

**2013 NMRA Convention – Atlanta GA.
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Part 2 – Extreme Steel Loads – Large I Beam**

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A little history about this project:

Sometimes you see a loaded railroad flat car go past that just screams to be modeled. A friend of mine took the picture above and showed it to me. One look at the picture, and I had to model the beam. This project shows what you can do when you have a less than perfect picture to work from.

When I started this project, it took on a life of its own! After I started this model, I decided to do two other models; the “plate” steel load and the small I-beam load. We have already covered those. Due to the complexity, this model was saved for last. The other two provide a good warm up before tackling this model.

I have made several assumptions about this load. The only known measurement that I had was the length of the flat car; 89 feet 4 inches. There was only one beam on the train. I have no idea where it was going or where it came from. I am not sure what the

beam is to be used for. I assume it is part of a bridge span.

I started by measuring the length of the flat car to come up with a ratio for converting it to HO scale. The picture was smaller than N scale. When I made these measurements, I did not have a digital copy of the picture. After I got the measurements, I drew up the HO scale drawing to work from. After I built the first beam, I got the digital copy and could better see the beam and its details. That is when I found I had made several mistakes with the model because of the bad picture. The major mistake was that the bottom of the beam is not straight; it has an angle that is more than half the length of the beam. I have included an HO scale drawing of the beam in the handout. Make a copy of the drawing, using the one inch ruler on the drawing to verify that you have an accurately scaled copy. You may need to enlarge or shrink it to get the drawing to be full size HO scale. If you need additional copies, you can find a PDF drawing on my web site, www.b-n-ferrco on the “Modeling/DCC Tips” page.

Materials

Evergreen .030 Styrene #9030	1 per beam
Plastruct 3/32 Angle #90503	1 piece
Plastruct .060 Plastic rod # 90750	1 piece
RustAll	Optional
Micro Scale Graffiti set #90211	Optional
Micro Scale TTX 89' flatcar set #87-579	Optional
Model Master Gunship Grey #1923 (spray)	
Model Master Gunship Grey #1723 (brush on)	
Testors Brown #1240 (spray)	
Testors Dull Coat #1160 (spray)	
Testors Rust #1185 (brush on)	
Model Master #2015 Flat Clear Finish (brush on)	
Scale Coat II CNW Yellow S2035 640-20356 (spray can) 640-20352 (air brush)	
Walthers 89' TTX flatcar #932-40325 undecorated	1 per beam
Kadee #5 couplers	Optional
Squadron Green putty	
400 grit wet and dry sand paper	Several sheets
1/16 X 1/16 X 24 square bass wood	1 piece
1/8 X 1/8 X 24 square bass wood	1 piece
3/32 X 3/32 X 24 square bass wood	1 piece
.015 piano wire	1 piece
Tenax-7R	
Extra Fine Point Sharpie	
Walters Goo	
Walthers Solvaset	
Super Glue	

Tools

Blue painter's tape	
X-Acto knife blades, #11 and #17	Several
Small machinist square	
Small X-Acto square	
Pin vise	
#78, #80 drill bits	Several
NSW Chopper	
Touch-N-Flow glue applicator	
Exxact Socket tool	
NMRA HO scale gauge	
Postal scales	
Kadee coupler height gauge	
Steel HO Scale ruler	
Dial caliper	
Small file set	
Side cutter	

NOTE:

Before cutting the first piece of plastic, **STUDY** the drawing. Read through the handout and make sure you understand the assembly order. The top and bottom flanges are two pieces, not one. Notice that the top flange that intersects the 24 inch radius (R2' on the drawing) is made from the web stiffener material. All web stiffener measurements are "centerline" measurements. I will refer to the "big" end and the "small" end of the beam throughout this handout. The plastic is .030 inches thick; this is 2 5/8 inches in HO scale.

Let's Get Started!!

Cut out a template of the beam from the poster board. Take your time on this step!! Once you have a template, use the blue painter's tape to fasten it to the styrene. Using a new #11 X-Acto blade, scribe around the template. You will have to move the tape to completely scribe the web of the beam. When you have the beam outline scribed, remove the template and mark the beam web with the measurements for the web stiffeners. Using the small machinist square, lightly scribe web stiffener lines on both sides of the beam. (Remember, the plastic is only .030 inches thick so go easy on the web stiffener scribing.) On the "small" end of the beam, lightly scribe a line that will extend the top flange below the 24 inch radius to the fourth web stiffener. At this time, the scribed lines on the beam web should look like the pattern on the beam in the line drawing at the end of the handout. Now cut out the beam web.

Use the second sheet of plastic to cut the top flange, bottom flange, beam end, and the vertical bracing for the beam. To get all of the top flanges and web stiffeners the same width, I used my dial caliper to scribe the plastic before I cut it with the X-Acto knife. The top flange, bottom flange and beam "small" end are two feet, three inches wide

(flange material). The vertical bracing is one foot wide (vertical material). Cut these pieces the full length of the plastic (12 inch side). Cut two pieces for the top flange, bottom flange, and ends. Cut two pieces for the vertical bracing the full length of the plastic (12 inch side). Also cut one piece of vertical material about three inches long (see Figure 1).

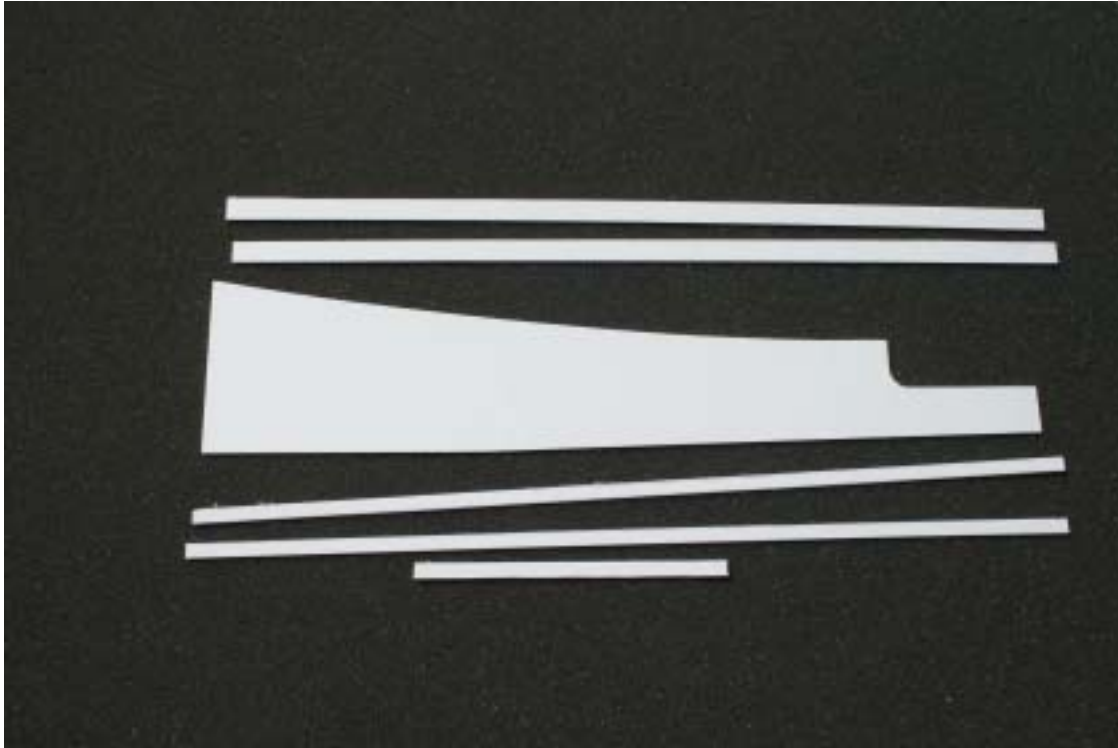


Figure 1

Use the dimensions for the web stiffeners, cut these pieces just a bit longer than is shown on the drawing. After all of the web stiffeners are installed, file or sand them to the correct length. Extend the web stiffener lines on the drawing, and use this as a template to line up the web stiffeners on the beam. Use the small square to make sure that the pieces are square both vertically and horizontally. If they are not square in both directions it will really be noticeable. Work from the “big” end to the “small” end. Install only the first four web stiffeners.

Measure and cut the flange for the top of the small end of the beam from the vertical material. Only install the top flange on the side that you are working on. Fit this to the beam web, flush with the top of the web. Make sure that it intersects the fourth web stiffener squarely. Fit the fifth web stiffener, this is a two piece brace. Fit the sixth web stiffener. The sixth web stiffener does not extend above the top flange. Its center line should line up with the beam end above the 24 inch radius (R2'). Now install the web stiffeners on the other side of the beam web following the same procedure. I used several pieces of scrap ¼ inch square plastic to support the beam web so I did not damage the web stiffeners on the other side. File or sand the web stiffeners to match the edge of the beam web. Make sure the ends are square with the web or the flanges will not fit

squarely on the beam.

Using the dimensions for the top flange, bottom flange, and beam end, cut these pieces a bit longer than is shown on the drawing. Install the first part of the bottom flange from the “big” end to the second web stiffener. Make sure the flange is centered on the beam. Test the second part of the bottom flange. File the end of the flange to get a good joint at the second web stiffener. When you are satisfied with the fit, glue it in place, making sure it is centered on the beam. Install the beam end on the small end, making sure it is centered.

Cut a top flange for the flat area over the 24 inch radius (R2’). This flange goes from the fourth to the fifth web stiffener only, not to the end of the beam. When you are satisfied with the fit, glue it in place, making sure that it is centered on the beam.

Cut a top flange to fit between the “big” end and the fourth web stiffener. File the end that mates with the first piece of the top flange installed in the last step to get a good joint. When you are satisfied with the fit, glue it in place, making sure it is centered.

Using the Squadron Green putty, fix any joints that are not perfect. Remember, on the prototype everything is welded and ground down to be smooth. Take your time: anything that you miss will really stand out on the finished model. When you have all the joints looking great, place a full sheet of 400 grit sandpaper on a flat surface such as a counter top and sand the sides of the beam smooth. This will ensure that all of the web stiffeners and beam flanges are the same height.

Make a paint mask out of scrap plastic that will cover from the “big” end of the beam to about half way between the second and third web stiffener (see Figure 2 on next page). The opening in the mask for the beam should be three scale feet high, and a scale 14 feet 6 inches wide. Install a “back stop” that is square with the opening in the mask 37 feet 6 inches from the opening. The “back stop” should be wide enough for the beam to fit in the mask either way and keep it square in the mask. The mask needs to be about a foot above the top and bottom flanges on the beam. The opening for the beam to stick out of should be about a scale foot larger than the beam is where it comes out of the mask.

When you are satisfied with the beam, wash the model to remove all oils from handling the model. Let it dry over night before painting. When you are ready to paint the beam, tape off the bottom flange at the “big” end of the beam. To do this, put a piece of blue painter’s tape on the bottom flange. Set the model down on the bottom flange on the work surface of your bench and trim the tape with a sharp (new) X-Acto blade. You do not want any paint on the bottom flange where it is going to be glued to the flat car, but you do want the sides of the bottom flange and the bottom flange where it rests on the dunnage (“small end”) painted. Paint the beam with Model Master #1923 Gunship grey.

Once the beam is painted, set it aside to dry for a couple of days. You can work on the modifications to the flatcar. Do not remove the painter’s tape until you are completely finished with the weathering and dull coating of the beam.

Between the second and third web stiffener is a chalk marking “494”, upside down at the

top of the beam. Put this on with Micro Scale #90211 graffiti decals. Let the decals dry over night before starting to do the weathering. Do not dull coat the decals at this time.

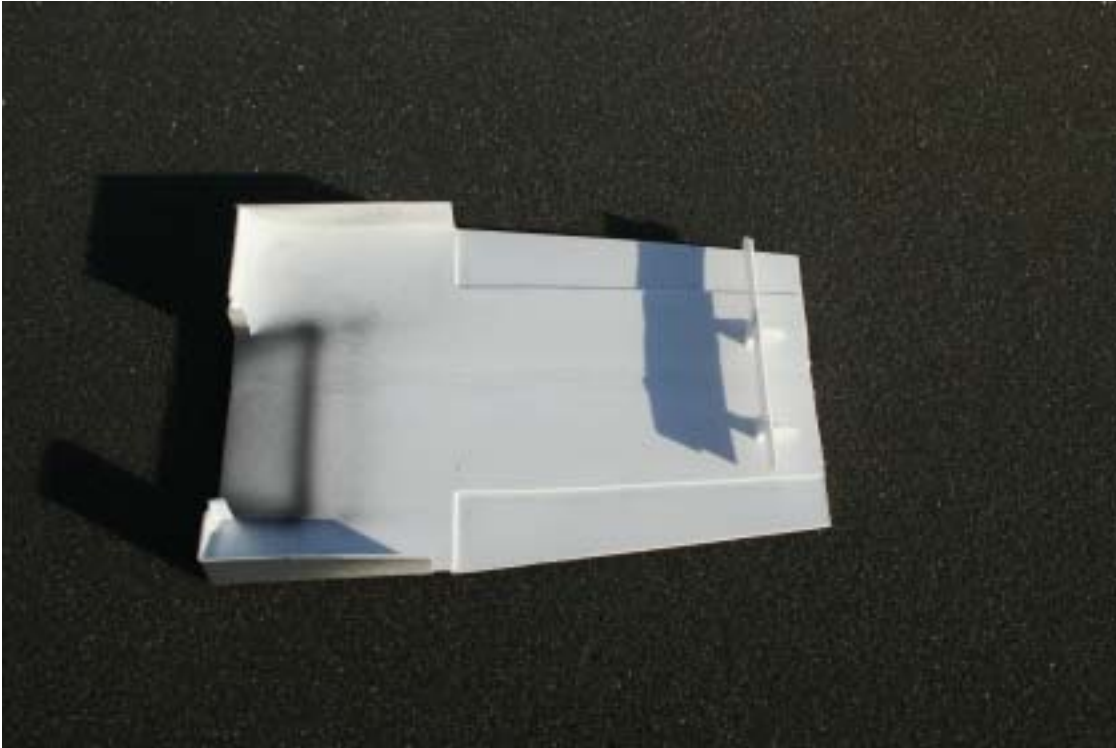


Figure 2

The weathering on this beam is really neat, and easy to do. Put on a heavy coat of RustAll from the “big” end of the beam to about three quarters of the way between the second and third web stiffener. Let it completely dry before putting on another coat. Don’t worry about trying to “feather” in the edge; we will take care of this later. Continue putting RustAll on one coat at a time until you get the effect that you are looking for. Make sure that you get an even coat of RustAll on both sides of the web stiffeners. I did this on both sides of the beam, because the effect looks so neat and I did not want to have to keep the car facing one direction at all times. You can use some of the dark brown and black chinks to add a bit of heavier rust areas. I put the chinks in the vertical plane to add to the over all affect.

After you have built the paint mask, put it over the beam. Spray straight down on the beam, making sure to get the top of the top flange, and the top of the bottom flange. Paint the entire exposed beam. This will give you the “feathered” effect on the rust. Once the paint on one side is dry, flip the beam over and repeat the process.

After the paint is completely dry, dull coat the entire beam. After the dull coat is dry, remove the painters tape from the bottom of the bottom flange. Inspect the area where the tape was to make sure that there is NO paint on this area. If you find paint, remove with fine grit sand paper.

Modifications to the flatcar

Remove the trucks from the car. Remove the wheel sets from the trucks and paint the trucks with the Testors #1240 brown paint and set aside to dry. Paint the outside wheel web on the Proto 2000 wheel sets with the Testors #1185 Rust paint. Be careful not to get the paint on the wheel tread or the axle point. Keep the paint off the lip of the wheel, this will leave a shiny rim that makes the wheel look like it has been through the retarders in the hump yard many times. After the brown paint on the truck has dried, spray the truck with Dull Coat and set aside to dry. Use the Exxact Socket tool to ensure that the truck has the correct shaped “point” for the axle of the wheel sets. This also gets any paint overspray out of the area where the axle rides. I have found that by using this tool I have improved the rolling qualities of my rolling stock. Check the wheel sets with the NMRA gauge to make sure the wheels match the gauge. When the trucks are dry, install the wheel sets.

Remove the trailer hitches from the deck of the car. Remove the trailer tire “rub rails” from the car deck with a # 17 chisel blade X-Acto knife (see Figure 3).

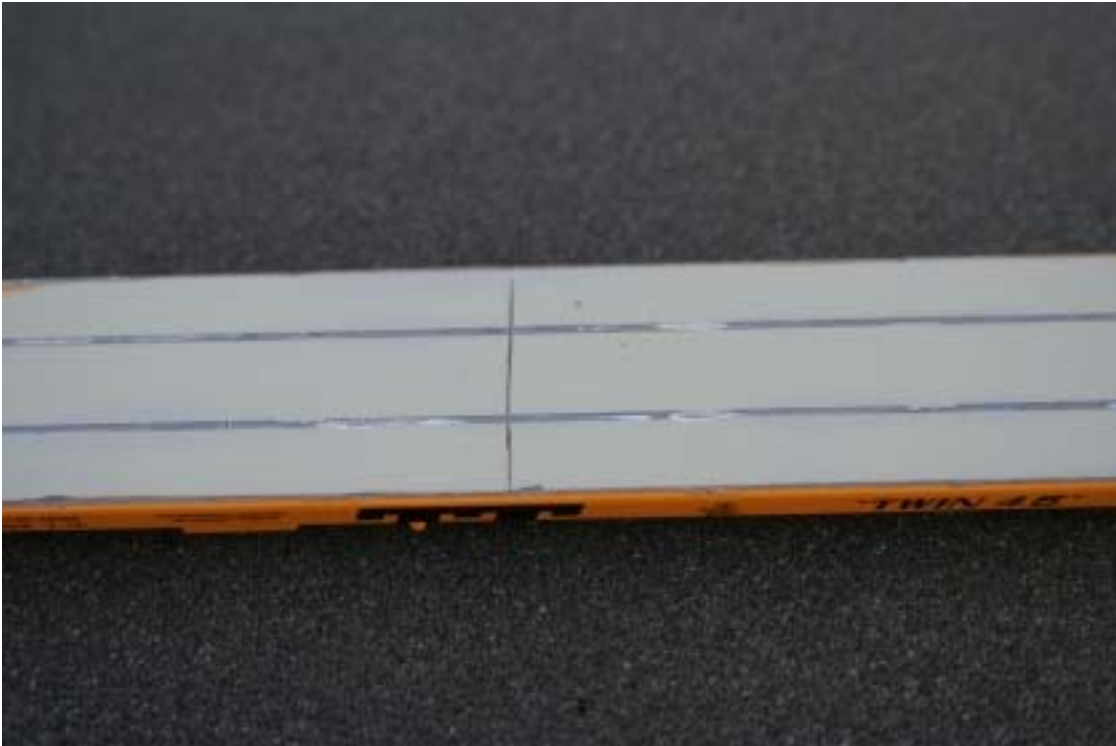


Figure 3

Paint the couplers with Testors #1185 Rust. Be careful not to get too much paint on the hinge area of the coupler.

Use a sharp (new) X-Acto #17 chisel blade remove the large circle on the bottom of the trailer hitch (see Figure 4). Use Tenax-7A to glue the large circle that you just removed from the trailer hitch into the hole for it on the deck. Make sure that you don't push this circle into the coupler area on the bottom of the car. Let the glue dry thoroughly. Use the 6 X 6 square plastic rod to a plug the hole in the circle you just glued in. The rod will snugly fit into the center of the trailer hitch circle. Use the Tenax-7A to glue the plug in place. Again, make sure that it doesn't get into the coupler area. If it does, use a #17 X-Acto blade to remove the offending piece. Cut the plug off flush with the deck. File the plug to make sure that it is flush with the deck. Fill any problem areas where the holes for the trailer hitch were and any areas that were gouged when removing the "rub rails" with Squadron Green putty and let dry. Wet sand the deck using 400 grit sand paper to get a smooth finish.



Figure 4

Use a #80 drill bit to drill the holes for the grab irons. Install the grab irons using super glue. Apply the super glue with a tooth pick. Remove any excess super glue with a paper towel. If you started with a painted model, strip the model with Scale Coat stripper, #10568.

After the car has the grab irons installed and all of the damage to the deck repaired, wash the car in warm soapy water, and rinse thoroughly. Let the model dry over night.

Mask off the sides, ends, and top of the car. Paint the bottom of the car with Testors Brown #1240. Let the car dry over night. Mask off the under frame of the car, leaving

the brake rigging exposed from the brake handle to where it goes under the car. Do not mask off the brake cylinder and reservoir, as these should be painted CNW Yellow.

Paint the car with the CNW yellow. CNW Yellow is a bit lighter than Trailer Train yellow, but it makes the car look a little faded. Let the car dry for several days before you start the decaling. If you get yellow on the under side of the car, you can cover this up using Testors Brown #1140.

Several people have looked at the picture of the car, enlarging it, trying to figure out the car number. The reporting marks were easy, they are JTTX. The car number is another story, we think it is 940365. See Figure 5 and 6 for placement of the decals. On my web site (www.b-n-ferrco.com) I have very large versions of Figure 5 and 6 on the “Modeling/DCC Tips” page.

Use the Walthers Solvaset to set the decals. Remove any air bubbles and reapply the Solvaset. Wash the car in warm soapy water, rinse thoroughly, and let dry.

Give the car a good heavy coat of RustAll and let dry. When the RustAll is dry, give the deck a second heavy coat and let dry. When you are happy with the looks of the car, give it a coat of Dull Coat and let the car dry.



Figure 5



Figure 6

Mounting the Beam to the car

There were several assumptions made about how this beam was attached to the flat car. Looking at the picture, I can make out three places that the beam is tied down. The end tie downs have two tie downs, one that goes almost straight down, and one that goes out at a slight angle away from the beam. I assumed that there is a piece of scrap plate steel

welded to the top of the beam at each tie down location. I also assumed that the beam is welded to the car at the “big” end of the beam.

Use the vertical material, cut three “tie down” plates that are a scale four feet long. Cut 20 pieces of the 3/32 angle a scale two feet long. Paint the “tie down” plates and “angle iron” with Model Master # 1923 Gunship Grey and set aside to dry.

Center the beam on the car, both lengthwise and crossways. Mark the outline of the “big” end of the beam with the extra fine point Sharpie. Remove the beam from the car. Sand the area where the beam is going to sit, removing all paint from this area.

Clean the paint off the top flange of the beam the width of the “tie down” plate at the following locations. About half way between the first and second web stiffener, about 75% of the way between the second and third web stiffener, and about half way between the fourth and fifth web stiffener. Glue the “tie down” plates to the top of the beam using Tenax-7R.

Drill a #78 hole in the “tie plates” on each side of the beam that is parallel. Once you have the holes drilled, glue the beam to the flat car. Give the glue time to dry: this is not the time to hurry the project!

Cut a piece of 1/16 X 1/16 X 24, 1/8 X 1/8 X 24, and 3/32 X 3/32 X 24 bass wood six scale feet long. Slide the 1/16 X 1/16 bass wood under the beam. Mark the ends and sides toward the small end of the beam with the extra fine Sharpie. Remove the bass wood. Scrape the paint from the deck where the “angle iron” will be attached. Reinstall the bass wood and glue in the “angle iron.” Repeat this step for the other two pieces of bass wood. See Figure 7.



Figure 7

Working from the “big” end of the beam, insert the piano wire through the “tie plate.” Mark where the piano wire contacts the deck and remove the piano wire. Scrape the paint from the deck and glue the “angle iron” to the deck once the glue has set on the “angle iron,” reinstall the piano wire through the “tie plate.” Using a toothpick, place a small amount of super glue on the “angle iron” and the “tie plate” to fasten the piano wire in place. Repeat this step until all eight piano wires are installed.

On the “tie plate” between the fourth and fifth web stiffener, carefully drill a second hole on each side of the beam that goes out at an angle. To determine the angle, use a piece of .015 piano wire. You want the wire to attach to the car about a scale six to eight inches from the edge of the car.

Use Model master #1723, Gunship Grey to paint the piano wire and any white spots caused by drilling the mounting holes.

Use Model Master #2015, Flat Finish to touch up any shiny spots caused by the super glue. You can paint the flat finish around the bass wood to act as a glue to hold it in place. Set the car aside to dry.

Use the extra fine Sharpie to go around the “angle iron” and beam. This is to give the look that the paint has been burned during welding. If the area where you used the Sharpie is shiny, you can spray Dull Coat on it, from straight over the top of the car. Do not get the car to wet with the Dull Coat; several light coats are much better than one heavy coat. See Figure 8 for completed model.



Figure 8

If you have any questions about doing this model, feel free to e-mail us at b-n-ferrco@cfl.rr.com or visit our web site at www.b-n-ferrco