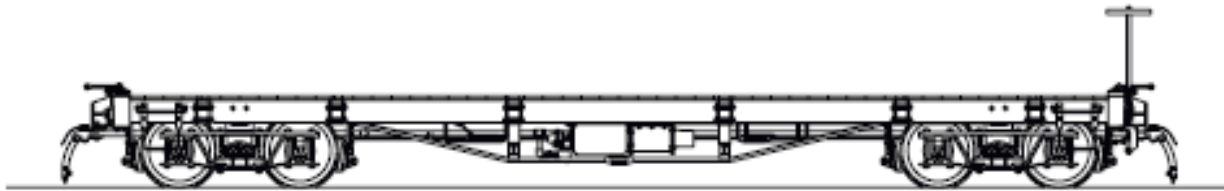




PRESENTS

LAUNCH INTO THE ACHIEVEMENT PROGRAM

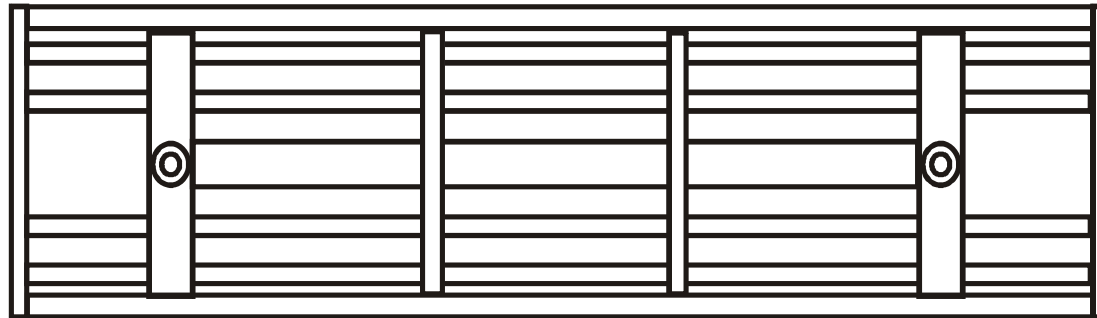


THE ANATOMY OF A FLAT CAR

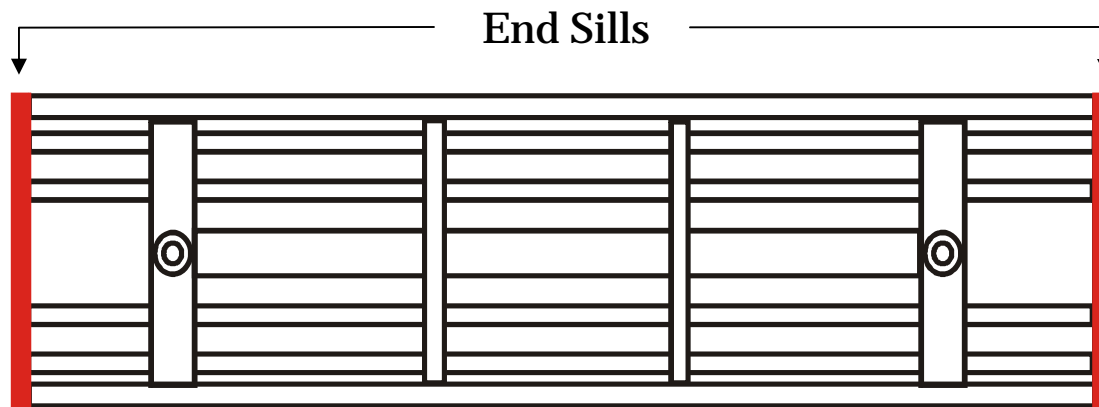
Duane Richardson, MMR

<http://www.purgatoryanddevilriver.com>

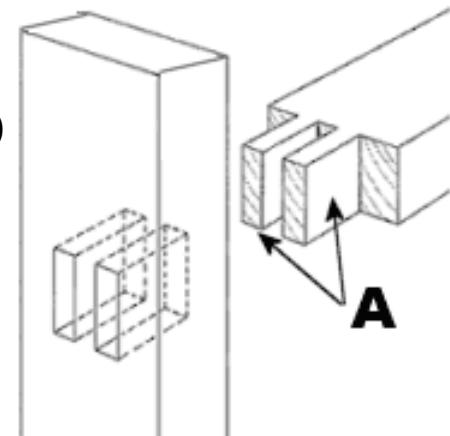
This is the basic underside of a wood framed flat car. Let's go over each of the pieces.



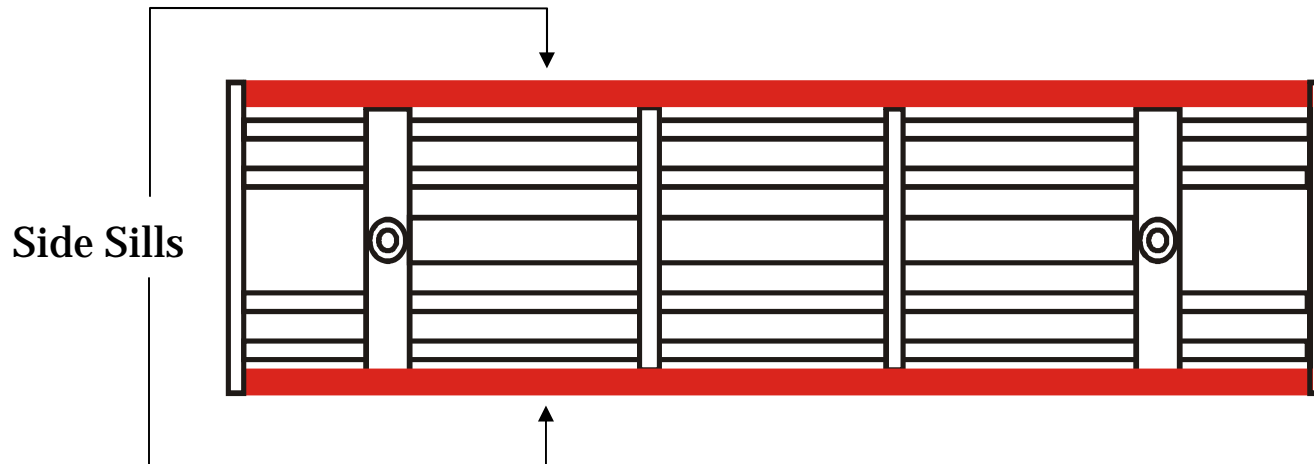
First, the **End Sills**. This is a large beam where all the other sills are joined to form the ends of the car.



On the prototype, the sills were joined together with mortise and tenon joinery. This is where a hole is created in the end sill (the mortise) and a tab is left on the other piece (the tenon). The tenon slides into the mortise and the two pieces are fastened together. On our models we just butt joint the two pieces together with glue.

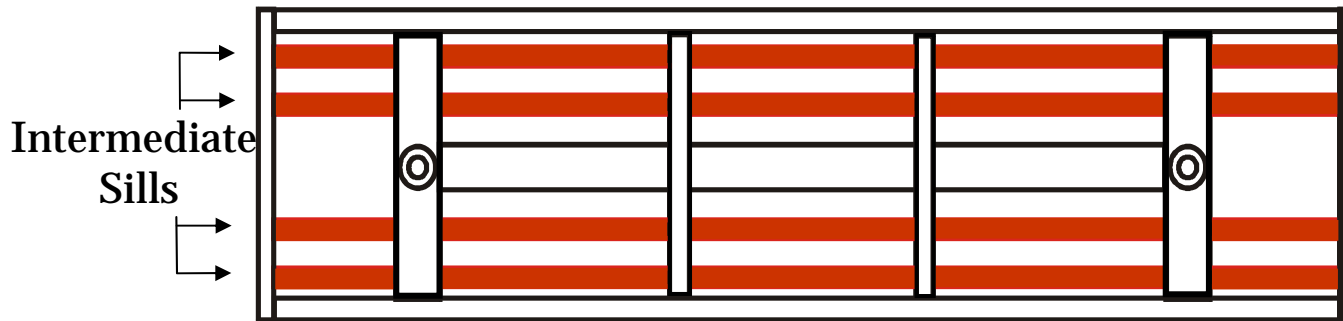


Next, the **Side Sills**. This is another large beam that makes up the entire side of the car.



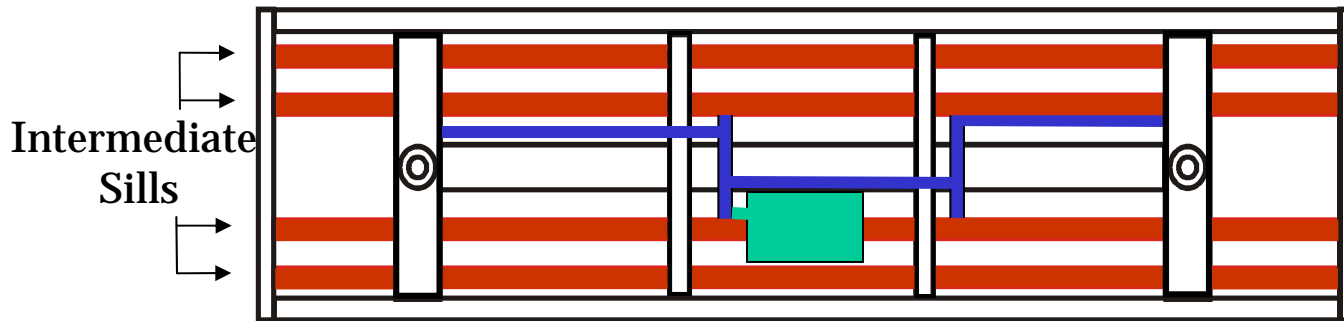
On the prototype, this beam supports the ends of the deck boards and is a good portion of the strength of the car. The side sill is the visible side of the car where all the lettering is and where any stake pockets and grab irons are bolted.

The **Intermediate Sills** are beams that are smaller than the side sills. While slightly smaller, they support the section between the side sills and the center sill.

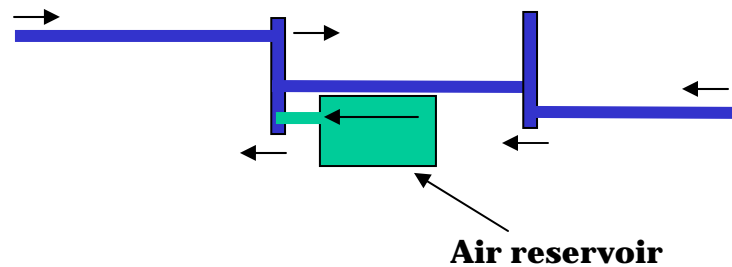
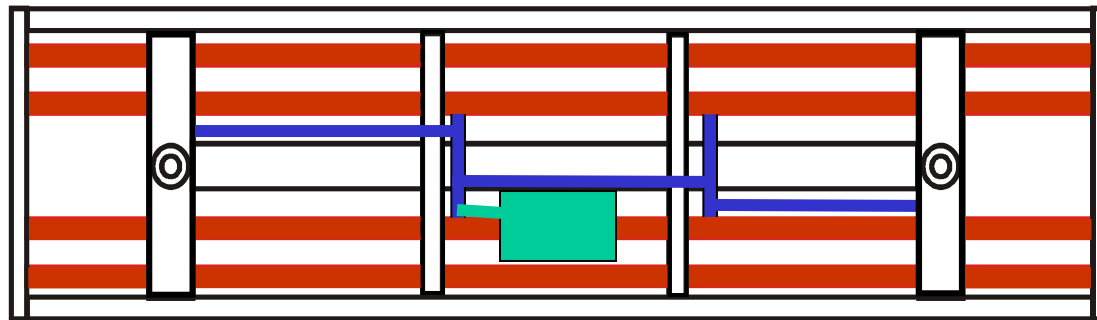


On the prototype, there are usually 4 intermediate sills on a car. They are positioned in two pairs. The support the middle of the car and provide a home for most of the cars appliances such as the brake system. The location of the brake system depends on the railroad and the manufacturer of the car.

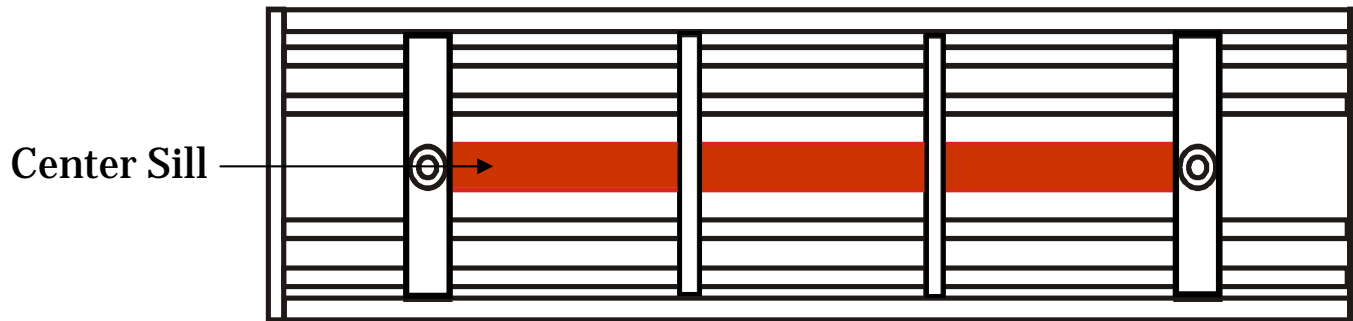
Typically, the brake cylinder would be located somewhere in the location of the green box. This is the tank for the cars air brakes. Pipes will run to and from this tank. The supply line comes in and a rod will come out one side to actuate the brakes of the car.



In this VERY basic illustration, the air pushes the rod out of the tank (the arrow). This will push this lever which pulls a chain or rod that draws in the brake shoes on one truck as well as pulling another lever that then pulls the brake shoes in on the other truck.

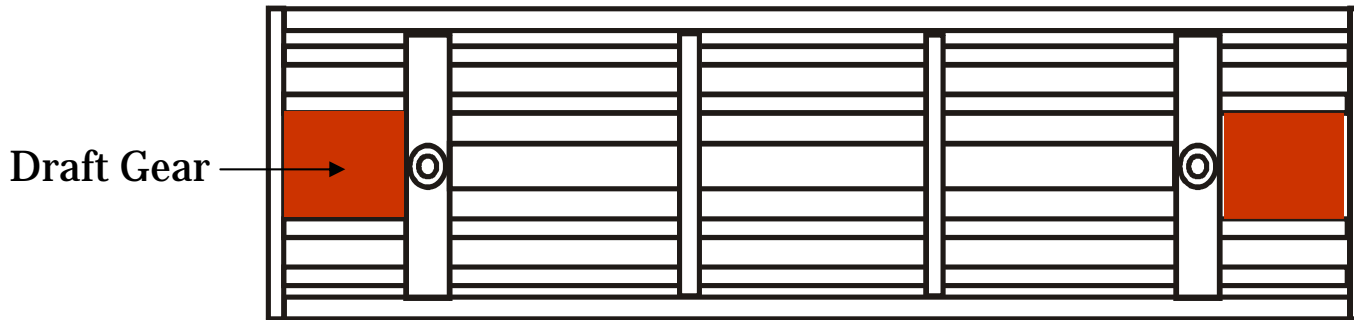


The **Center Sill** is the largest beam and forms the backbone of the car.



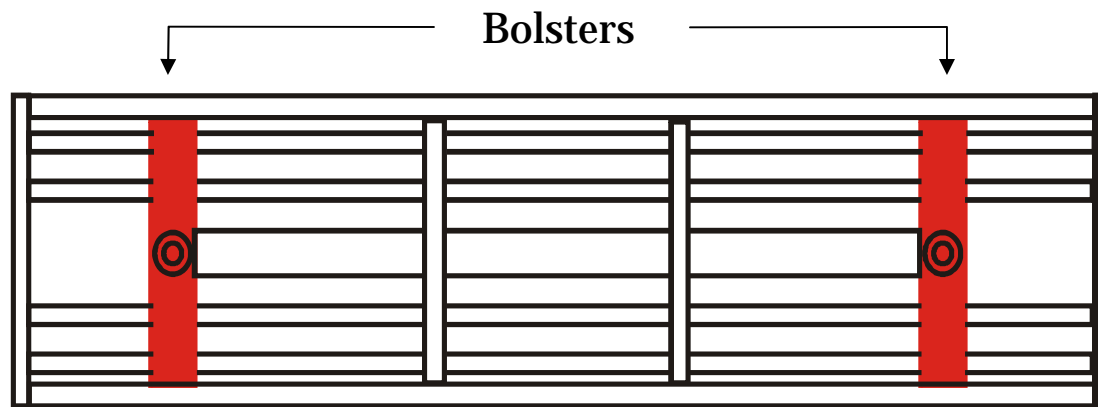
On the prototype there are usually beams bolted together to make up the center sill. This is where almost all of the stress of the pulling and pushing on a car goes. Where the other sills make up a good portion of the integrity of the car, the center sill is the very heart of the car. The largest portion of the stress on the car is handled here. Think of it like this, all the other sills hold the load, the center sill where the pushing and pulling takes place.

The **Draft Gear** is where the couplers mount to the car. The draft gear assembly is mounted to the cars end & intermediate sills, the deck and, most importantly, to the center sill.



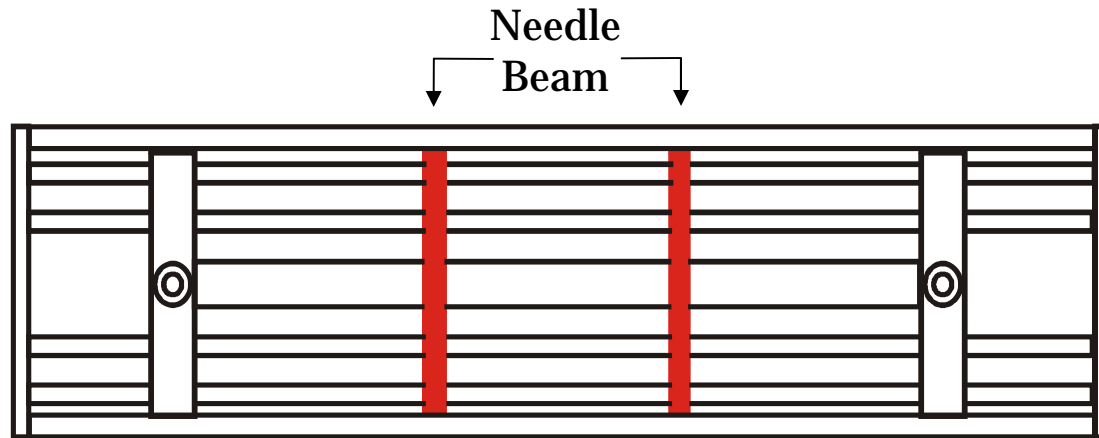
Pulling heavy trains up steep grades put a LOT of stress on this part of a car. It was not uncommon at all for this area to fail under a load. On our models this is a simple coupler box (like a Kadee box and coupler). On most model freight cars this is molded in place. Many modelers will cut this off and mount a Kadee box with a screw.

The **Bolsters** are cross members on the underside of a car body and in the center of a truck, through which the weight is transmitted.



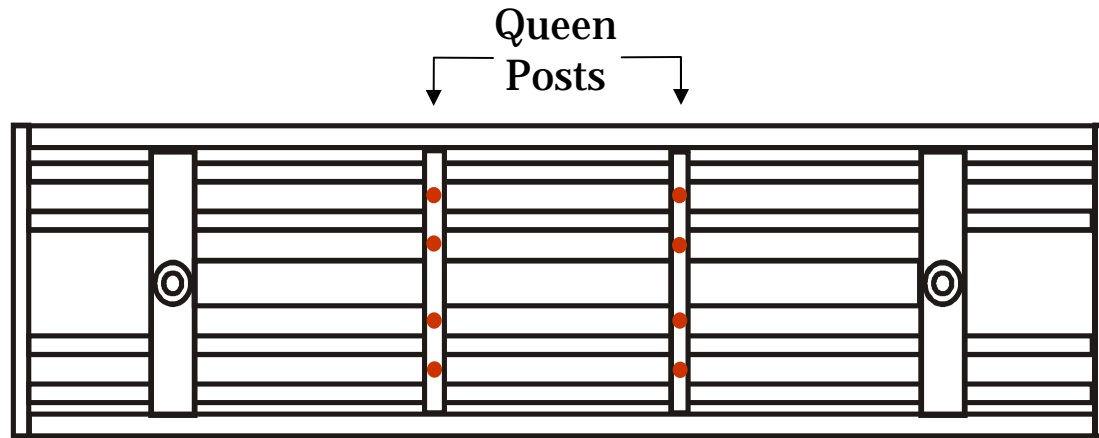
On the prototype the bolsters carry the body and truck center plates, the body bolster resting on the truck bolster.

The **Needle beams** lie across the various sills of the car. This is the first layer of support for the truss rods of the car.



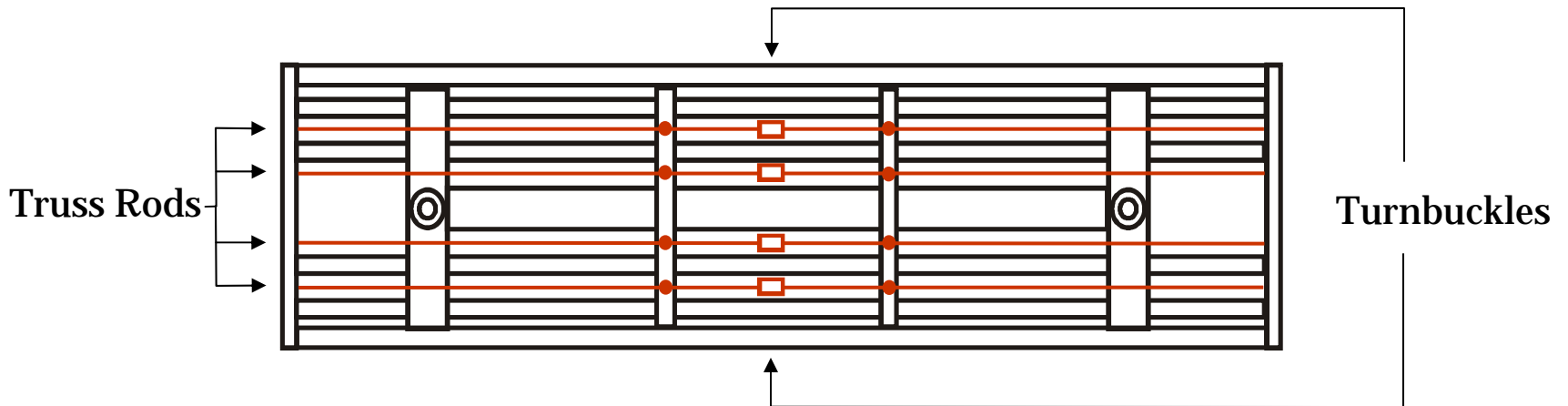
On the prototype the needle beam will have several holes drilled through it to allow parts of the brake system to pass through.

The **Queen Post** is a metal casting that mounts to the needle beam. The end has a U shape to accept the truss rod.



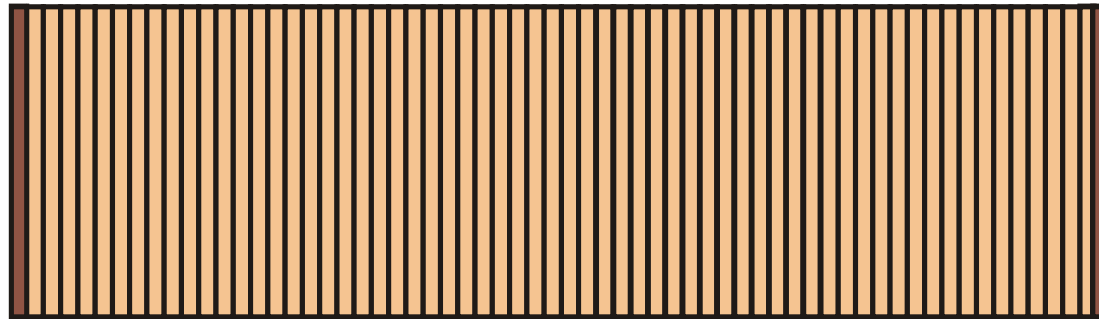
In wooden car construction, one of a pair of vertical posts against which a truss rod bears. When one post only is used, it is called a King Post. Such posts are used for the truss rods under car bodies.

The **Truss Rods** are metal rods that run the length of the car in two sections to keep the car flat. In the middle was a **Turnbuckle**.

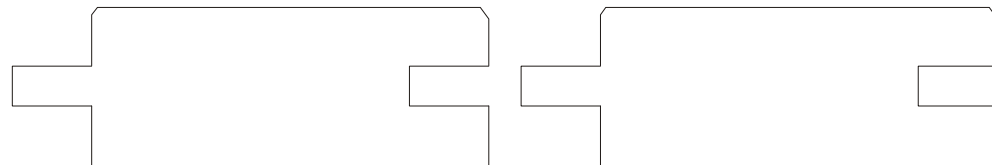


In wooden car construction, the weight of the load will cause the car to sag in the middle. A rod is threaded on each end. This allows the rod to be bolted to the end sill and threaded into one end of a turnbuckle. The turn buckle can be turned to tighten or loosen the rod and thus flatten out the car. It was common on many railroads to run a board through the opening of each turnbuckle to keep them from turning themselves due to vibration. The turnbuckle area was a favorite spot for hobo's to ride. Thus the term, "Riding the rods."

The only thing left to do is turn the car over, add the deck, mount the trucks, add stake pockets (if necessary) and the car is ready for paint. Most prototypes did not paint the deck lumber. It would normally need replacing long before it would rot.

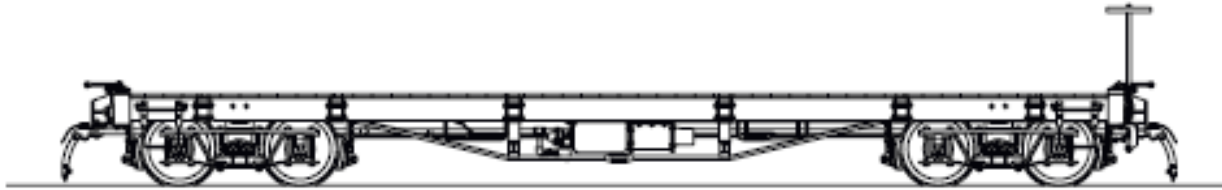


The deck boards vary in thickness and width depending on the car builder. Some were butt jointed together. This will leave a bit of a gap as the wood dries but this allows water to drain off the deck. Many of the car floors were joined with tongue and groove joints.



On my models, I paint the wood before I assemble the car. That way I can put weight on the wood and make it dry flat. If you paint it after the car is assembled there is a possibility that the wood can warp. I also find it's easier to paint and letter the car and then add the stake pockets. I mark their location so I don't get the lettering in the wrong spot. It's also easier to do some preliminary weathering without them.

The last thing I do is to add the grab irons on the corners and the break wheel.



That looks pretty easy doesn't it? It is and the best part is that this is the base for almost all other freight cars. A gondola is a flat car with sides. A box car is a flat car with taller walls and a roof.

Here is the parts list that you will need to take part in part 2 of this clinic. You will build a car in our next class.

- 1 package ~ 4x12's
- 1 package ~ 4x6's
- 1 package ~ 2x6's
- .012 Brass wire ~ 1 package (you can share this with a friend since we won't need much)
- 1 set of trucks
- 1 set of couplers (and mounting screws if not included)
- 1 set of brake details (only a brake cylinder if you want the basics)
- 1 brake wheel (a package has a wheels so they can be shared too)
- 1 decal set or dry transfers
- 1 package of grab irons (a package has a couple of sets so they can be shared too)
- 1 set of couplers
- 1 set of NBW's (Nut, Bolt, Washer castings). This will be listed with the size of nut and washer. Nut size isn't as import as the washer. You will want something in the 4 to 6 inch range. (unless you are really going after a certain prototype and then you will need to consult a set of plans for that car to see what size you need. Or better yet, measure one yourself if possible).
- 1 flat piece of brass or lead (especially if you want to run the car without a load) this should not be very thick but you will need some weight to help the car track correctly.
- 1 casting or set of castings for a load (some castings can be drilled out to add weight).

Tools needed for the first class:

- Exacto knife with several sharp #11 blades
- NWSL Chopper or a razor saw with a miter box (if you don't own a chopper I HIGHLY suggest you get one as it will make your life SO much easier)
- Sand paper (220 grit or higher) A 220 grit sanding sponge works really well for this.
- Wire cutters
- Glue for the wood. Aileen's Tacky Glue or Regular Elmer's White Glue (**NO SCHOOL GLUE**)
- Screw driver

While it is an incomplete list, the site below has a great collection of terms for steam era freight cars. I enclosed this only for another reference if you want one.

<http://www.steamfreightcars.com/prototype/glossary/glossaryahmain.html>

<http://www.purgatoryanddevilriver.com>

I look forward to seeing you all at our next class. This really is easy to do. We will even try to sort out the class by skill levels so you can work with others at the same level. Be sure to ask any questions that come to mind. The only stupid question is the one that goes unasked!

One last note...If you want to get a head start on the project, take 3 pieces of the 4x12 stock and paint all the edges and one of the wide edges with an acrylic paint. Leave one wide face unpainted (this will be the inside edge of the car). To do this, I lightly sand the wood to knock off any fuzz. Then I like to put a little paint on a paper towel or rag and DRAG the wood through. **DO NOT** push the wood through. Remember, it's thin and it **WILL** break if you push it through. Place some weight on the wood while it dries to keep it flat. This will allow you to have an almost finished car when we are done with the first hands on lesson.

Remember your parts and a tool box

&

See you next time...

