work on the tube plate is to remove the smokebox, do the work, and then weld on a new rolled smokebox (the original smokebox was too thin to reuse and would be scrapped anyway). Without much deliberation, the acetylene cutting torch was put to work removing the smokebox then cutting down the middle of the tubes, accessed through the large inspection hole in the side of the barrel. With the tubes cut along their section, the tube nest in the front tube plate was

cut out and the tube nest and tubes were pulled out in one go (fig 3.). With the tubeplate and tubes removed, full access was gained to inspect the internal surface of the barrel. Upon initial inspection, the barrel appeared to be in relatively good condition with some pitting along the bottom. One of the interesting things to note at this point was the 4 “screwed” rivets along the lap seam of the barrel (fig 4.). I understand that this is generally railway and marine practice when rivets have failed but are inaccessible from the inside and consequently can’t be replaced and riveted, so a rivet with a threaded shank is screwed into the hole. This didn’t throw up any major queries about the barrel’s suitability and it was assumed that the barrel would be retained.



Figure 4 - Boiler barrel seam with 4 “screwed” repair rivets

Attention quickly turned to the removal of the firebox. The firebox was the original one installed at the Aveling Works in Rochester, Kent, all those years ago in 1925. I use the term “original” in a broad sense of the meaning- the firebox had the majority of the stays* replaced and new ones welded in, plates had been welded into the walls and the fusible plug hole has been opened out to 1 1/8”Ø whereas the original would have been 1/2” BSP. They key part to the removal of this firebox, and the key part to the majority of the boiler restoration is the welded stays. There are 126 firebox stays and 10 cross stays, with 62 of the total number stays having been welded.

*Stays- A bar used to hold to plates apart. E.g. to hold the inner firebox away from the hornplate and prevent bulging of the flat plate when under pressure loading.

The very first job with firebox removal is to grind down the heads of the stays to be flush with the external surface of the plate. This is a quick and

simple task to achieve- when your stays are a pure and soft steel. But when your stays are a hard grade of steel and welded with a surface area and head volume twice as large as it should be, the time taken to grind these down extends by a considerable amount (fig 5.).



Figure 5 - Half way through grinding the crown stays

I spent 5 days with a 9” angle grinder removing the heads from the 136 stays and the 52 foundation ring rivet heads- the duration roughly equating to 56 hours of work (fig 6. and fig 7.).



Figure 6 - The last side complete!

With the heads ground down on the outside, the next task was to disconnect the stays from the inner firebox.



Figure 7 - How the disc started vs. how it ended up

We achieve this by “windowing” the walls of the firebox, removing the plate in between every other column of stays. The cutting torch can then access the stays and cut through them. This technique can’t be employed with the foundation ring, so the pressure of the gas in the cutting torch is used to burn out and blow the rivet material through the rivet holes until clear.



Figure 8 - 1st half liberated!

The foundation ring has to be removed before the firebox and to do this the boiler is turned upside down, then the firebox is separated from the foundation ring by flame cutting all the way around above the ring and using a hydraulic jack and a girder to force out the ring (fig 8.). Once partially free, the ring can be lifted out with the forklift. In order to remove the firebox easily, the tube nest was cut out and pushed into the barrel as the



Figure 9 - Jacking bar used to remove the foundation ring. Note the stays haven’t been cut yet.

remainder of the tubes wouldn’t clear the plate work. The fire box could then be lifted out with the forklift, exposing the cross stays (fig 9. and fig. 10).



Figure 10 - Box removed showing cross stays. Note the tube nest pushed into barrel to aid box removal

....Unexpected decision, industrial cleaning and the hottest day on record in **Part 4!**

Family Day – Volunteers Needed

The annual Family Day is fast approaching and we need your help please.

Volunteers are needed to help with catering, guards for the train and taking ride money etc.

The Family Day is on Sunday 2nd June between 11am and 4pm.

If you are able to help, please contact Michelle Richardson.

West Wilts Model Engineers

Family Day

Sunday 2nd of June 2019

At the Whitehorse Country park
Coach Road, Westbury BA13 4LX

Free Entry