

XI. Scratchbuilding Structures

Scratchbuilding allows any type of structure to be created. This steam engine sand facility and water tank were built without drawing plans or creating a parts list. I started with a vision of what I wanted and broke the project down into parts. Some guidelines I followed were: doors have to be tall enough for a person to walk through and the water tank must be tall enough so the engine can drive under the spout in the raised position. I did consult several articles from model railroad magazines to make sure the water tank and support actually resembled a prototype water tank. The sand tank is not wood, but metal representing a rebuild or modern upgrade.



A handy tool for working with scale lumber is the Midwest Scale Lumber Gauge. It has four gauges: N ($1/16'' = 1'$), HO ($1/8'' = 1'$), O ($1/4'' = 1'$), and $3/4'' = 1'$. Standard and metric rulers are also included. Made of white plastic.

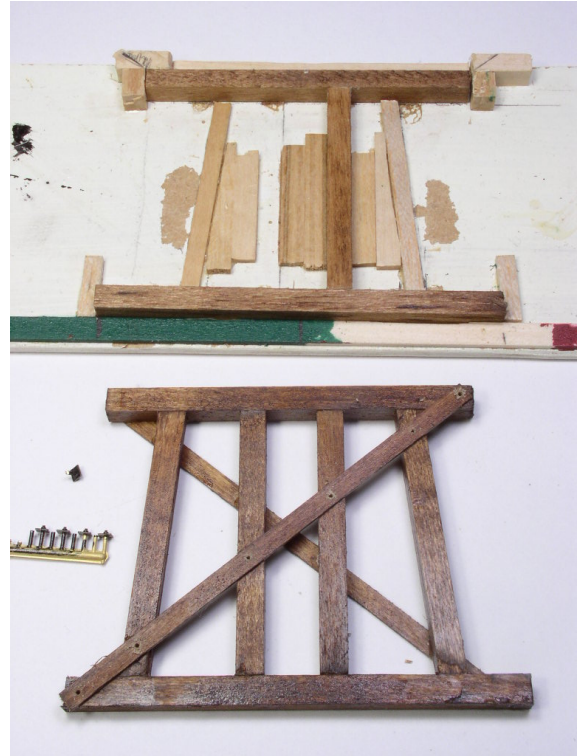
Water Tank



Water tank components. A plastic coffee cup, Grandt Line NBW and spout castings, an old Rix HO silo top, Midwest 2 X 6 balsa strips, Northeastern Scale Lumber 9 X 12, and 12 X 12 lumber. Not shown are Midwest 1/64 aircraft plywood and 3/8 brass tubing from K&S.

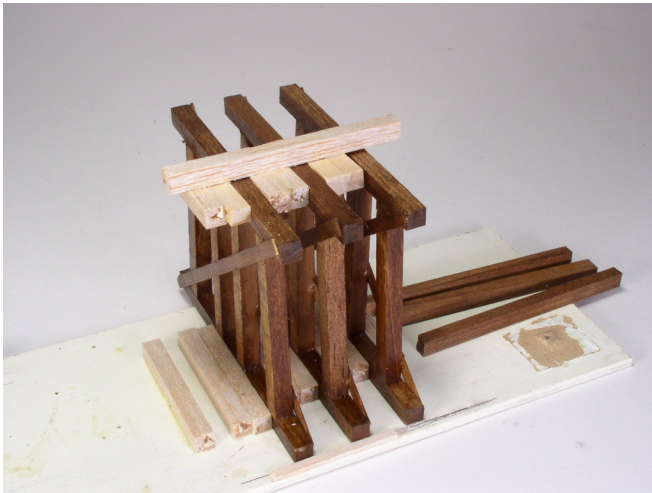
1. Bents

The bents are the supports for the tank and easier to make if a jig is made to align the parts during glue up.

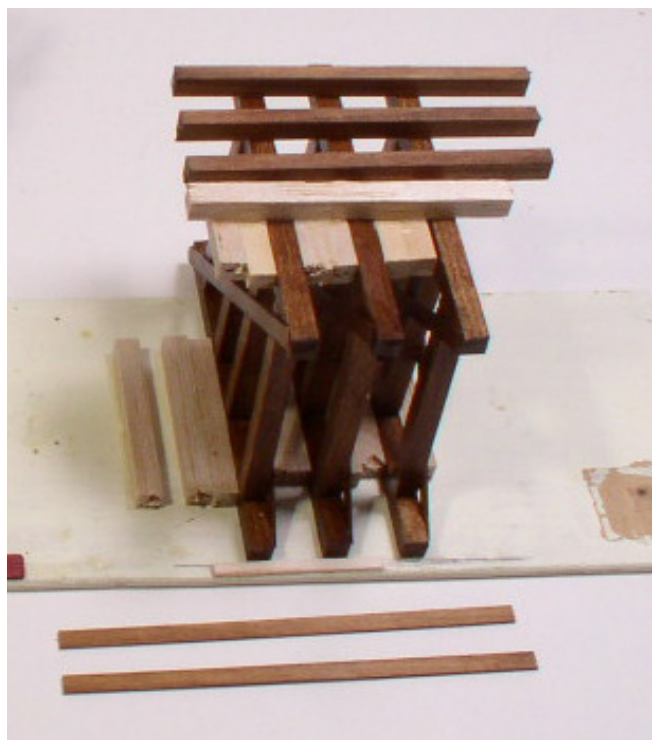


Each bent has four uprights and two horizontal pieces, all are made from 12 X 12. The cross bracing is 2 X 9. Height was calculated by measuring from the ground to the top of a steam engine tender sitting on a piece of track. The outlet pipe on the tank has to be higher than the top of the tender. The width of the bent has to support the tank, all four bents should be under the tank.

All lumber is cut and stained and then glued together. One piece of crossbracing is glued on and allowed to dry. Holes are drilled at the intersections and the NBW castings are painted and glued in. When the bent is removed from the jig, a crossbrace is added on the other side.



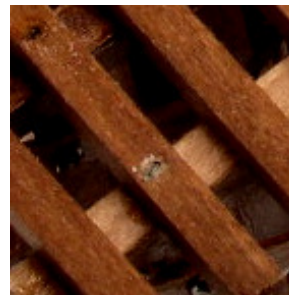
Two more jigs are made to hold the bents in place while building the remainder of the trestle. Balsa is glued to a piece of styrene and the bents sit between the balsa pieces. Another jig is made from balsa strips and has the same spacing as the bottom jig.



The supporting 9 X 12 boards are added. Use an even number so there is no center board. The water pipe to the tank will be located in the center.



The completed pedestal. Note that 2 X 9 crossbracing has been added on the ends of the bents. It was also drilled and NBWs added.



In order to give the assembly strength, a straight pin is inserted through the support boards into the bent. This is done on two boards on the outer bents.

2. Tank



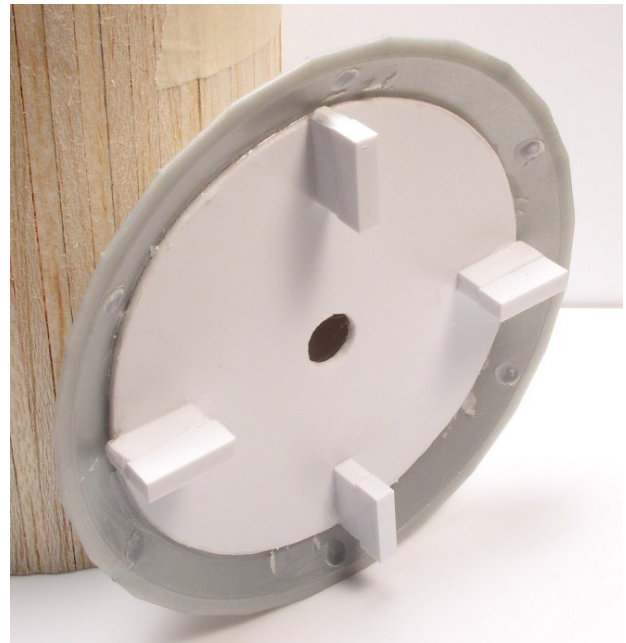
Remove the plastic handle and cut the plywood so it is the same height as the cup. Put the plywood into boiling water until it is pliable. Once it bends easily, wrap it tightly around the cup and secure with numerous wrappings of masking tape. The masking tape has to stick to itself as it won't stick to the wet wood.



When the wood has dried out, remove the tape. Pull the wood tight around the cup and make a mark where it overlaps. Remove the wood and cut with scissors so that the ends don't meet when the wood is put back on the cup. Be sure and test fit. When it fits correctly, rough up the outside of the cup with a wood rasp or coarse sandpaper. Glue the plywood on with Duco Cement or CA. Tape the wood again to hold it tight around the cup.



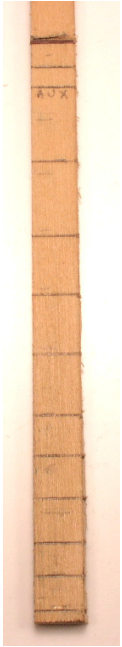
When the glue has dried, remove the tape and draw several vertical lines on the plywood. These are used to keep the staves properly aligned when they are glued on. A red Ultra Fine Point Sharpie works well. Cut the staves the same as the height of the cup. Lightly round the inside edges so the staves fit closer together. Glue on and keep them aligned with the lines. If there ends up being a space less than one stave's width, glue a stave on its edge and trim off.



Cut a styrene disc the same size as the hole in the cup. A dowel was used to center the disc on the roof when cementing them together. Once this dried, four chunks of styrene are glued to disc. These fit inside the cup and keep the roof centered and in place.



The roof is given detail by gluing on .040 square strips down every other roof seam and then trimming off the remaining roof seams. The hatch is made from .060 styrene and .030 styrene strip for supports. The top decoration is made by inserting a nail from the bottom and capping with the plastic head from a straight pin.



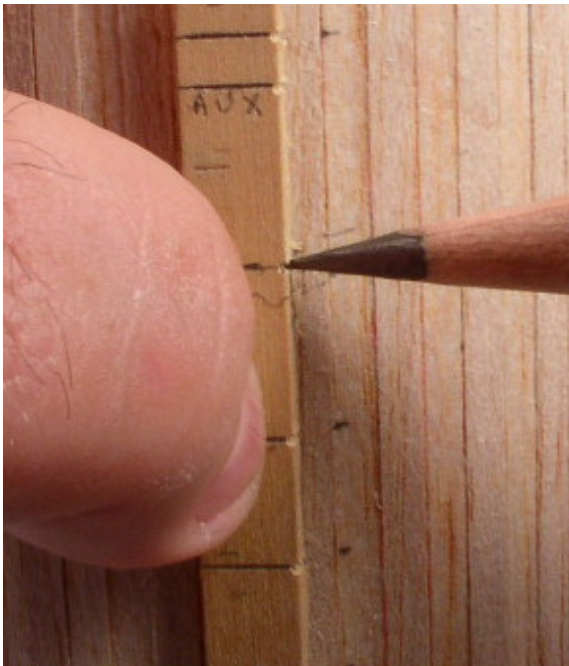
In order to easily locate the bands around the tank, make a measuring instrument from a piece of 1/4" basswood. Each graduation mark should be slightly farther apart, but this can be simulated by using only four spacings. At the bottom the first mark is 1/16". The next two are at 1/8"; the next three at 3/16"; the next three at 1/4"; the next two at 5/16"; and the last one at the top of the tank.

At every line, file a notch in the basswood on one side only.



1/8" black chart tape is used to make the bands. Set the bottom edge of the tape on a mark and work around the tank. The tape should cover the marks.

3. Details



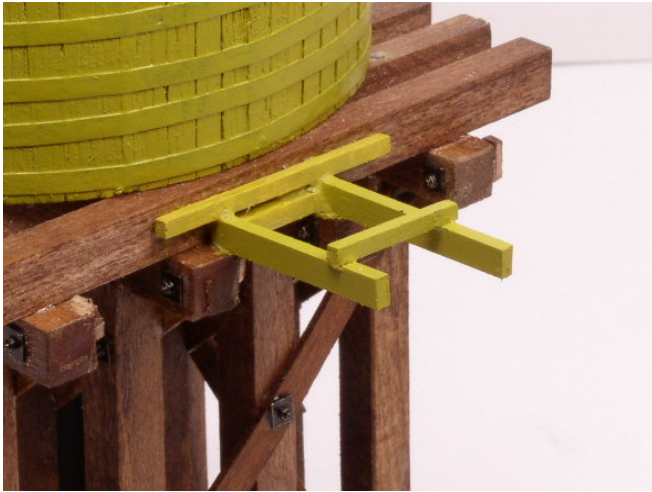
Set the device against the side of the tank, holding it upright. Mark the band locations by inserting a sharp pencil point into the notch on the gauge and making a mark on the tank. Do this six times around the tank. Make the marks light, don't poke the staves.



Insert the water pipe into the base and drill out the bottom of the cup to accept it. This keeps the tank aligned on the based. Drill out another hole for the outlet pipe of the spout.



The tank is painted with Testors Zinc Chromate and the roof is green. A few extra boards are added at the edge to hold the ladder.



More boards are added at the top of the base to hold the ladder.



A piece of brass rod is glued to the spout and inserts into the tank in order to support the spout.



Frame work is built to hold and guide the weights and to allow the spout to pivot. The outlet pipe comes out just below the spout and is supported by the horizontal piece of wood attached to the support boards.



The completed tank with a rudimentary water gauge made from cardstock framed with two pieces of stripwood. The indicator is basswood and its pull is a piece of brass wire.



A trackside view showing the ladder installed.

Sand Facility

This project is a free form design and like the water tank there are no plans or parts lists. It represents an older facility with a new metal sand tower.

1. Platform

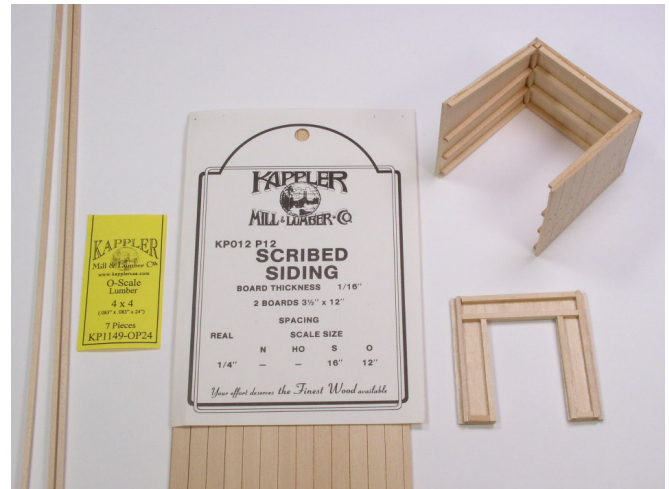


Midwest basswood before (below) and after (above) the floorboards added.



The balsa floorboards were cut in two lengths: 2/3 the width of the basswood and 1/3 the width. Pieces were glued on staggered.

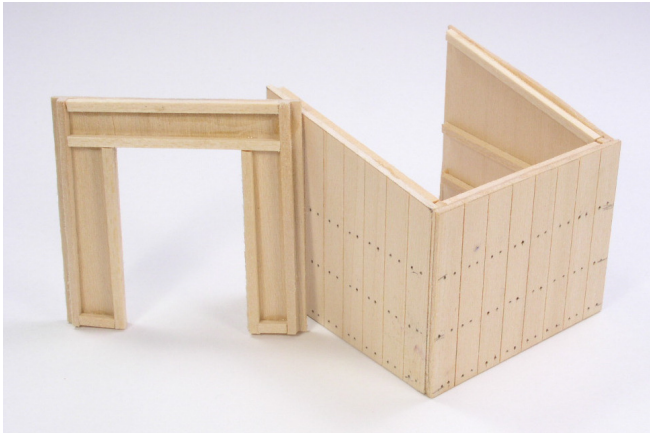
2. Storage Shed



Kappler scribed siding and 4 X 4 strip were used to construct the structure. The back is 6' 6" tall and the front is 8' 0" and all four sides are 8 boards wide. Cut out the sides and back and front. The boards of the scribed siding need to be vertical as battens will be added later.



Cut the 4 X 4 and add interior bracing. The front and back fit between the side walls and the bracing is cut short to allow this. Use a .5mm pencil to mark nail holes on the outside of the walls where the braces are located—walls are nailed to the braces.

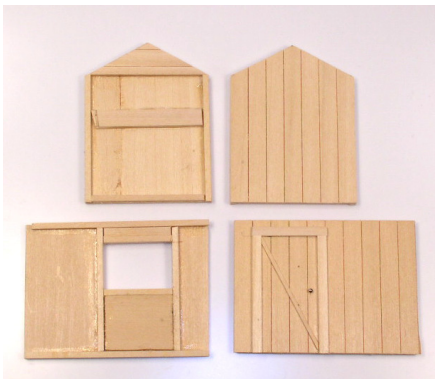


All nail holes marked and the front is ready to be glued in.



A roof was made from scribed wood. Battens are Northeastern HO scale 2 X 4's and trim made from Mt. Albert O scale 2 X 6. A door was made from scribed siding to fit the opening. Battens and bracing are added. Add the trim pieces first and then glue the 2 X 4s over the scribed lines on the siding, fitting them around the trim pieces.

3. Drying Shed



The ends are seven boards wide. The sides are ten boards wide. The door is only basswood strip glued on as a frame, the crossbrace is an HO 2 X 4 and a straight pin head is used for a door knob.



A piece of K&S photo etched mesh is used for the grill.



Drying shed assembled. Roof made from more scribed material. Nail holes made with a .5mm pencil.



Assembled drying shed showing air duct side.

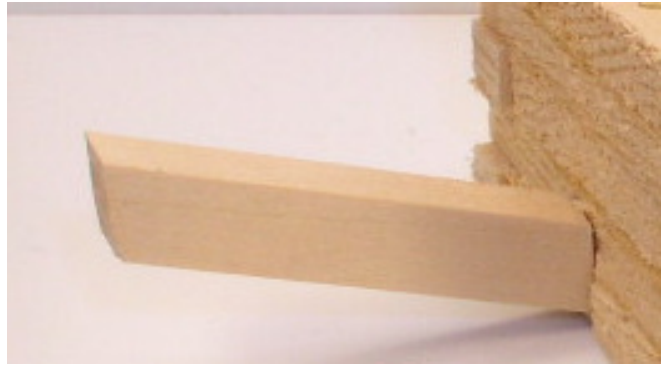


A Schomberg Scale Models gas tank is added and roughly framed in. The cradle is made from 2 X 12s and the rack is 1 X 2.

4. Sand Crib



Kappler O scale 12 X 16 stripwood was glued in an overlapping pattern and then the outer faces were scratched with a razor knife blade. Grandt Line NBW are installed to represent truss rods holding the sides together.



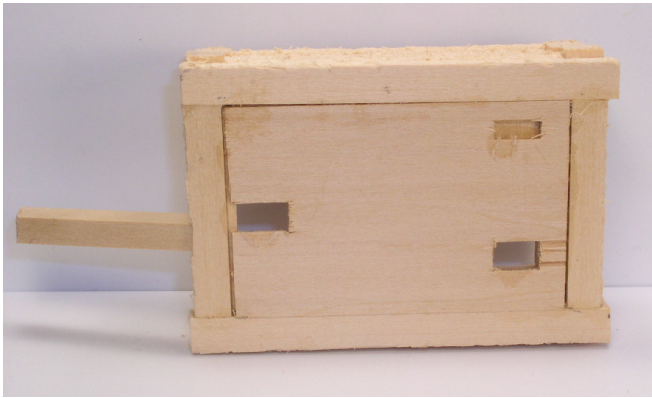
The conveyor is made from a piece of 12 X 16. A flat area was chiseled out on the crib. The drying shed and crib were set together and conveyor ends angled to fit. The conveyor is attached with a straight pin.



Once the position of the conveyor is found on the drying shed, HO 2 X 4 was used to frame in the spot.



The conveyer motor is a Plastruct detail part and the table is made from 4 X 4, 1 X 12, and 2 X 2 lumber.

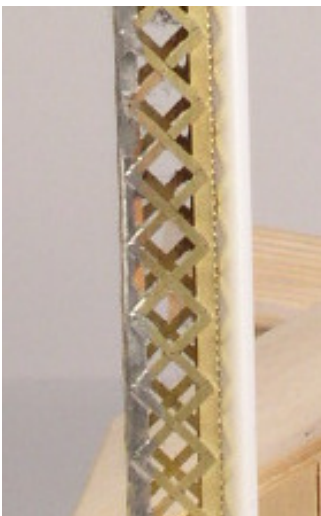


A scrap piece of siding was glued flush to the bottom inside of the sand crib. Holes were cut out for locating pins which will be glued on the platform.

5. Sand Tower



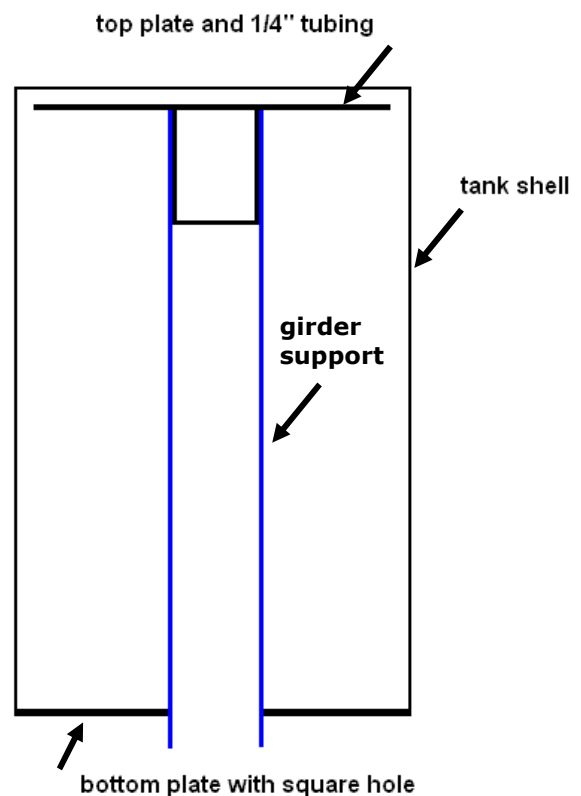
Shown are K&S brass material: 3/4 and 1/4 inch diameter tubing, .010 sheet, and etched brass girders.



The support was made from K&S etched girder, soldered together over a piece of 1/4" basswood.

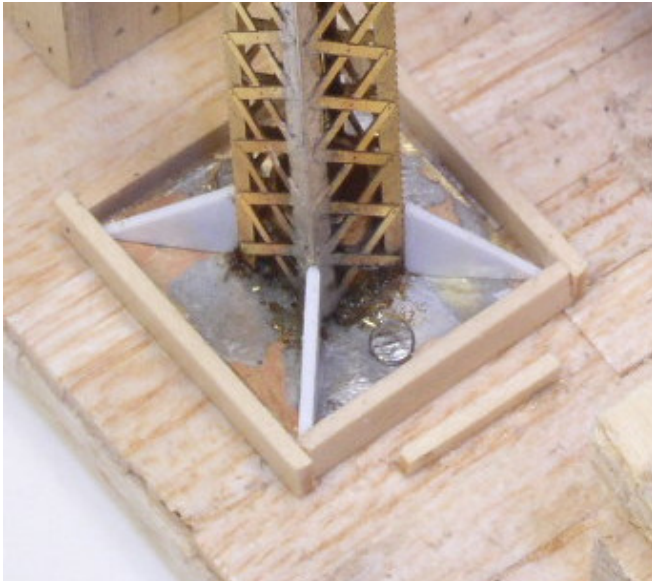


The tank—cut a piece of the 3/4 tubing to 6' 6" length. Then cut a piece of the .010 sheet slightly oversize to the diameter and solder on. File the edge down until it matches the tank curvature.

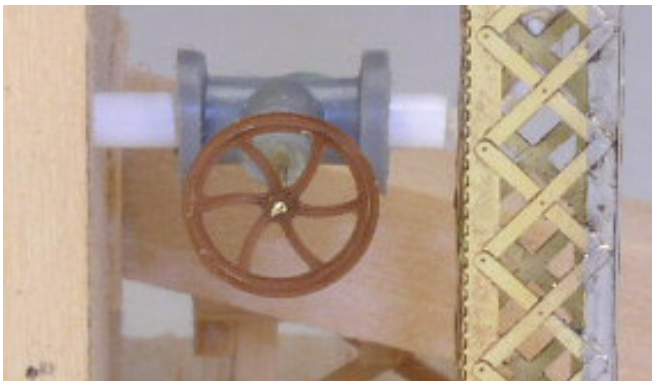


Top plate. Cut out a piece of the .010 material smaller than the tank diameter and solder a piece of 1/4" tubing, which is 1/4 long to the center. Insert into the tank with the tubing pointing down.

Bottom plate. Cut a piece of .010 brass slightly larger than the tank diameter and find the center. Cut the center out square so the girder support fits snug.



The base is made from a piece of 1/2" square .010 brass with a piece of 1/4" tubing cut to 1/4" length soldered to the center. Two holes are drilled to accept nails for mounting. Styrene gussets were made after installation as well as the stripwood border.



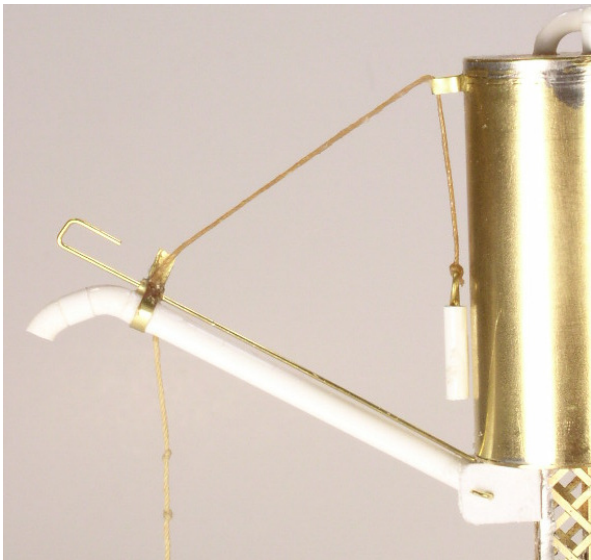
The shutoff valve is made from a Plastruct valve, a piece of brass wire, and a Grandt Line brake wheel.



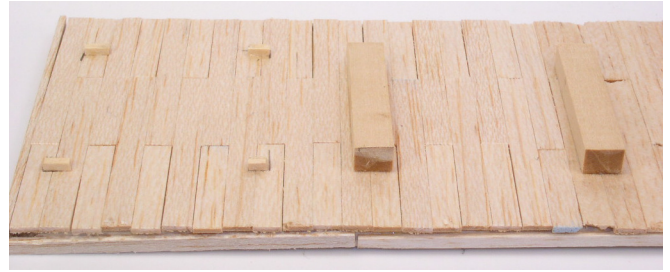
The fill pipe comes out of the drying shed to the shutoff valve, then bends and goes up the girders. This is styrene tubing and is held onto the girders in two places with tan thread.



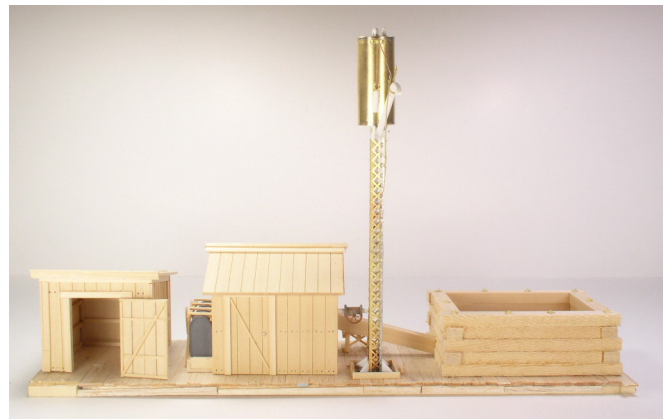
The filler pipe has joints to go around the tank side and then curves into the tank top. The air vent on top is made from the same tubing.



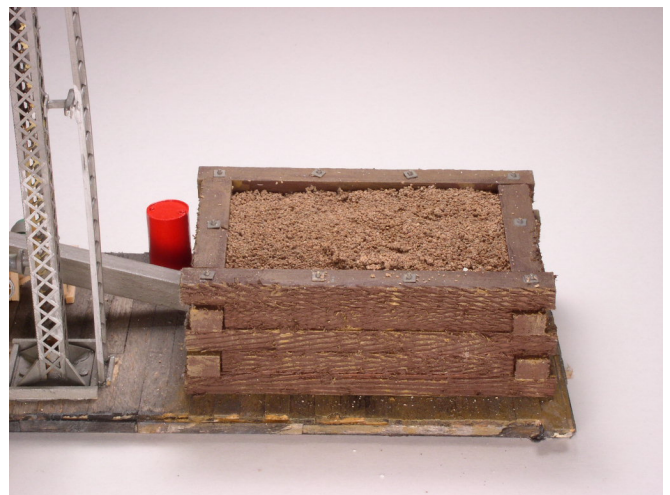
The filling apparatus is a piece of styrene tubing. Sheet styrene and brass wire form the hinge. Brass wire is used for the opening lever. Tan thread is used for the retrieve line and weight cord. The weight and the pulley are styrene.



Pieces of wood glued to the base hold each structure in place.



The sand facility before painting.



The base was painted with gray acrylic paint and then black to create shadows. The sandcrib was painted brown and filled with Woodland Scenics Ballast.



The two buildings are were painted Testors Zinc Chromate and Model Master green was used on the roofs. The gas tank was painted dark red and the framework not used. The 55 gallon barrels are a medium red. The grill was dabbled with black.



Sand tower was painted silver and a Plastruct O scale ladder added.



The finished sand facility.