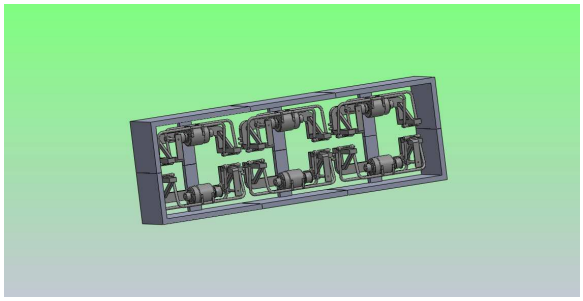
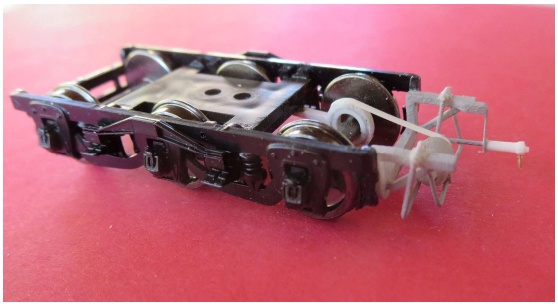
HO Scale 3D Printed Truck-Mounted Generators

HO 3D printed truck-mounted generators are now available in sets of six from Shapeways through the following link:

www.shapeways.com/model/853901/boxgen6.html

(If that doesn't get you there, go to www.shapeways.com and search for "boxgen6".)





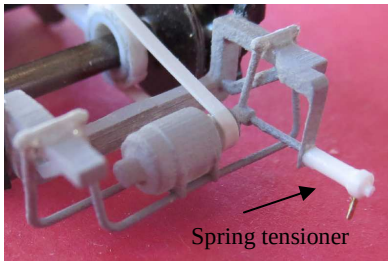
Introduction

The Santa Fe used truck mounted generators for lighting power on many of their heavyweight passenger cars. Pullman also used them on Santa Fe-assigned heavyweight sleepers. Cars equipped with Santa Fe-style steam ejector air conditioning, both Santa Fe-owned and Pullman, often received a second truck mounted generator.

These very hard, very fragile and very brittle parts were designed to fit Branchline Trains (now Atlas) 6-wheel Pullman trucks, replacing the inboard brake beam. They can also be fitted to Walthers trucks if the Branchline-style mounting pins are removed. They are impossible to cast in a tougher material but, with care, can be used as-is.

Some Things To Know

First, some cautions. Shapeways will not let you specify the build orientation of parts. They place as many parts as possible on a build platform, orienting each of them with the smallest practical footprint. All the sets I've received have been built on edge, but it's possible Shapeways might build them on end. Second, the parts are not absolutely smooth and show "build lines" and surface texture from the 3D printing process. The direction of these build lines depends on how the part is oriented on the build platform. Sandblasting (see next section) will smooth out the surface texture somewhat, but the saving grace for these generators is their location under the model. The prototypes were dark and grungy, so from a modeler's standpoint the shape and silhouette are more important than a finely rendered surface. Third, spring tensioners are not included in the printed parts as they are very exposed, would have made the parts much more fragile, and are fairly easy to scratchbuild. And finally, you *will* break some of these as you learn how to handle them. That's why they're in sets of six and priced barely above my cost**. There are no guarantees on either the quality of the parts from Shapeways, or on breakage. I can't control those, but I can describe how I've worked with these parts so you can avoid some of my mistakes.**

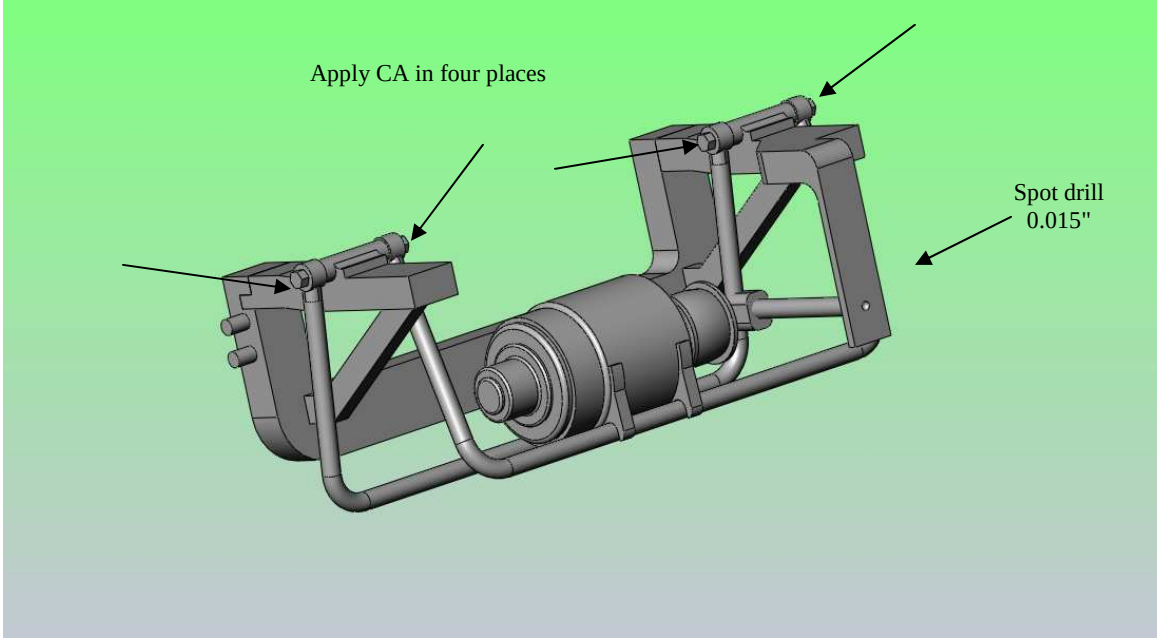


Let's Get Started

As received, the Shapeways parts need to be de-waxed and sandblasted. The support wax residue on the parts is soluble in Heptane (rubber cement thinner), but I've had good luck removing it by ultrasonically cleaning the parts in warm (almost hot) water with a shot of Dawn dishwashing detergent. A properly cleaned and dried part will have matte, non-sticky surfaces. I haven't used Heptane, but an ultrasonically cleaned part will be coated with a powdery residue. On a robust part, this is easily removed with a vigorous brushing, but for fragile parts a light sandblasting is recommended.

Do as much work as possible while the parts are still in the support frame. The most fragile joints are where the generator support pipes/rods join the pivot axle. These points, marked by the four arrows on the illustration below, can be reinforced with CA superglue. I used a pin to place a small drop of CA on the inside of the joint at each of these locations. If done properly the CA should both wick into the surface of the part and form a small fillet.

Very carefully spot drill the spring tensioner location 0.015" (see illustration). There is a small dimple there, but it needs to be deeper. This will help you position the spring tensioner but is not intended to be a mechanical joint. (In the event of an accident or careless handling, you want the exposed spring tensioner to pop off the generator frame without breaking it.)



Removing a Generator From the Support Frame

The best way to remove a generator is to place the frame on a wood support and cleave the connecting bars with a #18 X-acto blade. First, remove the bar that connects two generators:

Cleave close to but not at the generator frames - the material is brittle and the cleaved edges can chip. With the bar removed and the generator still attached to the support frame, carefully file the cut area to blend it with the top edge of the generator frame.

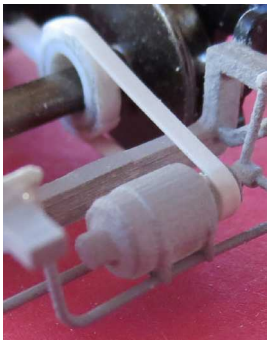
Once you're satisfied that nothing else needs to be done with the generator attached to the support frame, cleave it free. The bottom edge of the generator frame will need to be filed, and holding the generator while you do that can be an interesting challenge. Just be careful and be patient - it's one of those things that's easier to do than to describe!

Mounting the Generator to a Truck

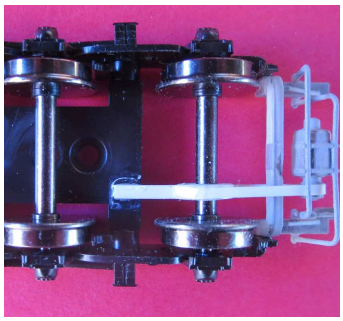
Mounting a generator in a Branchline truck is straightforward. The twin mounting pins on each side of the generator frame match holes in the ends of Branchline truck sideframes. Simply substitute a generator for the inboard brake beam when assembling the truck. Ream out the holes with a 0.025" drill so the generator frame is an easy fit, and attach it with CA. I haven't mounted one on a Walthers truck yet, but it looks like simply cutting away a Walthers brake beam is a good starting point.

Adding Final Details

Final details are best added after the generator is on the truck. Since the generator pivots with the truck, we can add full axle pulley and drive belt detail - as long as the pulley doesn't actually contact the axle!



The prototype axle pulley is 21" diameter, without flanges. I represented it with two nested pieces of styrene tubing, 1/4" and 3/16" diameter, cut to approximately 1/16" wide.



The pulley is attached to the truck bolster with a mounting arm made from a length of 0.040" x 0.060" styrene . A sector, approximately 90 degrees, is cut out of the pulley so it can be fitted over the axle. The sector is reattached after the axle pulley is mounted in line with the pulley on the generator and centered (more or less) on the truck axle.

I made the belt from a length of 1x4 styrene strip. It's bonded tangent to the top and bottom of the axle pulley and doesn't extend all the way around it.

The spring tensioner is a 13" (scale) length of 1/16" styrene rod turned to slightly under 0.50" diameter except for a collar at one end. (I was out of 0.047" rod or would have used that with a stub of 1/16" rod bonded to one end for the collar.) The collar end is center drilled 0.025" for a short length of 0.025" styrene rod. This represents the threaded end of the operating rod extending out the back of the spring tensioner. The handle is a short length of 0.015" brass wire inserted in a 0.015" hole drilled in the collar. On the prototype, turning the handle extends or withdraws the operating rod, moving the generator assembly toward or away from the truck axle. The face of the spring tensioner opposite the handle end is center drilled 0.015" for a very short length of 0.015" brass wire. This will nest into the hole you spot-drilled into the spring tensioner bracket lo those many steps ago. File the brass wire so it finds the spot-drilled hole but lets the spring tensioner body come into full contact with the bracket, then bond the tensioner to the bracket with CA.

Final Thoughts

The design for this generator was adapted from plans in the 1937 and 1940 Car Builders Cyclopedias. The generator shown was lightly primed for visibility, but the glue joints will be stronger if the work is done on an unpainted part. The dewaxing and cleaning steps are critical - neither CA nor paint will adhere to wax or wax residue. Experienced Branchline kit assemblers know that portions of the center sills need to be removed to allow the trucks to swing freely. You will have to do the same for generator-equipped trucks to let the axle pulley clear the center sills. Enjoy!

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