Willamette # 7 Work Party Notes

Historic Museum Fort Missoula, Missoula, MT

7/20/19 - # 6

We removed the remaining eccentrics (# 1 had been removed and cleaned Work Party #5) cleaned the "straps" and bolts. The Eccentrics were Babbitt, it was in fair to poor condition. There were signs on moisture on the lower strap from exposure to weather as could be expected. The castings themselves were solid and no damage was noted. For the uninformed reader the Eccentrics could be considered similar to a cam shaft.

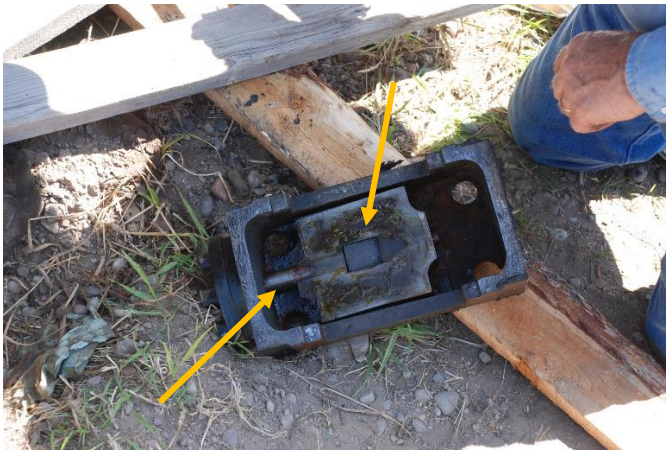
The crankshaft was removed from the engine. This was completed by unbolting crank shaft boxes, which contain the adjustment wedge and hold the lower crank shaft bearing in place. The adjustment wedge consists of a wedge, a led screw (threaded rod) and a nut in the center of the wedge. This allows the lower half of the split brass (crank shaft bearing) to be adjusted. The top half of the brass in against the engine bottom bracket, and was factory adjusted with "shims" prior to being factory line bored so care was taken not to alter the adjustment. When reinstalling the lower half brasses, they are adjusted as per factory specifications "….close to the crankshaft as possible without cramping it." (Note: Shay and Willamette were identical in this are, and the specification is from the 1923 "Shay Instruction Sheets".

As noted Eccentric Strap # 1 Bottom

Undoing nuts on # 2 Eccentric Strap

Care was taken in taking down the as to first remove # 2 and # 3 Crank Shaft Boxes first then we attached the crane to the shaft to hold it solid in place while the remaining boxes were removed. These crank shafts can be damaged it not handled in the proper manner by allowing it to flex. The boxes weigh more than can be held up by hand, along with the brass the generally comes down with them. We did not have a floor jack available which would have been appropriate to lower the boxes. Lumber was used "old school" to

Lower the box and brass to the ground so that they could be removed from the locomotive. We noted a minimum amount of moisture in the boxes account of years of exposure to the weather. There was a little rust and no damage that could be detected. The rust was easily cleaned. The nuts (4) holding the boxes in place were 1 7/8" that were removed with a Milwaukee 18v Impact.



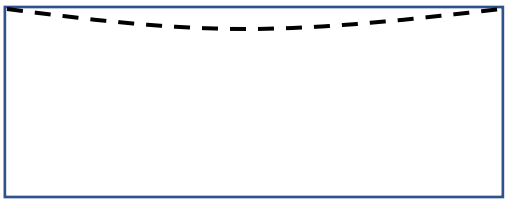
Box, wedge and adjustment nut and rod (yellow)

Impact removing Crank Shaft Boxes

Rigging Crank to Crane for lifting

Unbolting # 1 prior to removal

The Crank Shaft was then lowered and move out away from the locomotive and placed on the bed of the service truck for us to inspect and clean. The lower brasses were removed along with the boxes and wedges and cleaned. There was some evidence that the engine moved i.e. the crankshaft turned with dirt and grit in the bearings. They were cleaned and will be serviceable. The crank shaft showed evidence of rust from again moisture entering and was mostly on the lower points of the shaft. This would be the four main journals. The rod bearing (three) throws were much cleaner and only had superficial rust, staining on the journals and they cleaned very easily. It was noted that the journals on the rod appeared to have been welded on at some time in the past. This welding appears to have been done in a proper manner and the areas are very serviceable. The upper brasses were cleaned in place and showed the same evidence of having run in dirt as their lower counter parts. This should not affect limited operations if to come to pass. We also noted that there was a "dishing" on the rod journals on the crank. It is unknown how this would have occurred, suspected that it was run sometime in the past with the bearings out of adjustment. This was not measured but again should not affect limited operation. Below is diagram of what was noted.



Journal example “magnified” dishing

The crank shaft was moved to the back of the service truck as a “make shift” work bench. All journals, including Rod Journals were cleaned and inspected. We found rust and some affects of water (moisture) on the mains more so than on the rod brasses. These were all cleaned using emery cloth and a stone to polish the journal. The mains should allow limited operations. We will start a program of greasing and oiling on a regular bases to help preserve the work completed.

Swing the crank to the back of service truck

Journal # 2 prior to cleaning

Crew cleaning crank journals

Returning crank to locomotive

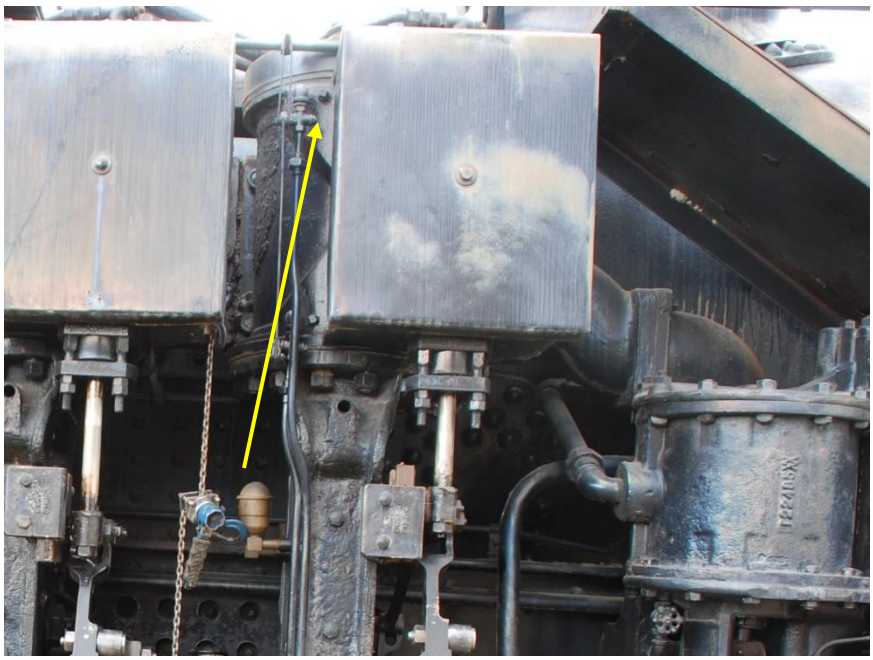
The crank shaft was reinstalled on the locomotive again using “old school” methods to press the boxes into position for bolting. The mains were not adjusted, but left loose until the next work party. All parts were well lubricated prior to installation. The mains use oil (30SAE Machine Oil) filled from the top by larger oil cups (3 per journal). We still need to place new “Wool” packing in the cups. This is regular (not dyed) wool

Yarn which is packed in the cups to allow for “slow flow” of oil to bearing surfaces. The eccentrics and Rod Bearings are both lubricated with grease. We have used a light bearing grease to allow free flow. After “run in” time it should be switched to a medium grease.

“Old School” installing boxes

Crank Shaft Back in place

We removed the timing ports on all of the cylinders and used a “Bore Scope” to inspect the inside of each. We found no issues with the pistons, walls of the cylinders or the piston securment nuts on the piston rods. You could almost say they were “factory fresh”.



Timing/inspection Port