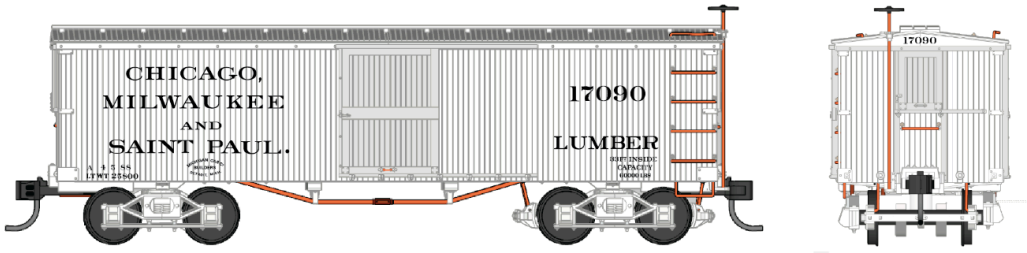
ZENITH
MODEL WORKS

HO-2004 SERIES

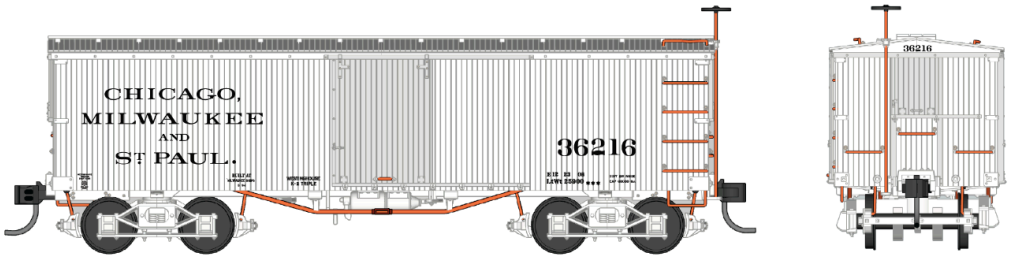
CHICAGO, MILWAUKEE AND SAINT PAUL RAILWAY 34' BOXCARS

1881-1917



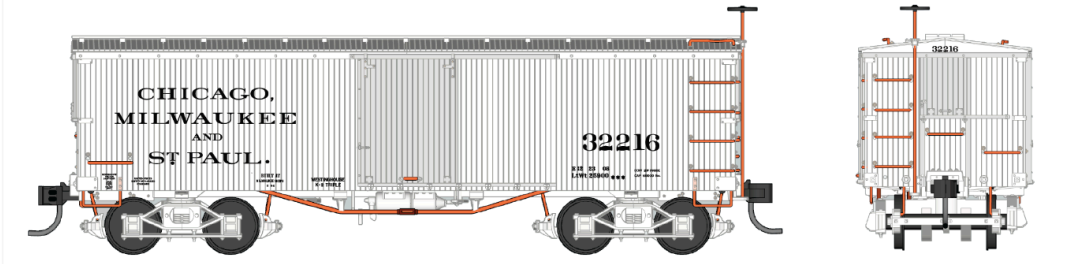
VERSION A

AS-BUILT, 1881-1890



VERSION B

AIR BRAKES, SAFETY APPLIANCES, REBUILT DOORS, 1892-1911



VERSION C

1911 SAFETY APPLIANCE UPGRADES, REVISED STENCILING

IMPORTANT INFORMATION:

Our models are 3D printed in resin. This material is similar to styrene plastic, but it is slightly harder and more brittle. The resin we use responds to ACC, but it will not work with most solvent cements. Unlike traditional resin kits, most of the major components are printed together and very little major assembly is required. Unfortunately, one drawback to resin 3D printing is that sprues used to support the model during the print job are inevitable. At the time of this writing, there is no way to print models without sprues; however, most sprues are easily removed with a fresh X-Acto blade. There may be subtle lumps or deformities in the material where sprues were located; these can be easily sanded or smoothed with contour putty. The resin cures under exposure to UV light. If the model is too soft to work with, place it in a sunny environment for a few days and it will harden. It will become more brittle over time, so use caution. When you receive your model, there may be areas where the resin hasn't fully dried. This residue can usually be wiped away without any significant changes to the quality of the model. 3D printing is a rapidly changing technology and we hope to update our kits as things improve. Thank you for your patience, and as always, thank you for choosing Zenith Model Works. Should anything be missing or broken, please email us at info@3dptrain.com and we will ship replacements at earliest convenience.

RECOMMENDED TOOLS:

Read the instructions thoroughly before beginning construction. Keep a pencil and/or highlighter handy to underscore key details or check off steps. The following tools are necessary to build this kit:

1. Metric ruler or similar measuring device
2. A hobby knife of your choice (a typical X-Acto® knife with a #11 blade works very well)
3. Needle-Nose Pliers
4. Wire Clipper
5. A pin vice
6. #76 and #78 drill bits
7. Flathead or Phillips screwdriver depending on your choice of bolster screw
8. Tweezers
9. ACC

It will help to have some familiarity with standard freight car features. You can add as much or as little detail as you like; feel free to omit certain steps or make modifications where you feel necessary.

Preparation:

1. If your kit feels soft, allow it to cure in a sunny window for around 24 hours before beginning. This may make assembly easier and the model will take paint better if properly cured.

2. Start by removing sprue marks and cleaning any uncured resin off the model. A small amount of rubbing alcohol and a paper towel usually works very well.

3. Drill out the bolsters to accept a screw of your choice. This location is marked by a small hole included in the print. We recommend a self-tapping 2-56 machine screw, although drilling the hole out first will always help.

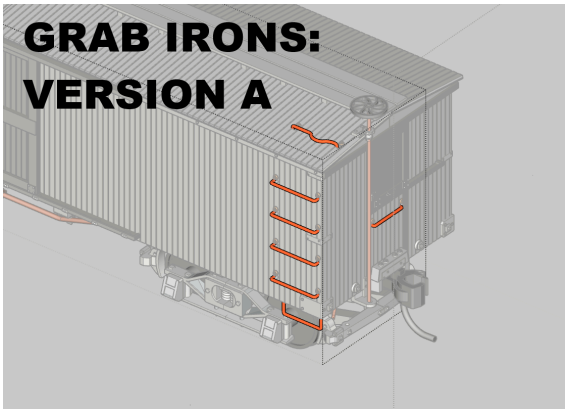
Body Details:

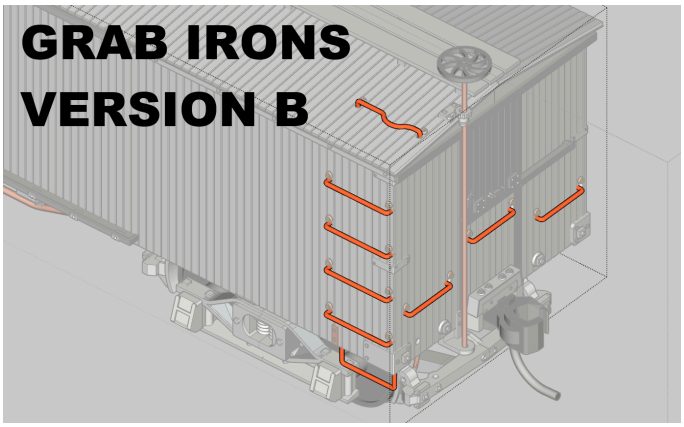
4. Start by drilling out the holes for the grab irons on either side of the car with a #79 drill bit. In addition there were two grab irons mounted on the roof on each end. Insert the grab irons supplied in the kit into the holes, so that they jut out about four scale inches. Secure with ACC.

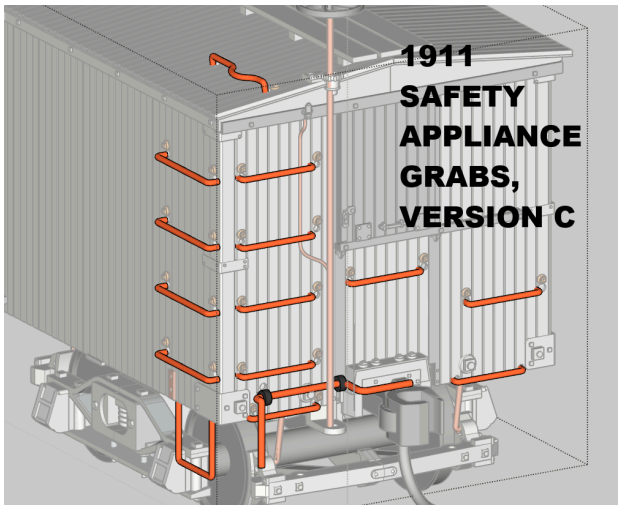
5. The roof grabs feature a bend and will have to be hand-bent from the wire supplied in the kit. Secure them in place with ACC.

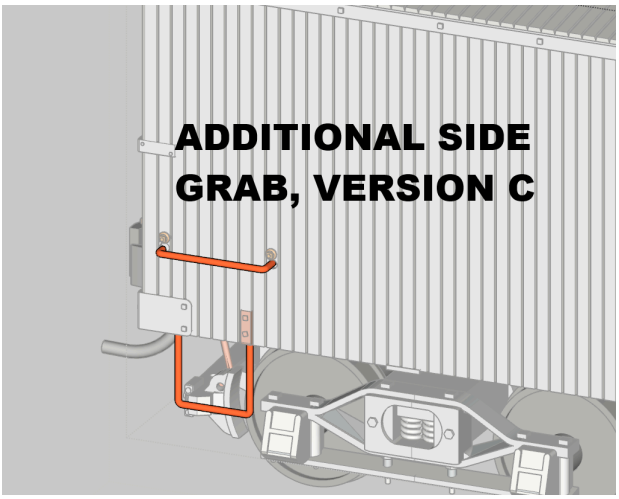
6. Cars that received safety appliances after 1893 received two additional grabs on each end (Version B). Drill out the holes and install from behind with ACC.

7. The door handle can be fastened from a small piece of wire. Locate the holes in the door, drill them out and install the handle. Secure from behind with ACC.









8. If you are modeling a car with air brakes, locate the retainer valve near the roof on the B end. Bend a piece of wire to match the diagram shown and secure it to the valve, running vertically down, and terminating beneath the end sill. Secure with ACC.

9. If you are modeling a car with knuckle couplers, add the cut levers. Locate and drill out the two holes on each end. Bend a piece of wire to match the diagram shown. Slide two eyebolts onto this piece, insert their ends into the holes and secure from behind with ACC.

10. Drill out the ratchet located on the roof of the B end and install a piece of wire to serve as the brake staff. Ensure it stands about 2 feet off the roofline. Glue the brake wheel to the top of the staff. Secure the base of the staff to the bracket below the end sill with a small amount of ACC.

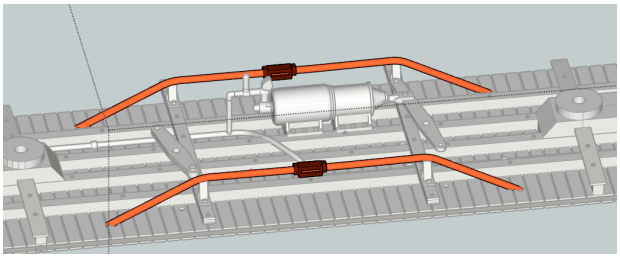
11. Stirrups will have to be bent by hand out of the wire supplied in the kit. There are holes along the side sill pre-sunk for this. Bend according to the diagrams and secure with ACC.

Underbody Details:

12. Drill out the bolsters using a 2-56 drill. Thread the holes using the 2-56 screws included in the kit. Ensure they are straight.

13. Add weights of your choice. Per NMRA guidelines, the car should way somewhere around 3 ounces. Secure them to the top of the floor with epoxy. Allow 24 hours to cure.

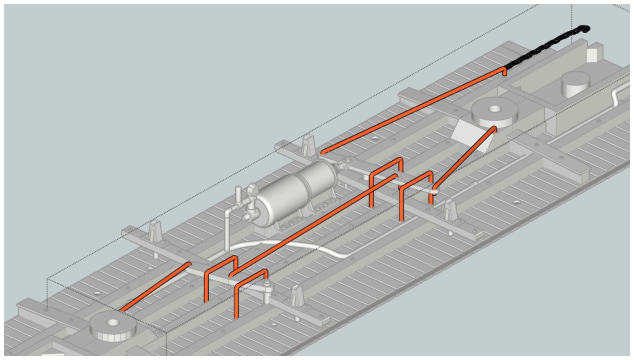
14. Drill out the holes in the underbody for the truss rods. Tie a knot at one end of the filament supplied in the kit. Add turnbuckles. Thread the filament through the holes ensuring it rests on the queen posts. Secure the filament in place with ACC. Ensure the turnbuckles are centered, and secure them in place as well. The prototype I chose had four truss rods, but some had two. You could remove the two interior queen posts to represent an earlier car from a different series if desired.



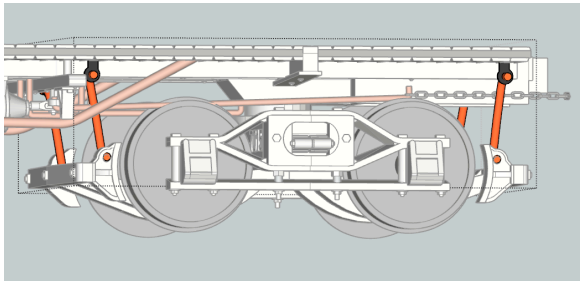
15. Versions A and B did not have air brakes. For B and C, bend and install pieces of wire between the brake levers to simulate linkage - see the diagram below. You can cut a turnbuckle in half to represent a clevis for added detail. We included a few extra for this.

16. There would have been a chain running from the hand brake to the main lever. We omitted this to reduce cost, but feel free to add this feature for extra detail.

17. **Brake Lever Hangers:** Drill out the holes located adjacent to the brake levers. There would have been two hangers jutting out from the underbody to prevent the levers from falling. Use a few grab irons to recreate this detail. Secure them in the holes with ACC. See diagram below.



18. **Brake beam hangers:** these cars had body-hung brake beams. Replicating the hangers is difficult and may cause issues during operation. If you wish to add them, see the diagram below. We supplied eye bolts for this. Bend pieces of wire about 2 feet in length with the tips curved to connect the hangers with the brake shoes. The holes in the brake shoes may need to be drilled out. If so, be very careful and use a #79 drill bit.



Painting and Final Adjustments:

19. Prepare the completed model for painting by washing with detergent to remove any skin oils. Allow the car to fully dry before applying paint.

20. Paint the underbody first, and then the roof and sides.

21. Refer to the history sheet for details on paint colors. Paint the model using paints of your choice. Allow to fully dry. I recommend you paint the trucks separately from the rest of the model.

22. Decals adhere best to a glossy surface. Gloss Coat the car if necessary, then apply our water slide decals with Micro-sol, Solvaset or a similar decal solution. Allow the setting solution to cure (at least 12 hours) before applying a flat finish.

23. Our trucks accept most standard HO scale wheelsets. It is advisable to install the wheels soon after you receive your kit, because the resin will continue to harden over time and may eventually break if strained too much. When fully assembled, test the coupler height. If the couplers are too high, file some material off the bolsters. If they are too low, you can use a washer to raise the height.

24. Congratulations! Your car is complete. For questions or comments, feel free to contact us at info@3dptrain.com. We appreciate your support.

ACKNOWLEDGEMENTS:

Zenith Model Works extends a gracious thank-you to David and Kristin Kmecik at 3DPTrain for assisting in prototype development and hosting production, and to Ray Breyer, who assisted my research. Without the kindness and generosity of these individuals this project would not have been possible.

CHICAGO, MILWAUKEE & ST. PAUL RAILWAY
34’ BOXCAR

HO-2004 SERIES

General History:

In the early 1880s, the Chicago, Milwaukee and Saint Paul Railway settled on a new 40,000 pound capacity box car to meet increasing traffic demands. The earliest mention I have been able to find of these cars is in the September 1881 issue of The Railway Purchasing Agent, stating “The Michigan Car Co. at Detroit is building for the Chicago, Milwaukee and Saint Paul (railway) 250 box cars, to carry 20 tons each.” The previous 28’ box car standard for the railroad had been rated for roughly 14 tons. This new standard car for the Milwaukee measured 33’ 8 in length. Between 1881 and 1895, roughly 11,400 cars were built to this pattern. Official Railway Equipment Registers indicate that every batch of these cars differed in terms of width or height by a matter of inches. Some batches were slightly longer or shorter than the common 33’-8” length, but all had similar spotting features and largely identical hardware. Refer to the table below for dimension specifications and fleet statistics.

Because each group differed slightly, I had to settle on one for the purposes of making this kit. I chose the series 17064-20262, even numbers, which numbered 1,600 cars in 1885. This prototype is probably similar enough to be numbered to represent other groups built around that time.

Builders:
Some incomplete but tangible data on car builders has surfaced. According to the 1916 ICC valuations provided by Ray Breyer, the Milwaukee was still running a few of these cars that year. Series 22688-23106 was built in 1888 by the Muskegon Car Company; 12 cars remained in service. Series 23500-23696 was built by the Ohio Falls Car Company in 1892; 23 cars remained in service. Series 45006-45990 were built by Wells and French Car Company in 1890; 25 remained in service. 43000-44934 were built by “various builders” in 1891 and 1892. 233 remained in service. A builder’s photo of car 35764 exists with a visible “Michigan Car Co.” builder’s stencil. It is likely many of the early cars were also built by these builders or by the Milwaukee’s car shops. I have included some builder’s marks in the decals in an attempt to represent this.

Painting and Physical Attributes:

These cars were most likely a Mineral Red (a red-brown). “Chicago, Milwaukee & St. Paul” was spelled out on the left hand side of the carbody in a Roman typeface. The road number was

located on the upper right hand side of the car. Weight data was located on the bottom-left side of the car, and weight and capacity data were located on the right. Cars in lumber line service had “LUMBER” below the road number. In later years, weight and capacity stenciling was moved to the right side of the car, the road number was lowered, and air brake and draft gear stenciling were applied to the bottom left hand side. Later on, “Saint” became abbreviated. I am not sure when exactly this occured; it appears sporadically in my reference material. I included this feature in the later decals for these cars.

Early cars were delivered without air brakes. The safety appliance act of 1893 mandated air brakes and knuckle couplers be installed on all cars in national interchange by 1900, so the majority of these cars probably received air brakes during the mid 1890s. If you are building a car without air brakes, be sure to snip off the brake shoes of the truck to be located on the “A” end of the car. Another safety appliance act passed in 1911 mandated standardized side and end grabs on all cars, in addition to a second stirrup on the left-hand side of the car body. The version you selected should reflect this accordingly.

Lifespan:
By 1910, numbers had begun to dwindle, with 9,585 cars in service. At the end of 1915, 3,461 remained in service. By June of 1917, just 1,747 cars remained, all but 42 of which were of what was (I believe) the final group built in 1893.

Thank you for choosing Zenith Model Works! For questions or comments pertaining to prototype information or reference material, email zenithmodelworks@gmail.com. For quality concerns, missing or broken parts, or order errors, contact info@3dptrain.com.

1881 Standard Box Car Fleet Statistics:

Series (Even Numbers Only)	June 1885	June 1895	July 1901	July 1910	December 1915	June 1917
15680-16078	200	200	177	146	-	-
16666-16914	125	125	22	25	-	-
17064-20262	1600	1600	1461	1293	-	-
20364-21998	818	818	753	689	-	-
30000-30862	432	339	298	340	-	-
31084-32654	686	786	722	621	-	-
32956-36854	-	1950	1828	1622	-	-
36856-37054	-	100	90	76	51	42

37056-39014	-	1105	900	390	-	-
42000-44948	-	1287	1406	1295	934	–
45000-45998	-	429	429	430	222	
46000-47498	-	648	716	651	457	
47500-51898	-	2002	2182	2007	1797	1705
Totals:	3861	11,389	10,984	9585	3,461	1747

*Differences in Basic Dimensions:

Series (Even Numbers Only)	Ext. Length	Width At Eaves	Height to Top Of Platform	Height To Overall	Side Door Width	Side Door Height
15680-16078	33’-8”	9’-2”	11’ 1”	12’ 2”	4’ 9”	5’ 11”
16666-16914	33’-6”	9’-3”	11’ 4”	12’ 5”	5’	6’ 1”
17064-20262	33’-8”	9’-4”	11’ 4”	12’ 5”	4’ 10”	5’ 11”
20364-21998	33’-8”	9’-3”	11’ 3”	12’ 7”	4’ 9”	5’ 10”
30000-30862	33’-8”	9’-3”	11’ 1”	12’ 4”	4’ 9”	5’ 10”
31084-32654	33’-8”	9’-2”	11’ 1”	12’ 5”	4’ 9”	5’ 10 ½”
32956-36854	33’ 5”	9’ 3 ½”	11’ 8”	12’ 7”	4’ 9”	5’ 11”
36856-37054	33’ 5”	9’ 4 ¾”	13’ 8 ¾”	14’ 4 ¾”	5’	6’ 2”
37056-39014	33’ 5”	9’ 3 ½”	11’ 2”	12’ 9”	4’ 9”	5’ 10”
42000-44948	33’ 8”	9’ 2 ¼ ”	11’ 2”	12’	4’ 9”	5’ 10”
45000-45998	34’ 2”	9’-8”	11’ 8”	12’ 10”	5’	6’ 3”
46000-47498	33’ 8”	9’ 2 ¾”	11’ 4”	12’ 11”	4’ 9”	5’ 10”
47500-51898	33’ 8”	9’ 10 ¾”	12’ 5 ¾”	13’ 8 ½”	4’ 9”	5’ 10”

***I found end door data relatively lacking, so I omitted this information. All photos I have of these cars show end doors.**