Volume 2 Number3 2018

Steel Mill Modeling and Steel Mill Pictorial Group

Founded
Oct. 21, 2014
July 14, 2017

The Mill is an official publication of the Steel Mill Modeling and Steel Mill Pictorial groups

THE MILL

Bob O'Neil's
Homestead Works pg.6

Franklin Forge and Gear 91 ton ingot mold pg. 25

Part one of building a blast furnace hot air blast ring. By Heinz Helm pg. 21

Also in this issue:

The Mill
The Mill is a publication of the Steel Mill Modeling and the Steel Mill Pictorial groups and is sent out to the readers quarterly. The Mill is only available in PDF format and is free to subscribe.

History
The Steel Mill Modeling group was founded on October 21, 2014,
July 1st, 2018: 1,377 members
https://www.facebook.com/groups/708840849171343/

The Steel Mill Pictorial group was founded July 14, 2017,
July 1st, 2018: 391 members
https://www.facebook.com/groups/1561038727264008/

The Purpose
This newsletter is to recognize the members of the steel mill community that would like to share their modeling ideas, on how-to build steel mills and equipment and the members who like to share their knowledge of the steel industry in general. This also includes industries that support the steel industry including coal, lime store, slag, coke, etc.

To Sign Up
To sign up to receive the newsletter, send an email to Don Dunn at don_csx@hotmail.com.

Thank You
I like to thank all the members of the Steel Mill Modeling Group, Steel Mill Pictorial Group and the Yahoo Steel Mill Group for what you all have done to make this newsletter possible. Thank you all who have contributed to past and future issues of The Mill Newsletter.

As Always Take Care, Stay Safe, Happy Modeling and God Bless you all.

Don Dunn
Editor

Printed Newsletter
Is there any interested in a printed version of The Mill Newsletter? Keep in mind fees would have to pay for the printing and shipping of each issue. If anyone is interested send an email to don_csx@hotmail.com. With enough interest, this would be something I would consider doing in the future.

Cover Photo

Overall shot of Bob O'Neal's layout, Heinz Helm's blast furnace interior and Franklin Forge and Gear 91 ton ingot mold.

Submission information

Anyone who would like to submit pictures, articles, club news, upcoming shows or evens to be placed in future issues of The Mill, please send an email to don_csx@hotmail.com. Pictures used have to of your own collection or used with permission. When submitting pictures the bigger the better for detail purposes.

All pictures in The Mill are used with permission. If there are any questions concerning pictures used please send them to don_csx@hotmail.com and the question will be forwarded to the contributor of the photo.

In this issue

In Remembrance

Russell Campbell passed away on Saturday, June 16. He was a great modeler and well known to many for his HO scale Campbell Valley and Ohio R.R. Russell will be truly missed in the modeling community. Rest in Peace Russell.

Fellow modeler and railfan Alex Rossi was found deceased Sunday, June 24. Alex was from Brazil and was known for his video series Trens & Ferrovias (Trains & Railways) of Brazil. He was also an avid model railroader. Rest in Peace Alex.

Groups & Clubs

Steel Mill Modelers Special Interest Group (SMMSIG)

"The mission of the SMMSIG is to share information concerning modeling steel mills and railroads a well as to foster camaraderie among persons with interests in these topics. http://www.smmsig.org/

Steel Mill.io group. This group takes place of the Steel Mill Yahoo group. The Yahoo can steel be accessed but cannot be posted to. https://groups.io/g/STEEL

Upcoming Events

2018 Steel Mill Modelers Annual Meet (Kent, OH)
THE OHIO WORKS
July 12—14, 2018
Kent State University Hotel & Conference Center
215 S. Depeyster Street
Kent, OH 44240

For more information contact Steel Mill Modelers Special Interest Group (SMMSIG) http://www.smmsig.org/

Homestead Works By Bob O'Neil

The layout attempts to be a representation of Homestead Works with Carrie Furnaces across the Monongahela River from the Homestead Plant.

This layout is different from most because:

It is a completely finished layout (2004).

It is not a fiction. It represents a real iron works, steel mill, railroad and related industries.

The many scenes are taken from pictures of the actual plant operations, set in the 1950s.

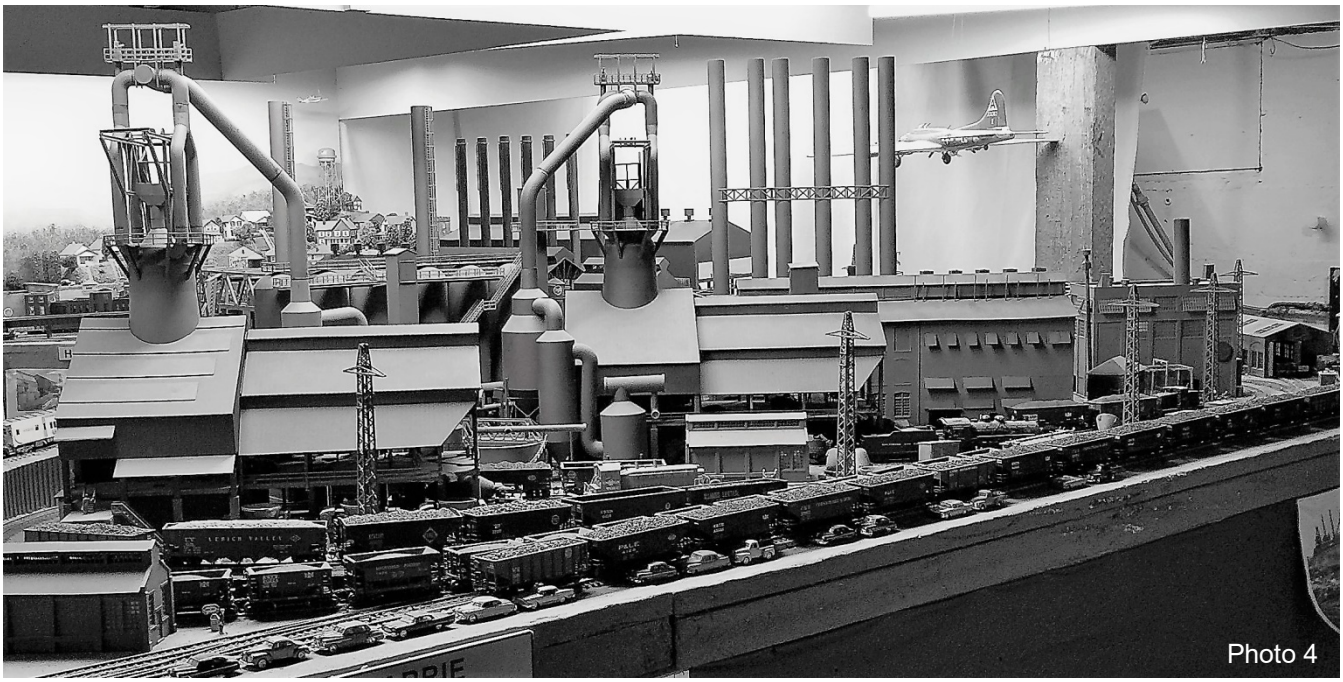
The whole 14'x16' layout is itself a **model diorama.**

It tells the story of the whole process of raw materials, smelting iron, disposal of slags, making ingots into steel products, and shipping the products by train and towboat to finishing mills as it was in the 1940s-50s.

(Photo 1) Bob O'Neil Standing in front of the ingot facility and eclectic furnace of his HO scale Homestead layout.

(Photo 2) Overall Shot of Bob's layout

(Photo 3) Photo about 1949 of US Steel's Carrie Blast Furnaces No. 3 & No. 4 at Rankin PA



(Photo 4) Using Photo 1 to model my first 4' x 8' part of my 14' X 16' basement layout. Molten Iron from the Carrie Furnaces was carried across the Monongahela River on the well known 'Hot Metal Bridge' to Open Hearths No. 4 and No. 5 at Homestead Steel Works. In view are the boiler & blower house and the A/C powerhouse.

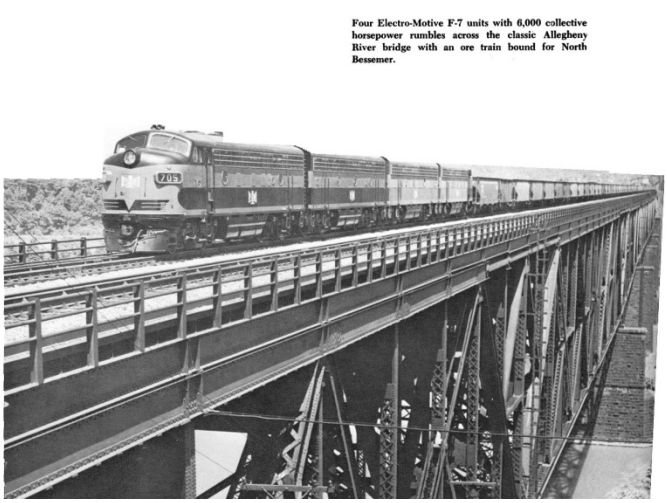
Photo 5

(Photo 5) Left to Right, Carrie Furnace No. 4; Blower engine and boiler house; A/C powerhouse. Engineering building in the foreground.

Photo 6

(Photo 6) Bob's Model of photo 3

Photo 7



(Photo 7) US Steel's Bessemer & Lake Erie F7 leads a long ore train across the Allegheny River Bridge on its way to North Bessemer. A URR Engine MU will pick up the cars there.

Photo 8

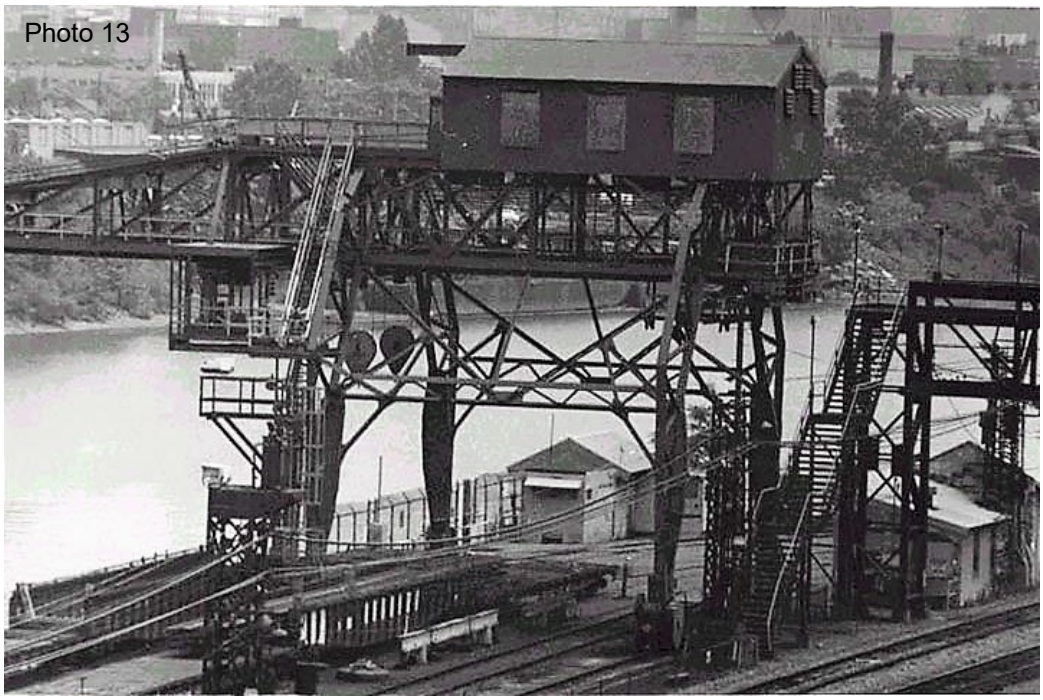
(Photo 8) Actual photo for Bob's model

(Photo 9) A slag train dumps its load at Duquesne Slag Co. operations on the Mifflin Branch.

(Photo 10) Bob's models Duquesne Slag Co. operation.

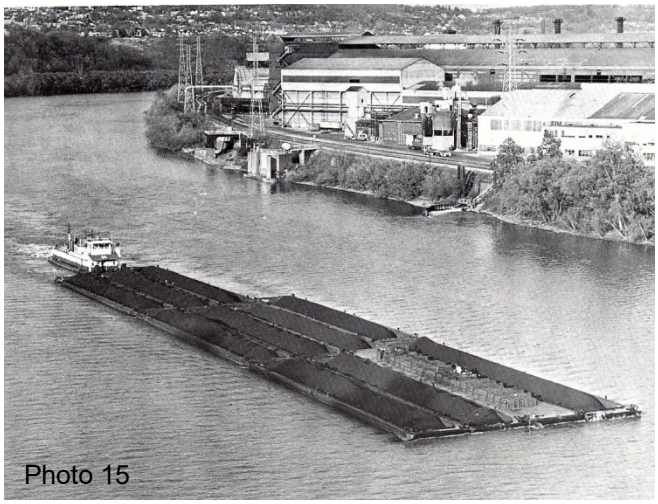
(Photo 11) Mesta Machine Company (now WHEMCO) Assembly Hall.

(Photo 12) Bob's model of the Mesta Assembly Hall. Mesta designed and built many of the presses and rolling machines for US Steel's 27 mills along the River.



(Photo 13) The Central Wharf Crane at Munhall Yard loads Homestead's steel slabs for barge shipment to finishing mills.

(Photo 14) Bob used leftover parts from 21 different kits to model the Central Wharf Crane.



(Photo 15) A "towboat" pushes 11 barges filled with coke and limestone down the Monongahela River past Homestead to other mills.

(Photo 16) Bob's towboat is of urethane castings, modified to the 1950s era. Above, a URR coke train crosses the Port Perry PRR bridge to Duquesne. Bob's Great Grandfather was a steamboat engineer 1854-1894.

(Photo 17) The URR "Hot Metal Bridge" carried molten iron from Carrie Furnaces to the Homestead open hearths. It was constructed with a steel floor and concrete & girder walls to contain any dangerous derailments.

(Photo 18) Bob's model uses an Atlas O-gauge bridge laying two tracks and switches as in the original. He added extra superstructure and set the slanted entrance girders to match the photo.

Article and modeling pictures by Bob O'Neal, Pictures of the actual mill from HABS/HAER Library of Congress collections.

US Steel Mill at Steelton, WV on Dave Stout's Layout

I have always been a model railroader since I was a little kid. I belong to the NMRA and I am a member of the local model railroad club and also a member of the Steel Mill Modelers SIG. I've always had a model railroad layout. The biggest industry I ever had was the HELGEN slaughter plant. At that time, there weren't very many large industry kits that you could build and put on a train layout. Then the Walthers model railroad company came out with steel mill kits. I was hooked from the first minute I saw them. I have a triple deck layout and after I got the steel mill kits, I completely changed the theme of my layout. It now, basically, serves my steel industry. Since I joined the Facebook Steel Mill Modeling Group, I have really been able to refine my modeling of my steel mill. My mill is basically a backdrop mill. Here are some photos of my mill and how I created it.

Picture 1

(Picture 1) Shops A and B, under the US Steel sign, by the main office building. Shop B is the HELGEN slaughter kit from my old layout. Sign made from letters I bought at the Dollar Tree. Ductwork on the side of the building is lifelike Scenic Masters. The false front office building is the front of a Model Power kit.

(Picture 2) Another shot of shops A and B, false front made out of an old plastic soda pop sign cut down to fit the space with Plastruct piping, ladders, and guardrails. I kit-bashed the building with the windows in front.

Picture 2

Picture 3

(Picture 3) This is the coil-loading area and off to the left, is the general maintenance shop. The coil-loading building was kit-bashed from the top part of the coke oven kit that I did not use.

Picture 4

(Picture 4) An overview shot across the old foundation of the diesel shops of the Mid-Ohio Valley Railroad now used by CSX to have engines ready to service the steel mill. Overview of shop buildings and coil-loading area.

Picture 5

(Picture 5) Here is a shot of the BOF-Basic Oxygen Furnace. The bottom part is the rolling mill Walthers kit. The top part is a cardboard piece, I cut to shape. I also used Plastruct piping and PVC pipe as well as copper fittings. The covered walkways, I cut out of scrap styrofoam and covered the sides and roof with corrugated Evergreen Styrene. Also, used Walthers pipe on the side of the building.

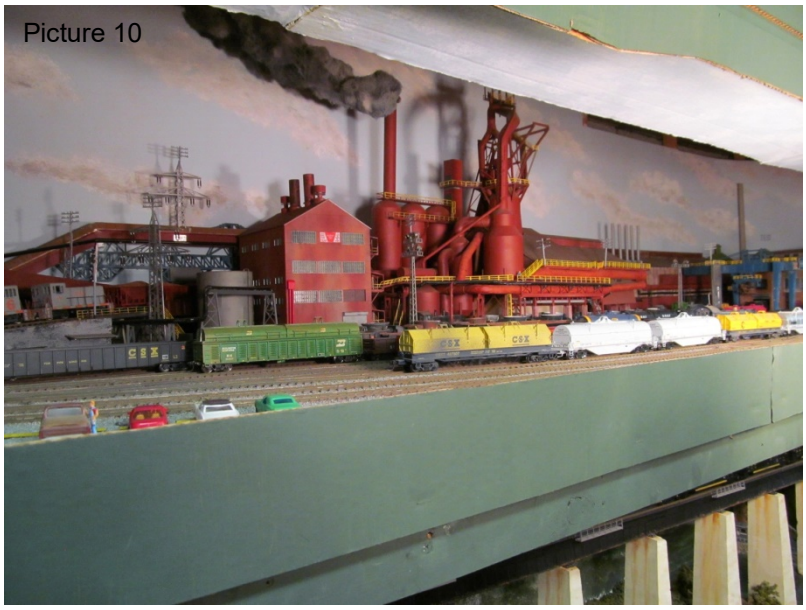
(Picture 6) A close-up shot in front of the BOF, looking towards another mill building that was the IHC Union Pacific coal-loading kit.

(Picture 7) Looking across the mill yard, at the Green Rolling Mill building in the background. Scratch-built from Evergreen Styrene.

(Picture 8) Another shop building and overhead crane. Behind the crane, is another Walthers steel mill kit made to be a finishing mill building.

(Picture 9) Looking across the yard at the blast furnace, pipes made from PVC pipe and copper fittings. I used copper fittings because PVC fittings are too large. Also, the black pipe is made from bendable straws. In addition, you can see slag pouring into a slag car as a leased engine by US Steel pulls out bottle cars from under the cast house.

(Picture 10) An additional view of the blast furnace and the cut down engine blower house kit, that I had to make to fit the space. The smoke coming from the stack is white polyfiber with a wire running through it, spray-painted with black paint. It was stuck in the top of the stack. I had better watch out for the EPA.



(Picture 11) Close-up view of the engine blower house. Off to the right, the stoves that burn gas and stores heat.

(Picture 12) Outside break area for the workers, as ore is being pushed up the high line.

(Picture 13) Walkway crossing CSX and the mill yard tracks, from the north parking lot, at shift-change. Looking towards iron ore being pushed up the high line. Far back on the backdrop, is a covered conveyor made out of wood with plastic molding, purchased at a lumber store that made the roof. A Walthers power house kit was made into a pump house, with a Walthers pre-built water tank beside it.

(Picture 14) Close-up view of the pump house. The backdrop is the Sinter material handling building. I made the building by using scrap parts of the New River coal mine kit.

(Picture 15) Covered line conveyer made out of two plastic hockey sticks, covered in Evergreen Corrugated Styrene, parts of an old Venician blind, the curved slats used to make the roof. The conveyor runs to an old grain elevator kit. The building behind the conveyor and bottle car is a rotary dumper building. Also, I put one of the coke oven buildings with a conveyor running to it from the rotary dumper building.

(Picture 16) Pipes across the roadway, used old Plasticville signal bridge and bendable straws for the piping.

(Picture 17) Coal truck leaving mill, passing guard house at Gate 6, as US Steel switcher is working in the ore yard, as a barge passes on the Ohio River. Guardhouse and storage building are scratch built from spare parts of old building kits.

(Picture 18) US Steel switcher shoving lime cars through the lime-unloading building office and lunchroom for the workers in the department in front of the lime-unloading building. The lime building is kit-bashed from the Walthers New River mine closed in at the bottom and corrugated parts added to the sides.

(Picture 19) At the material-handling entrance, Gate 6, at Route 7. Sign built out of scrap parts with stick-on letters and lights from an unused kit. At the east side of the mill.

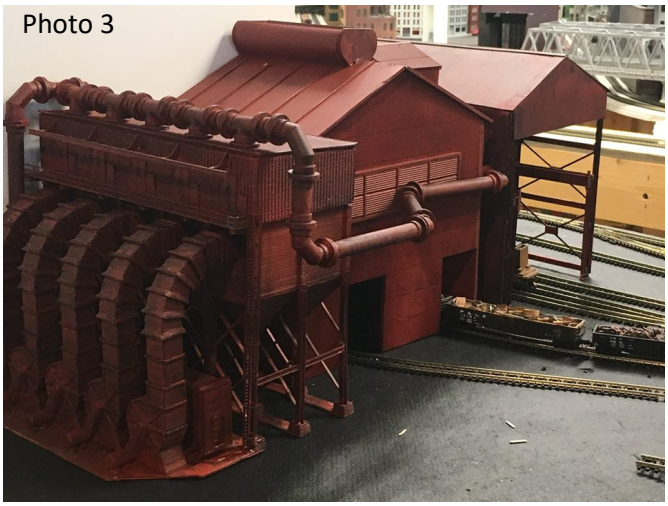
I live in Parkersburg, WV. I live about 100 miles from any hobby shops. I've had to make due and scratch-build things for my mill. I have always liked model railroading but since Walthers came out with the steel mill kits, I like it more than ever. In 2015, the Steel Mill Modelers SIG had their annual meet in Wheeling, WV. Myself and my good friend, Paul Lapointe, who also models steel, had the privilege of having our steel mill layouts on the tour. It was a great honor to have Eric Craig, Michael Rabbitt, Vince Altiere, Jim Dipaola, Phillip Burnside and his father, and Brendan Brosnan. Just to name a few who visited my steel mill layout. If you are ever in the Parkersburg, WV area, please give me a call at 304-916-1209. I would be glad to show you my steel mill layout. I have had fun building a model railroad and it has been enhanced because of modeling a steel mill. Modeling steel mills, I have found out, basic things in all mills are the same. In many ways, each mill is different. I've noticed that and looking at the pictures of the mills that each one of us models, every year on the first of May, we have STEEL IS KING day. It is a day of mine and Paul Lapointe's layouts being open. Steel IS king!!! Have a rail great day! I hope you've enjoyed this article.
Pictures and article by Dave Stout

Modeling Photos

This issue's modeling photos are of Don Cameron's N scale layout. All the buildings are made completely scratch built out of resin or styrene. Garry Lance is the builder of the steel mill. Photos by Garry Lance.

(Photo 1) Baghouse soaking pit roiling mill. The baghouse is from Burnside products for HO scale Garry made add-ons to make it N scale

(Photo 2) Ingot stripper building scratched from styrene.

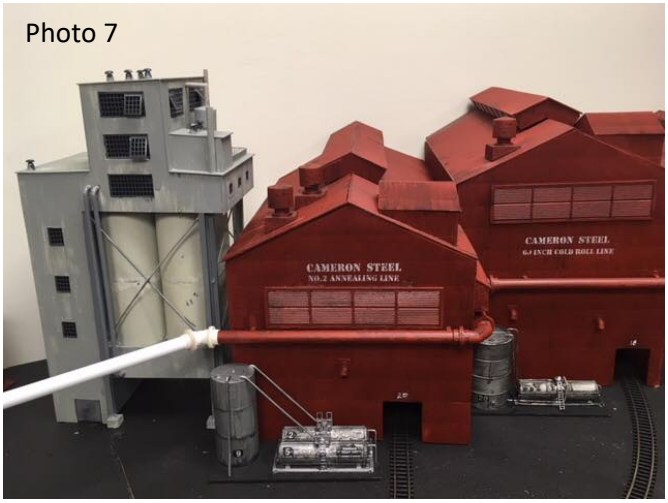


(Photo 3) Another shot of the baghouse, soaking pit, and rolling mill.

(Photo 4) BOF with scrap building scratch built out of styrene. Precipitator on right

(Photo 5) BOF with scrap building scratch built out of styrene. Precipitator on right. Small tanks from the parts box

(Photo 6) Water treatment with building flat all out of styrene.



(Photo 7) Two different mill buildings all made of resin, tanks from parts box, the grey structure on left has been moved to a new location

(Photo 8) Two more mill buildings one is a forge shop the other a pickling line all resin.

(Photo 9) Powerhouse all resin except stacks.

(Photo 10) Open hearth all resin except stacks plumbing pipe

What's on the bench!

In this issue of "What's on the beach!" Part 1 of Heinz Helm explaining how he built the hot air blast ring for his blast furnace, Franklin Forge and Gear shows how to make a 91-ton ingot mold, and Eric Craig open heath furnace build.

Building a Ho scale

Hot Air Blast Ping

Part 1

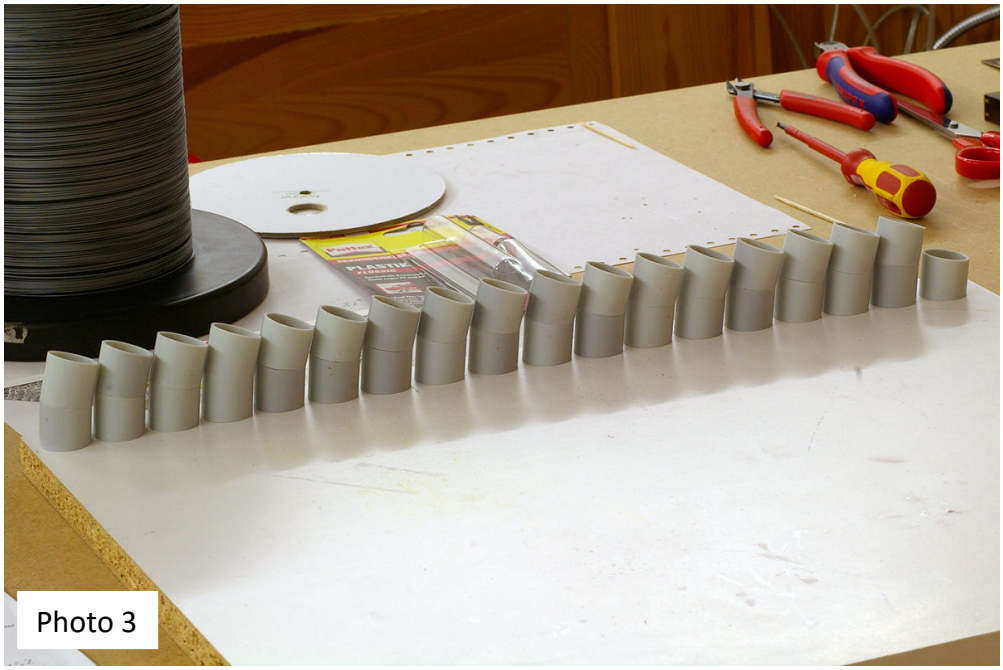
Article and Photographs by Heinz Helm

Photo 1

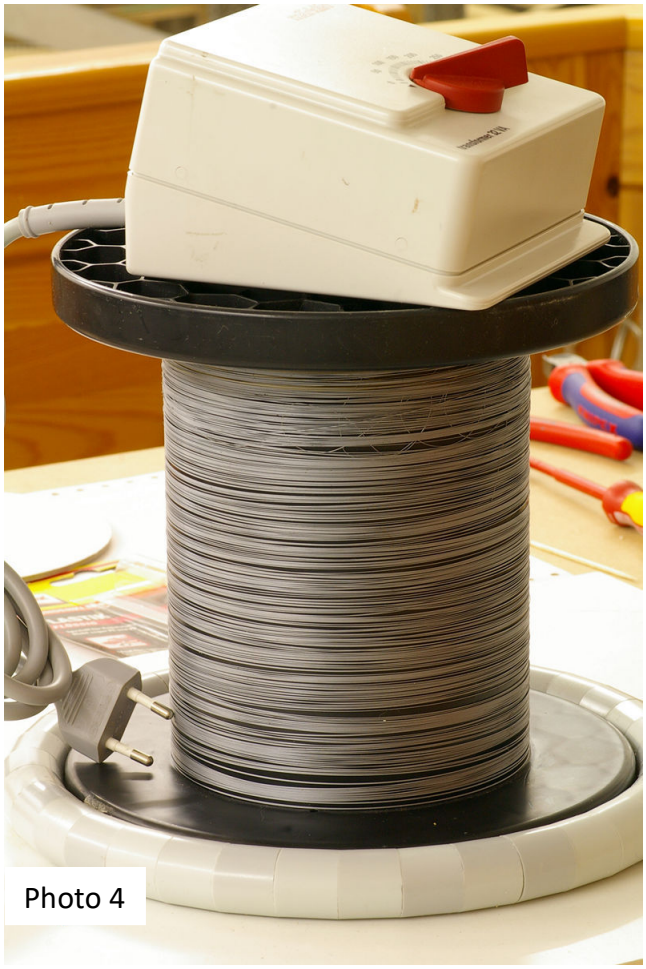
(Photo 1) Completed hot air blast ring can be seen here. Pictures of Heinz's blast furnace has been in past issue of The Mill.

Photo 2

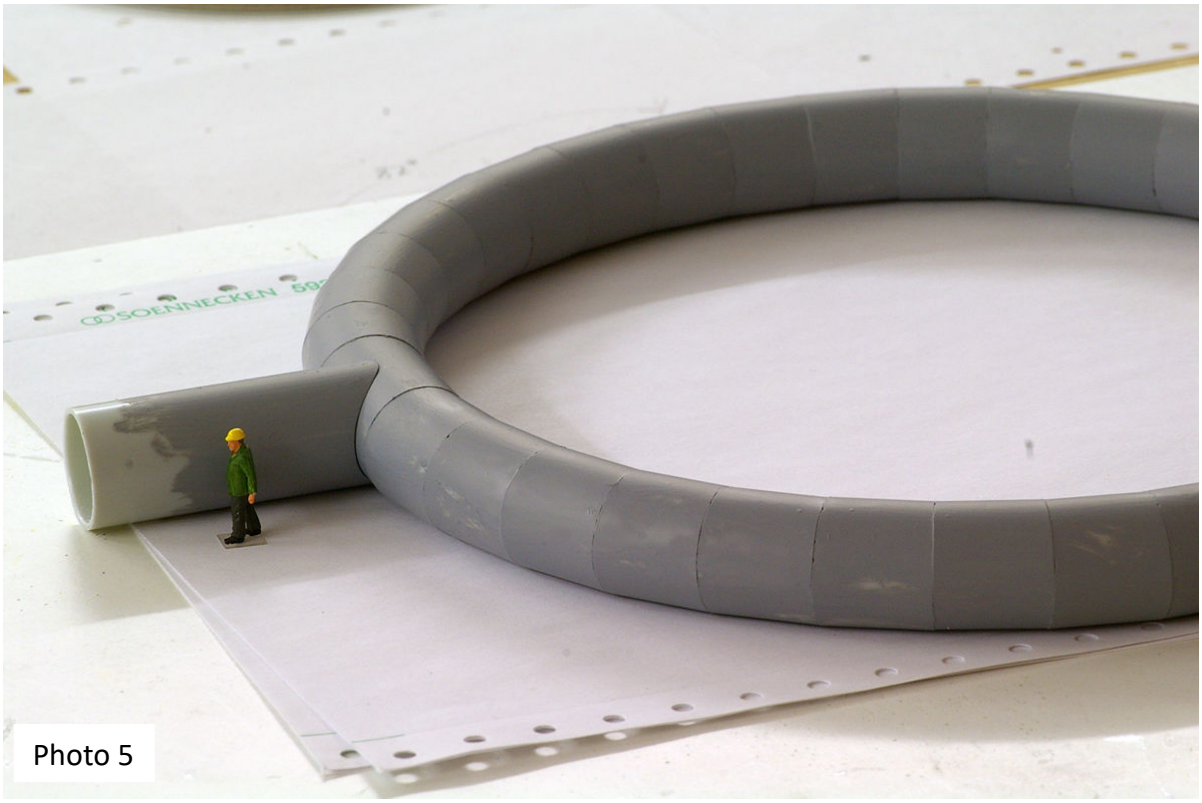
(Photo 2) 35 sections of 25mm (1") tube, cut at an angle of 5° on each side. The Pipe is from electrical conduit system



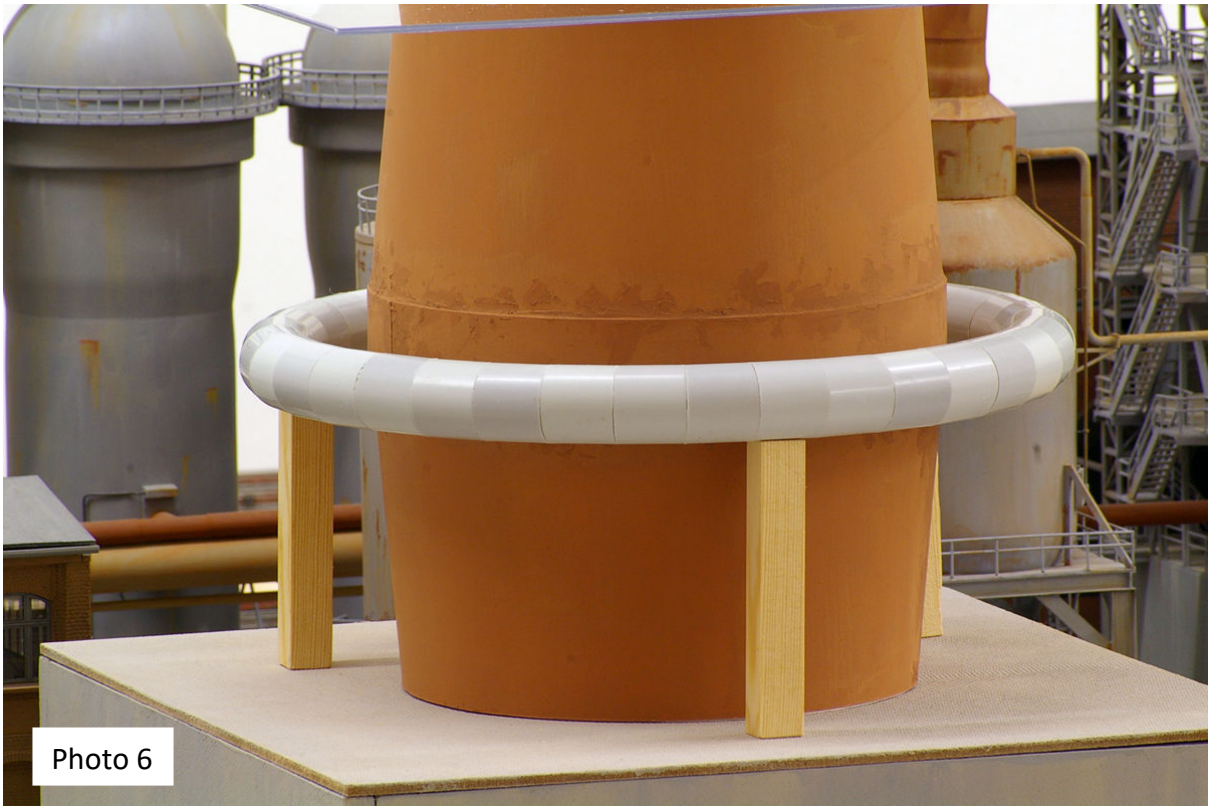
(Photo 3) Segments are glued together two by two for better handling when the circle will be formed



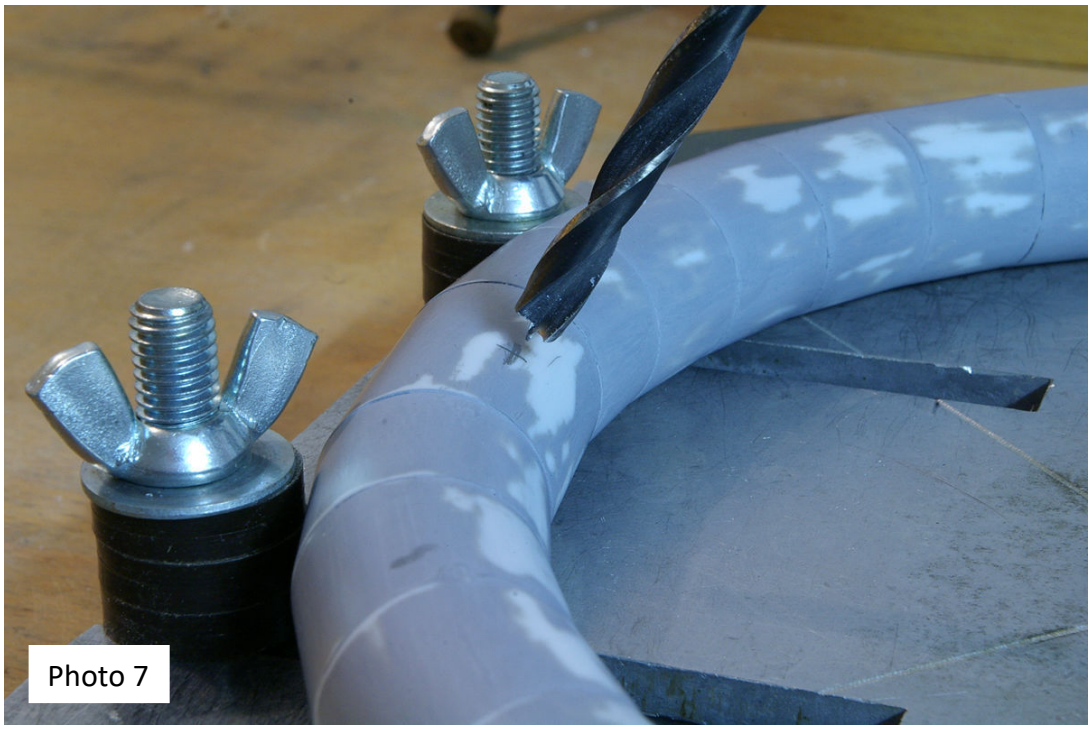
(Photo 4) An old wire spool happened to suit the desired diameter and was used as a caliber. It is weighted with a märklin transformer for easier working. This way I got the ring mounted as a plain circle. Ring's diameter depends only on the lengths of the segments, not on the 5° angles. As I wasn't able to saw exactly enough, I put 35 parts together and filled the gap that was left with a specially adapted end piece. It is a little longer than it's colleagues.



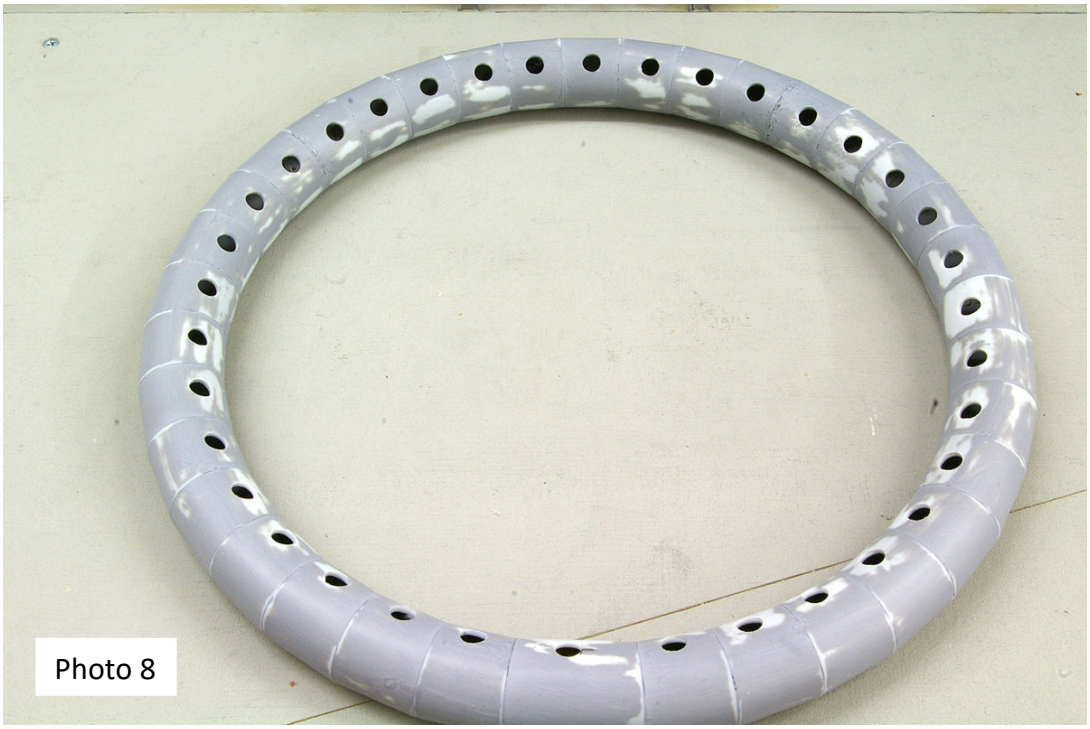
(Photo 5) This longer part comes just right to connect to the hot air blast line



(Photo 6) Before going on, the ring must proof to suit to the blast furnace's size



(Photo 7) Now it's time to think about connecting tweeters. Instead of gluing small pipes to that curved contour I thought it would be better to drill holes and just plug pipes in. It took a while to work out an adequate position for those holes. Finally, I marked one segment and started drilling. The drill was fixed and I just had to move the ring to the middle of the following segment after drilling



(Photo 8) Before going on, the ring must proof to suit to the blast furnace's size

Article and pictures by Heinz Helm. Part 2 will be in October 1st issue

Building an HO model of

91 ton ingot mold

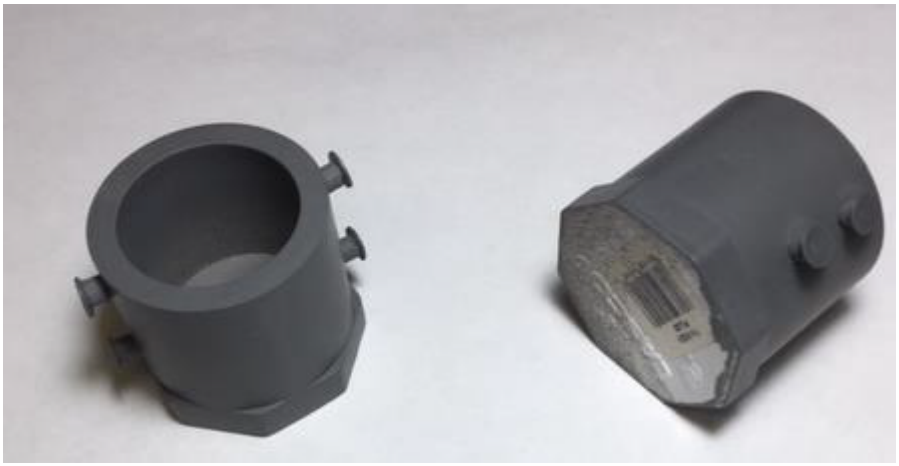
Article and Photographs Franklin Forge and Gear

Someone one once said that a Model Railroading layout is almost like a theater and the trains are just mere actors. It has a stage, scenery props, and our trains pass from one side of the stage to the other, spending a short time out in front performing. Like these theatrics, our models sometimes are not what they appear to be; fooling the eye and the mind, and can be a well, rewarding endeavor. At the same time, the art of kitbashing is seeing one thing and imagining something else totally different, can lead to some interesting theatrics and deception of the mind and eye. The challenge of kitbashing is what leads to the large ingot mold build based on the picture of the ingot mold car shown below.

The main focus of this piece of rolling stock is the 91 Ton ingot. Building this piece would be challenging but not difficult. In doing some comparison of the parts sizes within the picture, it appears to be about 26 ft long and 13 ft wide (as a rough estimate). I looked online for octagonal tubes and none I could find were thick enough. Hand carving out of wood or foam appeared to be a time-consuming process and out of the question. Making a mold for resin casting might be overly complicated and time-consuming also, besides a pattern would be necessary. 3D printing was just too costly. I was looking for a quick hitting easy, affordable project. I needed something that the average modeler could build. But keep in mind that the 50/3 rule was going to be in effect for this project. For those that don’t know what the means, if your over 50 and you cant see a detail or defect at 3ft then it is considered good enough. Some of our younger modelers will be there one day also, so don’t laugh. Oh, BTW I am not a rivet counter. If it looks good, then it is good.

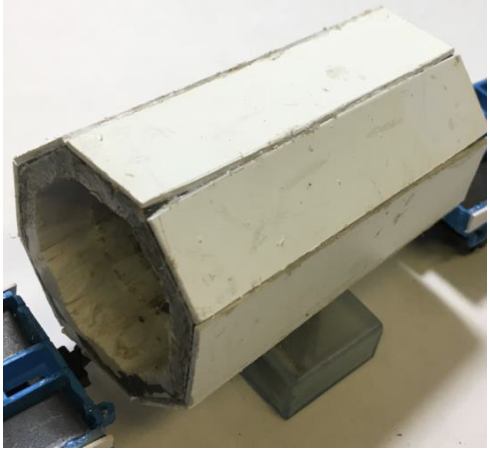
When looking at one of my train display cases I saw a previous project of some old pouring molds that I had made for my steel mill. These were a quick 15 min projects. They were made from 1 ½” end cap plugs for PVC pipes that I had gotten from my local big box lumber supply store. For my steel mill, I made some of these, adding the trunnions (lifting ears) on the side, made out of thumbtack tops cut and glued on the sides. Now you have a ready-made ingot mold and stool. One can also put flutes in if desired. I took my HO ruler out and did a quick measure and these were perfect. They had 8 sides and needed to be built up some. But they would work.

The first step was making the solid end hollow. I did this by drilling a hole in the middle of the bottom and cutting the center out with a coping saw. Once I had this done, I then butted the two round ends together and glued them together. I used a glue called Fastenall found at your local Dollar Tree store for a dollar a tube. This glue will bond almost anything to anything as long as you follow the directions. For our purposes here, it would be strong enough.



The next step was to take 1/16” half round strips of plastic and glue them to the sides of the pipe so that the edge of the flange of the octagon and the half round were flush. This gives a solid surface for supporting and gluing. Because next the sides of the ingot will need to be glued on. The thickness of the plastic sides is up to the individual modeler. I had some 1/16” thick stock left over from an old signage project in my scrap box so I used it. It might be a little thick but it worked. Carefully cut the sides out so that the sides of the ingot will butt up correctly and glue solidly. The set of pictures below will guide you on the assembly process.

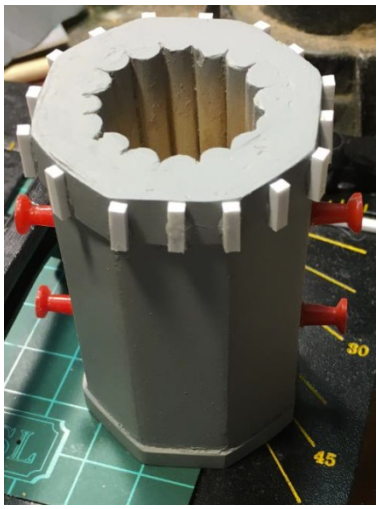


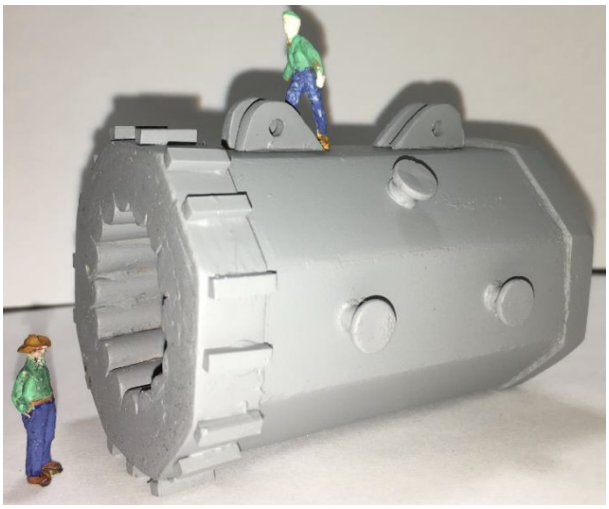


After the body is assembled the next step is adding the flutes to the inside of the ingot. I did not have any 1/8” plastic half round in my scrap box but I did have some 1/8 wooden dowel rod form of some hot dog sticks I purchased on closeout last Fall from a grocery store. Below is the tedious process I used to cut them. Not perfect by any means but it worked. After all, once the model was assembled and the car was built they would hardly be seen in the middle of the ingot. I then glued the flutes inside the ingot.


Once the glue is dried (overnight) I took some thinner plastic and cut 2 strips approximately ¼” wide (one wider than the other to distinguish top from bottom) and glued it around the top and bottom of the ingot. I then filled in both ends and sides with modelers putty to lessen any defects. One can also use a combination of Superglue CA and Baking Soda for gap filler. However, the fumes are very toxic and do this only in a well-ventilated area. But the bond one gets from this process is almost unbreakable. Once dry sand the sides and ends smooth. Remember as a model railroader one has to sometimes be a mechanical engineer /dent and body mechanic /woodworker / machinist / chemist / artist all at the same time.

After all the sanding and the filling in the gaps is done the next step was to “Americanize” the ingot since the picture showed the practices of Great Britain, and did not have all the details we are accustom to here in the States. I painted it to show any final surface flaws and then made lifting lugs from thumbtack heads. For correct positioning, I found a picture that shows how BSCo handled a large ingot mold such as this. I cut some 1/16”square stock for the rim of the top and hand cut some J-Hook trunnions.





Ingot mold used at BSCo

Ingot Mold being delivered to Franklin Forge and Gear. Note boards between flutes of ingot and girder panel of the train car. This is to keep damage from being done to the flutes while loading and unloading, this also prevents damage in transit.

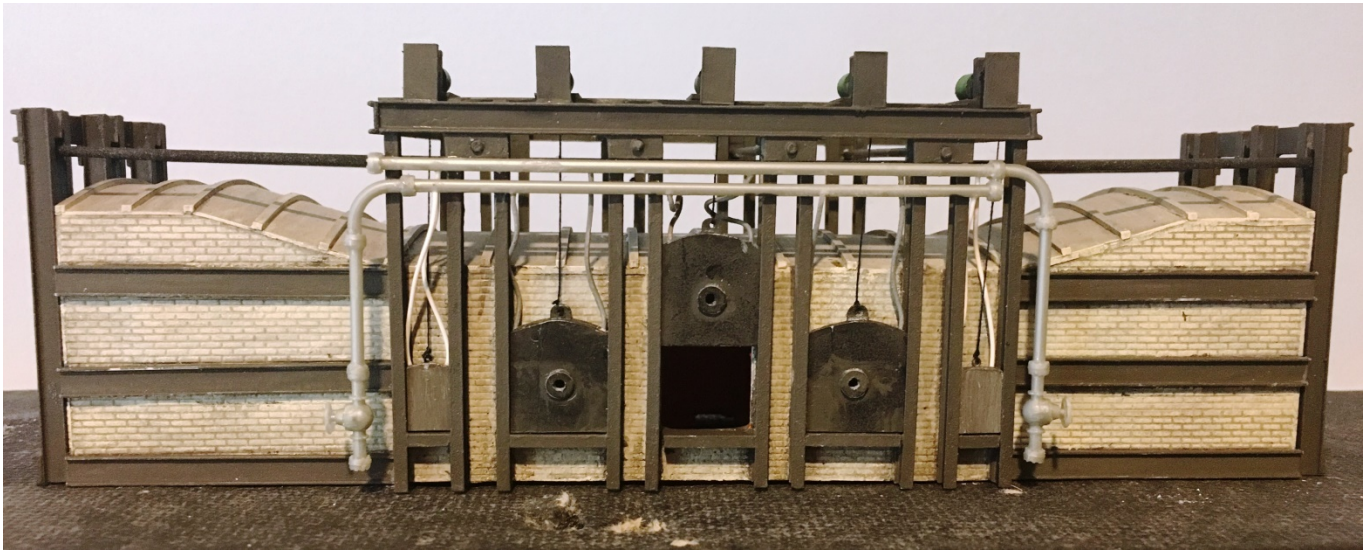
Article and model photos by Franklin Forge and Gear. Pictures of the real ingot load are from. https://www.gettyimages.com/

Building an HO Scale Model of an

Open Hearth Furnace

Article and Photographs by Eric Craig

The modern open hearth furnace was first developed in the 1860's by German born Carl Siemens. In 1865 French engineer Pierre-Emile Martin took out a license from Siemens and built a furnace to make steel. The process was called Siemens-Martin resulting in the birth of the first modern open hearth furnace. Its main advantages over the Bessemer process were; not exposing the steel to excessive nitrogen, which causes the steel to become brittle, easier to control, and the ability to use large amounts of scrap.



In the early 1900's, open hearth steel overtook Bessemer steel in tonnage output, and by the early 1990's most open hearths were gone, being replaced by the basic oxygen furnace.

Open-hearths furnaces take blast furnace hot metal and scrap, heat it to drive out the impurities with the result being steel. A duplex furnace takes semi processed hot metal, possibly from a Bessemer converter or electric arc furnace, and further process it. No scrap is used resulting in a much shorter heat time. A furnace using scrap can do about 4 heats per day whereas a duplex furnace can do about 10 to 12 heats per day. Some furnaces, such as those found at Roebling Steel, were strictly cold charged, with scrap, pigs or both. In all of the above, the final result is the same, molten steel.

The first step in building your furnace is to decide what era your mill "lives in". This will determine what size furnaces would be plausible to model. Transition to early 1990's had larger furnaces, most likely in the 200 to 300-ton range. I am modeling the 1920's when smaller furnaces when the norm. During this time some mills had 150 to 200 furnaces, but most were smaller.

I settled on 50-ton furnaces, which would be prototypically correct for the time of my mill. They are small enough to plausibly fit into the Walthers Rolling Mill Buildings. The Walthers electric arc furnace buildings would be a better fit, but they are difficult to find, so six 50 ton furnaces shoehorned into six feet of Walther's rolling mill buildings it is.

Two are duplex furnaces, with hot metal supplied by the Bessemer converters, and each can do 10 heats per day for a total daily output of 500 tons per furnace. The other four are standard furnaces, charged 50/50 with hot metal and scrap. Each can do 4 heats per day for a total daily output of 200 tons per furnace. The six furnaces can produce up to 1800 tons per day.

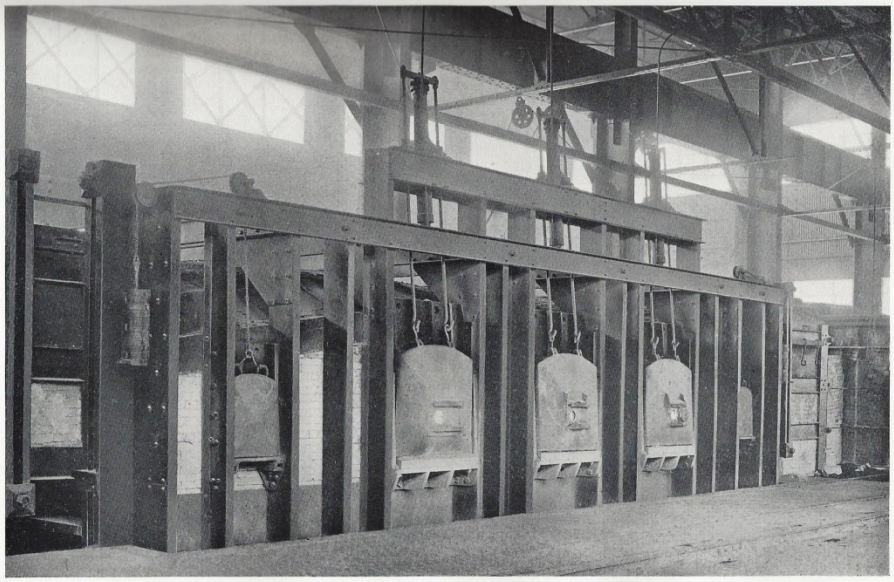


Figure 16—CHARGING SIDE OF A 35-TON WELLMAN FURNACE

The charging doors are operated by hydraulic power through lifting cylinders carried on a frame above the furnace binding. The small side doors being counterbalanced are easily opened and shut.

Construction of The Furnace Body

The “go to” book for 1920’s open hearths is “The Open Hearth, The Wellman-Seaver-Morgan Company” by Victor Windett. It contains many pictures and voluminous amounts of detailed drawings. From this book, a 50-ton furnace measuring 58 feet long by 16 feet wide by 14 feet high was selected. There is a hard-cover copy of his book in my library, but spending money to get one is not necessary as it is available on Google books for free.

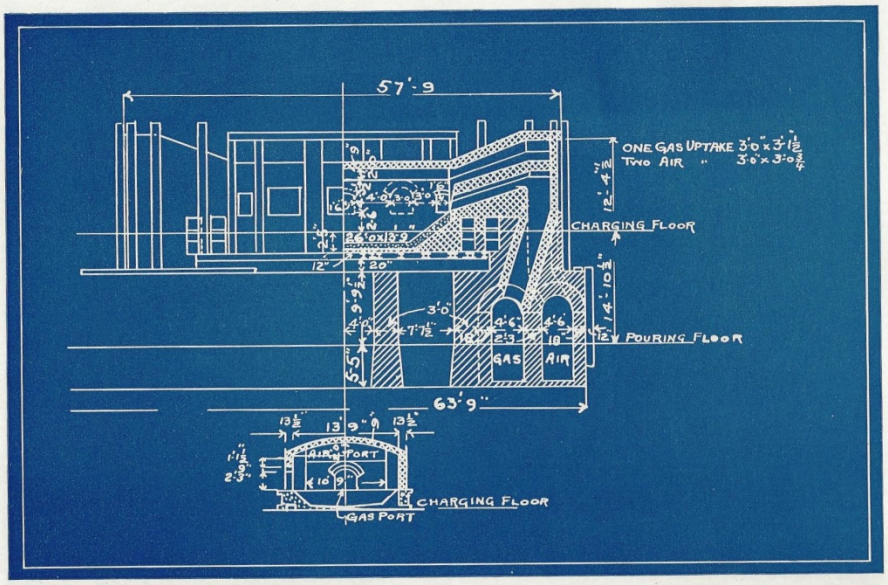


Figure 70—50-TON OPEN HEARTH FURNACE

Built for Worth Bros., Coatsville, Pa., in 1906. Gas is used for fuel. The hearth is 13 feet 9 inches by 28 feet. The ratio of the length to the width is 2.04.

A rough sketch was prepared to utilizing the Wellman drawing. The model was broken down in three basic shapes for ease of construction. It is just a series of rectangles, a center with two ends. Except for the Plastruct brick sheeting, the body was constructed using styrene shapes and sheet. The shapes are various sizes and the all the sheet is 030.

The Center

Make a solid box with cutouts for the doors. Next, cover the front and back with a Plastruct brick sheet, leaving the sides, top and bottom uncovered. Glue a beam lengthwise in the center of the top. Cut a piece of sheet that will fit lengthwise and lap over the edges, glue in place. Cut out pieces for the ends and glue in place. After it sets up, trim the sides and lengthwise edges. Next, we want to put the support straps on the top of the roof. For the support straps, use what you have available that looks plausible.

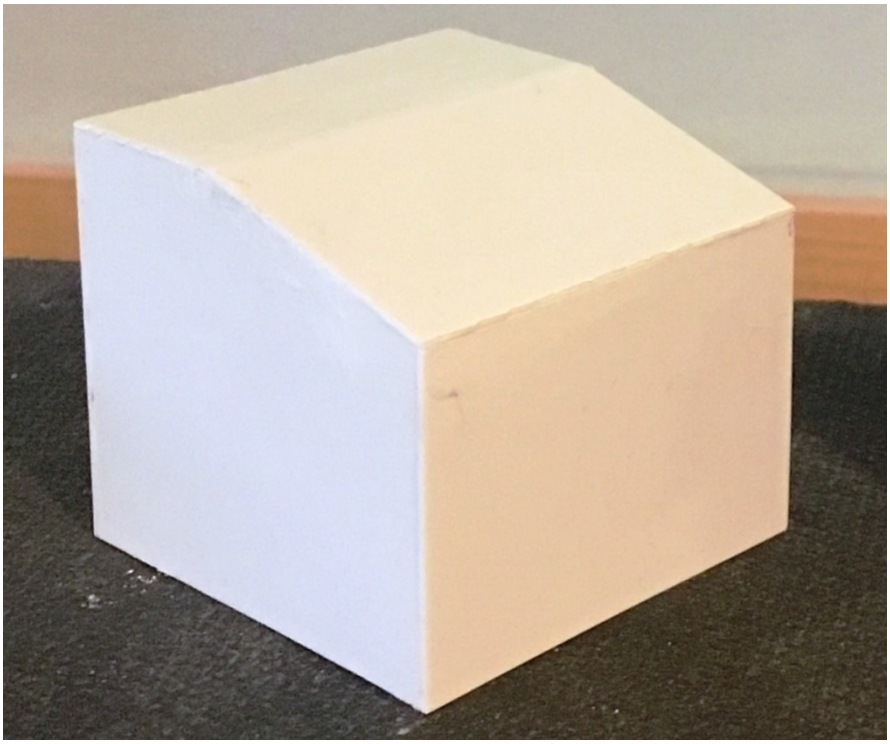
The End Pieces

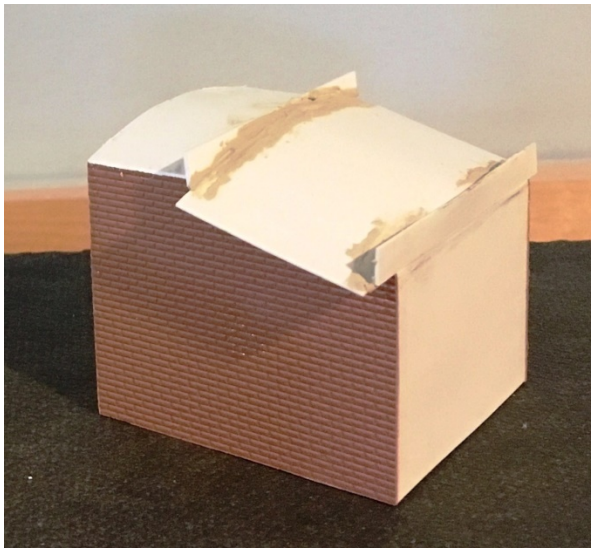
The end pieces are constructed the same as the center, except you will have to do some filling in where the roof edges join. I used spackling putty. On this model, there are no doors on the end pieces.

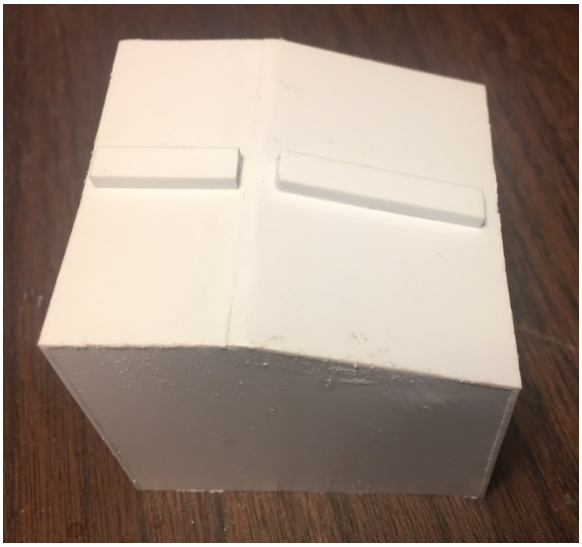
Construction Pictures.

In order to avoid redundancy, only pictures of an end piece are shown. All are constructed in the same manner. The first is the box, the second is the box with the beam in the center of the top, the third is the ends and sheet on the top and the last is the support straps on the roof.

Glue the sides to the centerpiece and paint the assembly. Firebrick is not red, it is typically off-white to a whitish yellow.





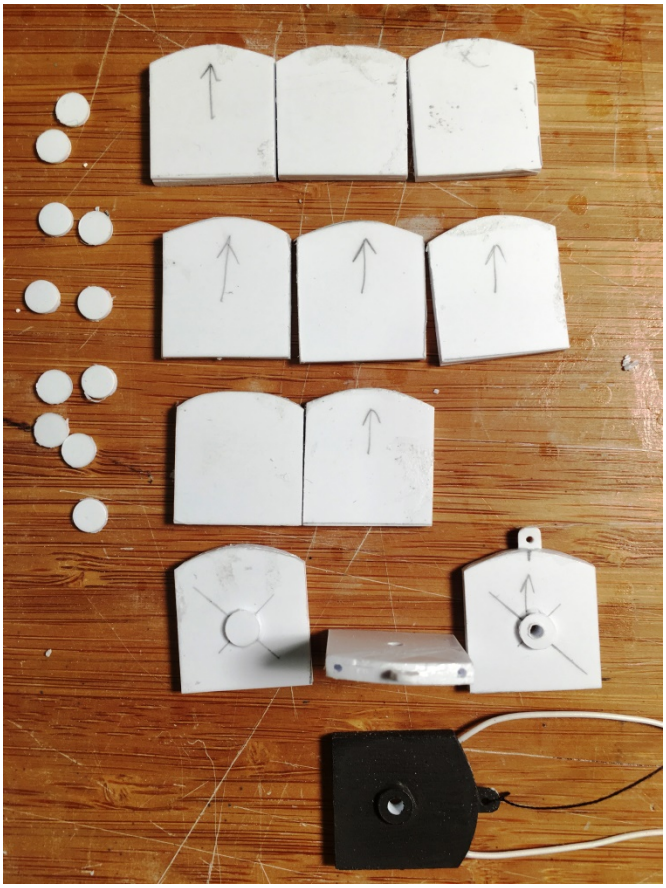


The Support Beams

You can drive yourself crazy looking at pictures of the furnace support beams, just pick a design. Since the fronts and backs are the same, and the sides are the same, jigs were made to save construction time. This also insured that all were the same and they matched up. The vertical supports are 5/32 I beams and the horizontal supports are 3/16 channel. The vertical support beams hold the doors in place. Why these sizes? Firstly they look prototypically correct and more importantly I had a good supply of both on hand. The tightening rods are 1/16, which is probably oversized, but as before, I had a good supply on hand. Make sure they are square before gluing them down.

Doors and Motors

Styrene sheet was used to make the doors. They were cut to fit the openings, tops were rounded off, with discs placed in the center of the doors. Holes were drilled through the discs to simulate the sight glass. The sights were left open so the fiery effect was visible. The lift hooks were made of scrap pieces of styrene, tops rounded off and holes drilled in the middle to accept the retracting cable. The cable is wire rope and thread was used to simulate this effect. The doors are raised and lowered utilizing electric motors on top of the furnace. The motors were constructed of 3/16 tube, 1/16 tube and, 040 rod, all telescoped together. The gearboxes, support bases, and shafts were made from scrap styrene, I just grabbed what looked right, not sure of the sizes.



Cooling Pipes

Anything metal that comes in close contact with hot metal needs to be cooled, with the most important being the furnace doors. Water is circulated through the doors and sent to a chiller to be cooled. Looking at various pictures of furnaces, some supply and return lines appear to be rigid while others appear to be flexible. For ease of construction, the flexible tubes were selected. Looked through my wire drawer I found what appeared to be 22 gauge coated wire. Good enough. Small holes were drilled in the tops of the doors and bottoms of the pipes to accept the flexible hose (22 gauge coated wire). The wires were cut to fit, inserted into the holes and secured with a drop of CA. The common supply and return lines were made from Walthers 933-3105 piping kit parts. The main supply and return lines are overhead and in back of the furnaces. Feeders drop down from them and go under the furnaces and back out the front side where they are connected to the individual furnace lines. When the furnace complex is permanently placed on my layout, the main supply and return lines will be run out of the building and connected to a chiller/pump house.

Lights

The insides of the furnaces were painted orange to simulate a very hot fiery molten metal bath. Lighting was added to enhance the look of burning hot metal. Three LEDs were placed under each furnace and all were daisy chained together. A 12-volt power pack supplied the “juice” with an add on to simulate the flickering effect. Mike Rabbitt told me that they shut off the gas during charging and Jim Kerner said they kept it on. Jim’s opinion is based on a visit he made to the Fairless Steel in the early 1990’s. The open hearths were included in the tour. I have never seen an open hearth in operation but my company works regularly on melt furnaces in an aluminum factory. These furnaces are run at 1700 degrees and the gas is shut off during charging. “Whatever”, it’s too much work to separate the lighting, so all have the gas on (i.e., flickering lights)

Around the Mill

These group of pictures is from Michael Davis collection. Michael has a great collection of dragline and shovel pictures. The following set of pictures of from mines that served the steel industry.

(Photo 1) Benjamin Coal Company 1250W in Pennsyvania

(Photo 2) The Anthracite King is a Bucyrus Erie 1250B. From Jeddo Highland Coal. It worked in the strip mines of Northern Pennsylvania

(Photo 3) Jeddo Highland Co. Bucyrus Erie 1450W

(Photo 4) Taft Coal Bucyrus Erie 1300

(Photo 5) Jeddo Highland Coal Marion 8700W

Steel Mill Related Videos

Green Frog Productions
*Styrene The Ideals, Tips and Techniques of Dean Freytag.

PCN Tours
*Joy Mining Machinery
*ArcelorMittal Steel

Pentrex
*Eastern Kentucky Coal

Plets Express
*C&NWs Iron Ore Route
*Duluth, Missabe & Iron Range Vol 1
*Duluth, Missabe & Iron Range Vol 2
*Lake Superior & Ishpeming Vol 1
*Lake Superior & Ishpeming Vol 2
*Bessemer & Lake Erie
*LTV Ore Lines
*Missabe T-Birds
*Missabe Rails
*Missabe Winter Vol 1
*Missabe Winter Vol 2
*NorthShore Mining Railroad
*Ohio Rails and the Wheeling & Lake Erie
*Railroads & Ships of U.S. Steel
*Taconite Trains of Minnesota Vol 1
*Taconite Trains of Minnesota Vol 2
*Birmingham Southern
*Elgin Joliet & Eastern
*Tribute to the Erie Mining Ore Lines
*Twin Ports Trackside Vol 1 Duluth Minnesota
*Twin Ports Trackside Vol 2 Superior Wisconsin

Prairie Works
*Hot Metal
* Union Railroad
* On the Great Lakes
* Lake Superior Iron
* Missabe Retrospective
* Duluth, Missabe & Iron Range Steam Power
* Duluth, Missabe & Iron Range Depots & Structures
* Taconite Haulers
*USS Duluth Works - Photo Video
*Super detailing a Walthers Blast Furnace Part 1
*Super detailing a Walthers Blast Furnace Part 2

Model Railroader's Dream - Plan - Build
* Railroads and Steel

Videotrain.com
*The Union Railroad

Any steel mill related videos that should be included on this list please send information to don_csx@hotmail.com .

Steel Mill Related Books

*Morning Sun Books
By Stephen Timko
Steel Mill Railroads in Color Vol #1
Steel Mill Railroads in Color Vol #2
Steel Mill Railroads in Color Vol #3
Steel Mill Railroads in Color Vol #4
Steel Mill Railroads in Color Vol #5
Steel Mill Railroads in Color Vol #6
Steel Mill Railroads in Color Vol #7
Appalachian Coal Mines and Railroad Vol#1
Appalachian Coal Mines and Railroad Vol#2
Appalachian Coal Mines and Railroad Vol#3
Industrial Railroading Vol#1
Industrial Railroading Vol#1

Steel Mill Railroad Facilities and Equipment (eBook)

By Robert Wilt
Bethlehem Steel Company Vol #1, Obtaining – Transporting Raw Material, and Making Iron
Bethlehem Steel Company Vol #2 Making Steel, Finished Product Handling, and the Final Years

By David C. Schauer
LS&I Vol #1
LS&I Vol #2

By Richard C. Borkowski Jr.
Union Railroad In Color

By Kurt Reisweber & Brad Esposito
Pittsburg & Shawmut

*Model Railroader
By Bernard Kempinski
The Model Railroader's Guild to Steel Mill

*The Railroad Press
By Nevin Sterling Yeakel
Bethlehem Steel

*Plastruct
By Dean Freytag
The Cyclopedia of Industrial Modeling

*Walthers
By Dean Freytag
The History of Making and Modeling of Steel

Any steel mill related books that should be included on this list please send information to don_csx@hotmail.com

Steel Mill Related Websites

Groups
*Steel Mill Modelers Special Interest Group
http://www.smmsig.org/

Facebook:
*Bessemer Subdivision
https://www.facebook.com/groups/787429424621662/?fref=nf
*Bessemer and Lake Erie Railroad Sightings Page
https://www.facebook.com/groups/1029716723816394/
*Bethlehem Steel Railroads
https://www.facebook.com/groups/bethsteelrailroads/
*Birmingham Southern-Fairfield Southern
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*Steel Mill Pictorial
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*U.S. Steel Duluth Works
https://www.facebook.com/groups/101591233225098/
*Youngstown Steel Heritage
https://www.facebook.com/SteelHeritage/

Layouts:
*Acme Steel Riverdale BOF & Chicago BF Modeled in HO scale(1/87)
http://www.trainweb.org/chicagosteel/index.htm
*Bethlehem Steel Layout
http://www.brokenbushandroundtop.com/bethlehemsteel/
*Columbia River Steel Corporation
http://www.prairie-works.com/crsc.html
*Dave Scale Modeling
http://daveayers.com/Modeling/
*DK Recycling
http://www.frankshuette.de/
*Forsten Online
http://www.stahlbahn.de/index.php
*Harrisburg Terminal Railroad
https://www.facebook.com/Harrisburg-Terminal-Railroad-271356453384157/
*Pittsburgh and Western Railroad - Paul Lapointe
http://www.coaldivision.org/pittsburgh_and_western.html
*Pittsburgh, Youngstown & Ashtabula RR
http://www.pyamodelrailroad.com/
*Stahlbahn
http://www.stahlbahn.de/index.php
*Timber River Railway
http://www.timberriver.org/
*Republic of Train World
http://trainworldcity.webs.com/apps/blog/show/43914314-the-trainworld-city-steel-works-and-duluth-works-

Blogs
*KV&O and D&D Mining & Steel
http://doncsx.blogspot.com/
*Musser Steel Mill
http://mussersteelmill.blogspot.com/

Hobby Shops
*Industrial Model Shop
http://industrialmodelshop.com/
*Joswood
http://lasercut-shop.de/Joswood-Ltd
*KenRay Models
https://kenraymodels.com/
*State Tool & Die
http://www.statetoolanddie.com/

Photographs
*2007 Steel Mill Modelers meet
http://www.pbase.com/jtunnel/2007_steel_modelers_meet&page=1
*Arthur's Albums and Images
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Manufactures
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http://adairshops.net/index.php
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http://www.firecatdesigns.com/home.html
*Plastruct
https://plastruct.com/
*State Tool & Die
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*Steel Mill Modelers Supply
https://www.facebook.com/steelmodelerssupply/

Museums
*Youngstown Steel Heritage
http://www.todengine.org/

Podcast
*A Modelers Life
https://www.amodelerslife.com/
*Model Railroad Hobbyist podcast
http://model-railroad-hobbyist.com/podcast/episodes
*The Roundhouse
http://theroundhousepodcast.com/

Yahoo Groups
*Harrisburg Terminal Railroad
https://groups.yahoo.com/neo/groups/htrrco/info
*Steel
https://groups.yahoo.com/neo/groups/steel/info

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* Heavy Industry Postcards
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