Pins, sleeves, L-girders and track butt joints on my 7th St. Free-mo module.

For the internal module joints on my 7th St. yard, I've decided to go with track butt joints together with endplate pins. The module will have many tracks crossing the internal module joints, and I don't relish the thought of installing lots of fitter rails at each set up. What I came up with seems to have worked very well. It has held up to two set ups so far. The yard goes together very quickly and the trains run smoothly over the joints. In addition to the pins, I added an L-girder stiffener that might be used on any kind of Free-mo end to help keep the endplate as straight and warp-free as possible. Here is how I did these joints.

Figure 1 Two pairs of endplates with pins (one opened, one closed). In the background is a single endplate without pins.

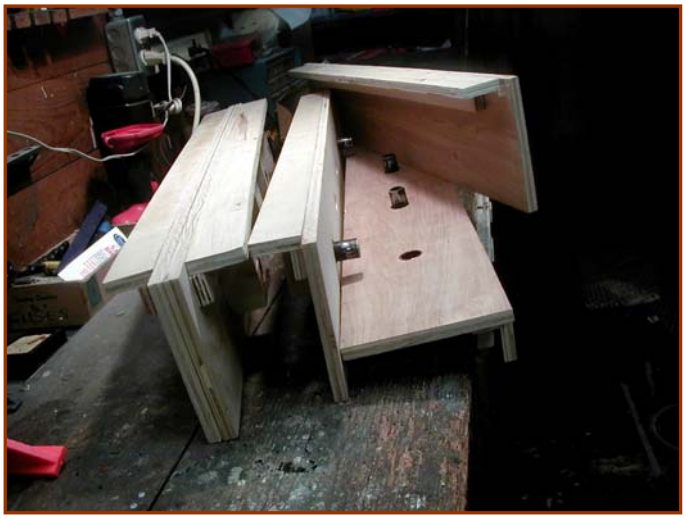

Figure 2 Side views.

Construction steps

I'm using 1/2" birch plywood.

1. Cut rectangular end plates. Mark four equally spaced points for drill centers running along the horizontal. Stack pairs of endplates up and drill them out with 1" Forstner bit in a drill press.

2. Mark a length of 2x3 to make enough square pieces so that there are four per endplate (8 per joint). Mark centers of those squares. Drill half of them at 1" and half of them at ca. 7/8", again using a Forstner bit and drill press.

3. You need four pins and four sleeves per module joint. For male ends (pins), cut 2 15/16" lengths of cast metal pipe (available from hardware or big box stores) with o.d. 7/8". For female ends, cut 2 1/16" lengths of tubing with i.d. just slightly larger than cast metal pipe used for pins. I have used both copper and aluminum tubing for sleeves. Aluminum is cheaper and seems to work just as well. I purchased tubing from (www.onlinemetals.com, item 6061-T6 ALUMINUM TUBE 1" OD x 0.065" WALL). Debur and clean up the cuts with files so that the male pins fit into the female sleeves.

4. Epoxy copper or aluminum tubing into blocks with 1" holes and cast metal pipe into blocks with

7/8" holes. There should be ca. 1/2" of copper projecting from one side of the blocks. There should be ca. 1 1/2" of cast metal projecting from one side.

5. Turn back to the endplates now. To reinforce them, hold them straight and provide a very firm substrate for the track at the joints, glue on L-girders cut from plywood, 2" shorter than the endplate width (1" set back from each end). The L-girder has a horizontal "top" 1 7/8" in width glued onto a base that is 1" in width. The L-girder is then glued onto the endplate with the top piece flush with the top of the endplate.

6. When L-girders have firmly set, clamp two endplates together so tops are flush and holes are lined up. Insert one male and one female pipe/block subassembly into each hole to test fit. There should be just enough play so those fit in without any trouble. Now glue those subassemblies onto the endplates. Let dry.

Figure 3. Two endplate assemblies on the workbench.

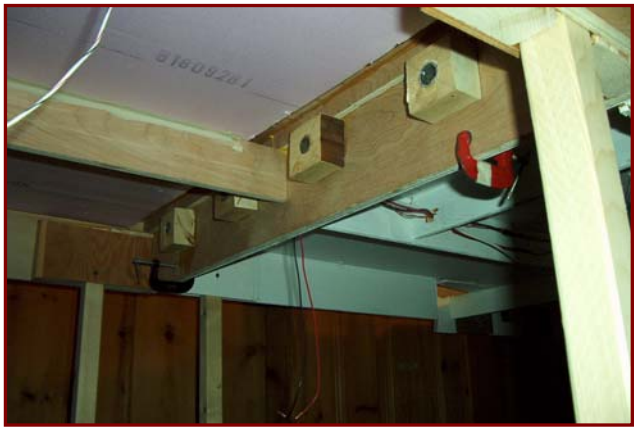

Figure 4. Bottom view of installed endplates.

When you put four of these pin/sleeve subassemblies together onto a pair of endplates, you end up with a joint that is easily pulled apart and put together, but which has essentially zero play. The metal on metal pin and sleeve system I hope means it will be long-lasting system. I also think the L-girder will add to the long-term stability of the joint.

Figure 5. Intermodule joint showing installed pins and sleeves and four sets of tracks bridging the joint. Note that even curved tracks can cross the joint smoothly.

After the module is framed you will need to run tracks across this junction. To bridge the tracks, I am using the technique popular with European FREMO. I added some plywood to the joints, glued to the tops of the L-girders to raise the subroadbed to the level I wanted. The plywood should be cut for the submodule joint before gluing the separate pieces to the module. I am using CVT track, so the ties are installed before the rails. After laying ties but before adding the track, I installed three brass screws on each side of the joint for each rail, one in each tie space as you move away from the joint. I screw those down so there is a small (~1/32") gap between the bottom of the rail and the top of the screw. I tin both the rail and the top of the screw with solder. I install the rails across the joint and then use a soldering iron and additional solder to attach rail to screw, checking carefully that gauge is maintained across the joint. I watch for any vertical bulges or sags, using a straight edge held along the top of the rail. Repositioning of the rail is possible by reheating the solder and firmly moving the rail into place. When satisfied with the joint, I cut the rail with a razor saw. Painting the soldered screws helps to hide them. After ballasting and track detailing, they are hard to spot.

Figure 6 A submodule joint showing numerous tracks. Those closest to the foreground have brass screws. In the background there are tracks that have been laid and screws painted (right) as well as tracks that are fully sceniced with ballast.

I'm very pleased with how all this turned out. These joints are easily assembled and disassembled. The joints look great and the trains don't even know they are there – there isn't even a click as the metal wheels pass over.

Prototype modeling information on this module set also is available on the 7th St. page at www.mnfreemo.org.

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