

# Shay - Painting The Tender

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It's been over a year since the Shay was started. It's been under steam on the test stand so it's had hot water and hot oil scattered over the surface. Some pieces now have surface rust while other parts have enough oil on them to keep away rust for a hundred years. It's too cold to run it so I decided to start the painting. The tender is essentially finished so it could be completely painted. The locomotive is also essentially complete except for the smoke box rivets, boiler jacket and domes. I decided to paint the tender first and then do the trucks and the main frame. If the weather is still bad at that point I'll probably try to finish the boiler and get it installed permanently. The various pieces of plumbing and pipes will be next and the cab and engine last since they can be removed without disassembling the rest of the locomotive.

The initial plan was to powder coat (PC) the smaller parts such as trucks and engine and spray the larger pieces with automotive type epoxy paint. However, after PCing most of the tender parts and remembering:

- The mess of spraying
- The cost of paint (~\$200 for a quart of primer and a quart of color and hardeners and reducers for each)
- The smell
- The need to heat the garage
- The mess of mixing the paint again and again to do a small group of parts
- The spouse's complaints about smell & mess.

I decided to PC the whole thing. The biggest problem with PCing larger pieces is to get an oven large enough to accept pieces such as the 49" long main frame. However, I think I can overcome that problem so, current plan is to PC everything.

Those of you unfamiliar with powder coating can obtain more information at the following link:

[http://www.buckeyetriumphs.org/technical/PowderCoating/powder\\_coating\\_equipment.htm](http://www.buckeyetriumphs.org/technical/PowderCoating/powder_coating_equipment.htm)

I had already PCed the tender truck, frame, floor and tank top before I thought to take any pictures. However, I can describe painting similar parts of the main locomotive so nothing is lost. The main thing I want to pass on with these notes is the degree of disassembly I used. Some disassembly is required to do an adequate job of rust prevention. However, one would be at it for a year if everything is disassembled. Also, some parts won't fit together if completely painted because of the paint thickness. The disassembly is applicable to both liquid and powder paint.

**Sill:** I had just finished making all the sill parts so decided to start this with the painting of those parts. The photo shows sill parts hanging from an oven rack. The parts were cooling after the powder coating was heated for curing. Sorry I didn't put something light colored behind the parts so they showed up better.



This photo shows the finished sill. The wood was painted with RUST-OLEUM Satin black that had been diluted to about half strength with thinner so that the paint would soak in but not completely obscure the wood grain. Two coats were used. I haven't decided whether to paint the stainless steel screw heads. If I do, I'll use a small brush and RUST-OLEUM Gloss Black. This paint can also be used to repair any minor defect with the powder coating. That's the fuel tank in the background.



The screws through the sill are 1.5" long hex head stainless steel 4-40. I normally purchase hex head screws from McMaster Carr. However, they don't carry 4-40 hex head screws 1.5" long. I purchased the longer screws as well as some #0 & #2 hex head screws from [Microfasteners](#). They gave quick delivery at a good price.

**Tender Tank:** This shows the tank after the power had been sprayed on the tank but before the curing. Before spraying, the tank was taken outside and blasted to remove all oil and surface rust. Next, it was heated in the oven to drive out all liquids that had accumulated in the seams and around the rivets. After the heating there were faint oil stains around a number of rivets. If the oil had come out during the curing process, the paint gloss would be ruined in those areas. After the heating the tank was blasted again. The powder was then applied in the vented paint booth. If it was warmer I'd have done it outside.



The support shown above positions the tank in the center of the oven but sticking out about 6 inches. The photo at right shows the oven extension made from fiberglass duct panels held together with duct tape. I had previously dubbed this device the *pregnant oven* for obvious reasons.



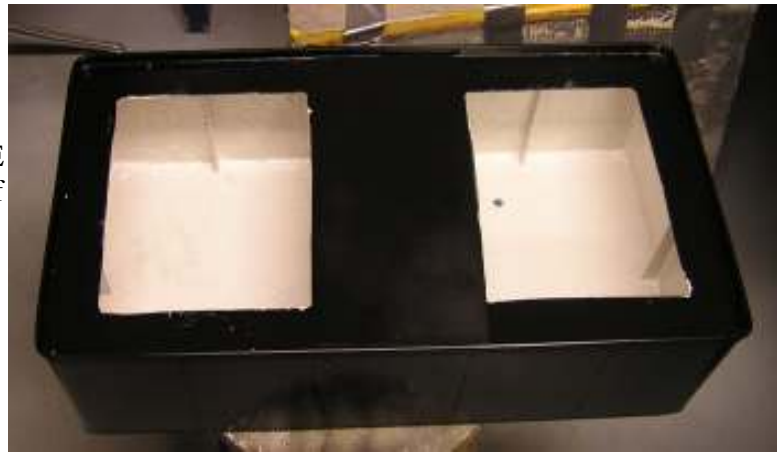
This photo shows the cured tank.

Normally I heat the oven to 450 degrees and then after the powder flows back the temperature off to about 400 degrees for 5 minutes for small objects and 10 or 15 minutes for heavy objects. I used 355 degree soft solder on the tank so had to keep the temperature below about 325 degrees. I did some tests using small pieces soldered together and also watched the oven temperature. I found that a setting of 275 degrees had transients up to about 325 degrees. A setting of 300 degrees went above the 350 degrees and the test pieces fell apart. I heated the tank at setting of 275 for about 20 minutes after first cycle of the thermostat. Next time I'll use higher temperature solder.





The next step was to paint the inside of the tank. (Kenneth suggested that even the galvanized tank would eventually rust. I had already seen some surface rust where I had scraped off the galvanize.) I used KWIK-SET 3 - 3 HOUR SUB SEA/MARINE EPOXY (McMaster-Carr). It turned out to be the consistency of bread dough. I thinned it a little and applied it with a brush. I did the bottom and sides first and the next day did the underside of the top and touched up the sides and bottom. The stuff is pretty thick --- like a coat of stucco. The paint has embedded Kevlar fibers so it should be able to handle really hard water rattling around in the tank.



The hand pump, overflow pipe and baffle were reinstalled and then the cork strips were cemented to the top using Permatex No2. That's the black baffle across the middle of the tank.



The tender is finished except for sanders on the rear of the tank, a light and a cushion or seat of sorts.

The tender is now in the corner under the bench to make more room to work on the locomotive.

On to the locomotive .....



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