

Mechanical Department Report

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I don't have much to really write up other than throwing out some suggestions for mechanical work scheduling, a quick write up about the last couple of major projects from the end of 2017 and some observations about last year.

I know that we face some *interesting* new hurdles at the start of this season, but I'll still be writing up planned schedules, SOP's, and reports as though it were any other year so as to not fall behind one way or the other; I'd like to have plans/procedures in place even if they aren't acted upon until the situation allows. There are quite a few things I'd like to discuss with CMO Jackson as well as others to hopefully start getting them nailed down procedure wise at a minimum, and hopefully develop some schedules/timelines. These would mostly be the radiators in the various locomotives and power-assembly work on SP2873 and WP917 of which I'll write up further in the document.

This is also as good a place as any to write that I'm unsure of what kind of commitment I'll be able to make to the department or museum this spring or this season overall. I should be on my last semester and be walking with my AAS with Machining Emphasis and possibly another with Welding Emphasis, so I'll likely be spending more time than previous years dealing with my classes and work.

Locomotives

WP2001

We finished up the injector change out and the rest of the annual inspection items left from the previous spring mid November; November 14, 2017 to be precise. Over all I'd say things went well though I took longer on parts of the process than I should have. Luckily I was granted three days off from work to be able to finish the project. I think the only major issues with the unit at this time are the six or so radiators that need to be repaired and replaced. For most of what we've done with the engine the last several seasons the use of ginger root has seemed to be able keep the leaks down to a manageable level though it has become increasingly harder to get that to work requiring a certain procedure to allow the ground root to be as effective as possible. The headway made in getting things stopped up needs to be redone however as the ginger root lost all effectiveness at somewhere around throttle four or five when we load tested the locomotive following the injector project. I'd talk more about the radiators but there is enough to discuss on that subject across most of our equipment that I'll go into depth in a separate section.

Some minor issues to still be traced out are the electrical issues with a couple of areas pertaining to lighting; the left side of the engine room and the rear platform light. The engine room light likely requires tracing the dead wires back a junction though I've yet to find where it ties in but I have an idea of where to look next this spring. The rear platform light has less than half the voltage it should be getting and I suspect that a wire has been compromised by corrosion at a terminal location or possibly the insulation being old has cracked and allowed for corrosion somewhere along its length. Back in 2016 I'd pulled up the rear platform panel and started cleaning out that compartment to inspect the air and electrical lines similar to what was done to fix the air piping on WP707.

QRR1100

Overall I'd say the locomotive is doing well in spite of everything. So far this winter has been extremely warm, such that I've noticed almost no loss of coolant at the lower liner seals. Something that used to happen every winter was that the temperatures dropped and stayed low enough to allow for just enough contraction of the metal and seal material to allow for the coolant to seep out. As much as I'd like to pull all eight liners to be cleaned, inspected, honed and reinstalled with new seals there isn't time and the locomotive has more pressing issues.

The air brakes are the biggest concern to me at the moment. While we've known that they are getting sloppy and worn out for some time the last few seasons have seen the air brakes degrade more dramatically before to the extent that it caused some issues with operating the locomotive multiple times during the 2017 season. Part of the issue is old worn out equipment but luckily parts, seals and whole control stands and valves for 6 brakes are still available from a few sources. Pulling the stands apart and replacing the seals between the stacks along with some thorough cleaning and lubricating would go a long way. Replacing the valves under the cab would also help. One of the main issues at the moment though would seem to be the mechanisms under the cab related to the dead man's pedal which was removed long ago. There are two valves under that cab that ultimately connect to the line that comes up into the cab where the pedal used to be. This spring when the locomotive is shopped I'd like to pull the valves and clean them up. At the moment it takes some fiddling of the air brakes to get things reset and working properly, the procedure of which I'll write up on the chance that cleaning the afore mentioned valves doesn't solve the problem.

The governor while *functional* goes through an incredible volume of oil. I'd like to ask the engine crews to make sure to note when it is low on the inspection form and to also notify CMO Bil Jackson or myself. I'd also prefer that the adding oil to governors be done by Mechanical or trained Ops personnel as people seem to have a knack for over filling the governors; this goes for all locomotives. I'd be more than happy to go over the procedure for filling to the proper amount at crew training.

I've been talking with Dr. Cornbinder about the load regulator and various ways of fixing the broken unit or replacing it outright. I have some resources at the community college that I should be able call upon if need be. The instructors for the electronics and production technology courses have fixed similar (albeit smaller) components for the welding shop.

I also hope to have the radio optimized before the start of the operating season. An old Micor control head will be placed back into the bracket and wired to work with the radio on the electrical cabinet. This will put a speaker (with volume control) sixteen to eighteen inches away from and facing the engineer. It will also have a six pin mic plug so the handsets won't need to be stretched across so far.

SP2873

I think that 2873 is pretty good to go from a mechanical standpoint. Obviously it will be getting an annual inspection prior to (hopefully) the start of the operating season and Bil and I need to go over the previous seasons inspection reports to compile the still outstanding items to form into work reports.

The only work items I can really think of at the moment are the radiators and water pumps. The leaking of the very rear right side radiator continues to slowly progress. The water pumps are pretty straight forward. I've talked with Bil about it and decided to put my previous idea of removing just the impeller to gain access the seals on hold and will instead go with the more in-depth disassembly process which is at the moment going to be easier as it just requires a large enough gear puller. The main trade off is that this method involve the complete disassembly of the pump though the pumps we will be rebuilding could probably due to have all new bearing and such installed in addition the new seals.

There are some power assemblies I'd like to pull and replace though for the time being that is a long term wish and still needs to be discussed at length with Bil. Ultimately I'd like to pull the 645 assemblies that have been dropped into the engine and putting in 567C assemblies.

While the way in which we use SP2873 at the museum day to day would seem to put little stress and load on the engine there are a few things to consider. Namely the difference in cylinder volume, injectors used and the power output between 567 and 645 assemblies and some of the issues that can crop up when they are placed into a common block in a manner such as ours.

Being that the 645 has a larger volume it requires a larger volume of fuel injected to work optimally. Using an injector for a 567 will cause the 645 liner to in effect run lean and have a lower power output. Using an injector specified for 645 assemblies will while running properly for that assembly also be putting out more power than any adjacent 567 assemblies. Either way the crankshaft will be experiencing stresses due to the differentials arising from either lower or higher power input as opposed to any 567 assemblies. While the engine idles this may not be very apparent and only cause slight stresses it still becomes a cumulative issue and could over time cause issues. While our engines do spend quite a lot of time at or near idle they also experience regular rapid increases of the throttle, a situation that greatly exacerbates the afore mentioned stresses. While it is possible to either increase or decrease the amount of fuel provided depending on the injector used to optimize power output this would require needless time and trial and error to get dialed in not to mention it would need to be done every time an injector is replaced on such an assembly. This also brings up an issue if unaware personnel are doing an injector change out and are unfamiliar with which assemblies are which and what needs to be done depending on what injector is being installed.

The installation of 567C liners back into the engine of SP2873 will allow not only for longer engine life in the long run but also simplify the logistics of parts and maintenance. Injectors known to be for 567C assemblies can be replaced anywhere on the block and quickly and simply adjusted per the standard procedures.

WP917D

As with the other units the inspection reports need to be looked at from last year. I believe it was winterized in a more or less adequate state. It will need an annual inspection as well and any chronic issues and known issues looked into during this period.

The front most right side radiator still leaks though luckily it doesn't seem to be degrading as fast as the one in SP2873. The water pumps will need to be rebuilt/resealed same as 2873. There is a blanking plate over the front left radiator manifold that used to have a thermocouple in it which will need to be resealed, and I may make a proper blank for it instead of the roughly cut and drilled piece of galvanized sheet that is currently in place. That pretty much sums up any known water leaks. The radiator shutters were acting up again last season so I'd like to try and get those working again.

Last season the MU connection was having some issues working with certain units. While it responded to control from SP2873 we couldn't get it to be controlled from WP805 (when *it* was working) or WP707 and we never got the chance to look into any probable causes. It has the newer split style of pins and one of them had a section bent over and shorting to an adjacent pin but fixing that didn't solve all of the problems. The MU system works just fine as a controlling unit though. As cantankerous as 917 can be I would not be surprised if it works fine this season, at least for the start of it.

The number nine assembly of the block still has issues with smoking out the stack and into the upper deck as well along with the slight knocking. While the source for the smoking is likely an issue with lash adjusters and/or injector timing and rack setting we haven't really done much fiddling in the past to see if that helps; though we now have the injector tools to properly adjust things. I believe that the smoke is getting into the upper deck because of an issue with the seal between the head and the exhaust manifold; something easy enough to check when the unit is in for inspection.

On the subject of assemblies WP917D has a few 645 assemblies installed as well. See SP2873 above

Radiator Repair & Replacement

Due to the large number of locomotives in need of radiator repair or replacement I would like to develop an action plan to outline procedures and guidelines in addition to proposing scheduling for such work. The equipment and tools for lifting the cores individually or in sections are fairly straight forward and can be easily built in shop not to mention we have the drawing/diagrams; having them ready to go before any lifting would be optimal.

I've checked the weights of the two sizes of fans that we have as well as calculated the weights of the different hood panels. The overhead in the shop should be able to lift any of the hatches with fans still in place on both the GP7/GP9 locomotives and on WP2001 and stay well within a decent safety margin of the 2000lb max capacity of the hoist.

EMD 567C Parts

In addition replacing the 645 assemblies in WP917D and SP2873 it would be quite useful to have an easily accessible supply of 567C power assemblies and components should we have issues with any C-block equipment such to avoid further applications of 645 assemblies (see SP2873 above.) In addition to the two aforementioned locomotives C-blocks are also installed in WP925C, WP725, WP731 and the SPMW Rotary snail.

As such I'd like to pull parts and assemblies from the 567C currently residing on the flatcar on the ramp track should there not be any current plans for it. Parts pulled would be cleaned and inspected, and serviced if needed and feasible. Assemblies beyond refinishing due to either being beyond our service capability or beyond allowable spec should be able to be traded in for either UTEX or at scrap value depending on the condition. Good components can then be matched to one another into complete assemblies to best fit per specs and put in inventory.