

# Modeling corrugated metal

How can modeling something so common be so difficult?/Jack Burgess



MODEL PHOTOS BY JACK BURGESS

Corrugated metal made from mild galvanized steel has been a popular building material from its development in the 1890's through the first half of the 20th century. In the West, at least, it proved to be fast to erect, economical, relatively fireproof and earthquake resistant. My prototype, the Yosemite Valley Railroad, used corrugated metal for the siding and roof of a replacement roundhouse built in 1914 after fire destroyed the original wooden roundhouse. Corrugated metal was also used for a paint shop built in 1914 and several other buildings along the line built around the same time.

Modeling corrugated metal siding is relatively easy, given the availability of two different types of materials from three manufacturers. Grandt Line makes an injected styrene corrugated roof material but getting a realistic finish with this product can be a challenge. It is also much thicker than the prototype material, a fact that is difficult to conceal in certain circumstances.

Campbell Scale Models and Builders-

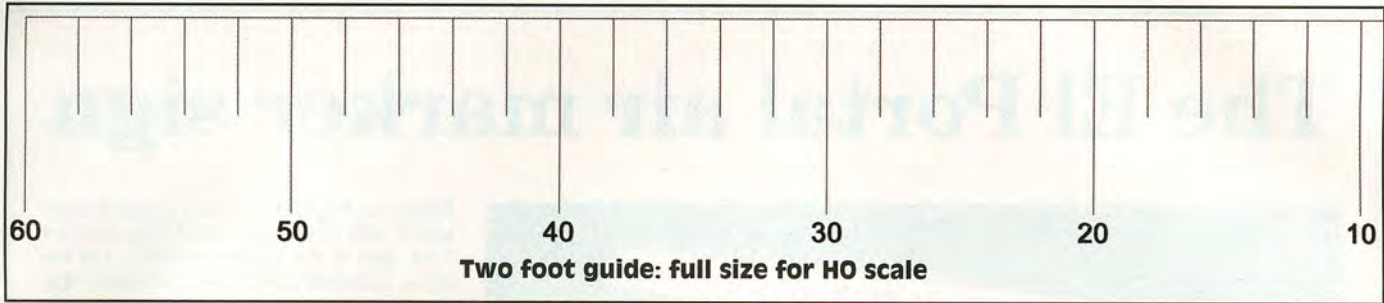


AUTHOR'S COLLECTION

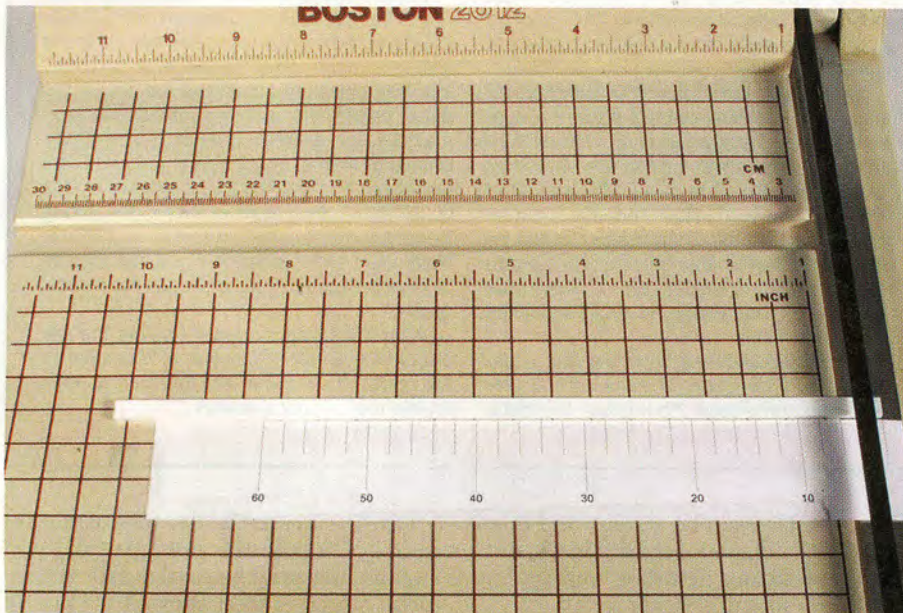
The models (top) are based on prototype buildings which were part of the Standard Oil gasoline distributorship in El Portal (above). It was located on a spur off the Yosemite Valley Railroad mainline; these are typical examples of corrugated metal siding construction. The morning passenger train is backing into the El Portal station in this photo.

in-Scale both make corrugated metal from an aluminum material. Being made from metal, they are thin and have realistic corrugations. They are

relatively easy to use except for cutting, bonding, and painting, which covers just about all the aspects of using one of these two products. While that might



Materials for the project (above) include Campbell Scale Models or Builders-In-Scale corrugated metal, Bron Killer Red double-sided tape, Testors Dulcote, and Floquil paints for finishing the structure. A paper cutter (below) was modified for cutting corrugated metal by the addition of a new styrene fence and an HO-foot measuring scale (top of this page).



be a slight exaggeration, this statement probably accurately represents the frustration of many modelers who use this material.

### Cutting

According to John Nehrich in his book, *NEB&W Scenery, Structures & Details*, the 1908 Sears, Roebuck catalog listed corrugated metal siding and roofing material; it was 26" wide and five to ten feet long in one-foot increments. With an overlap, this width provided a 24" exposure. This width seems typical for structures on the YV, although I tend to use four-foot wide panels for most projects since it appears generally correct but with fewer joints.

For years I have cut Campbell corrugated siding with a hobby knife and a jig I described in the August, 1978, RMC. However, using a hobby knife can leave a burr when cutting across the corrugations and is less than perfect when cutting with the corrugations.

The Campbell corrugated siding can be easily cut on an old-fashioned, guillotine-type paper cutter. X-Acto has a six-inch paper trimmer that takes up only a little space on the workbench, but it tends to fold the corrugated material rather than cut it cleanly. I therefore use a twelve-inch paper cutter from an office supply store, modifying it with a new fence and guide.

The fence is held in place using the tape described under the section on bonding, below. An accurate-length guide with two-foot, HO scale tic marks was drawn with CAD and taped to the table to speed cutting pieces to length. It is included with this article. Cut it out or photocopy it and tape it to the paper cutter; set the scale the proper distance from the cutting edge.

### Bonding

Attaching metal foil corrugated siding to a building substrate can be frustrating. The typical approach is to first build a substructure using wood, foam core or styrene. The corrugated material is then cut to width and bonded to the substructure. Building a model with interior detailing requires modeling the framing (wood or metal) and applying the siding to the completed framework, a

# The El Portal air marker sign



If you look closely at the prototype photo of the Standard Oil building in El Portal, you can see the name of the town painted on the roof of the building. I have long been aware of the practice of painting town names on the tops of buildings and knew that it was done primarily as an early navigational aid for airplane pilots. However, I didn't realize that these signs were part of a formal painting program until I asked Rob Artac, a friend who is a professional pilot and model railroader, if he knew the "official name" for these roof signs. Not only was he able to come up with the name of these signs (air markers) but he also gave me an interesting internet link to an article on their history ([www.uh.edu/engines/epi2130.htm](http://www.uh.edu/engines/epi2130.htm)).

In the early days of aviation, pilots typically navigated by relating landmarks and topographic features to a map on their lap, a less-than-accurate method. Apparently, it wasn't that unusual for pilots to land in a pasture and ask for directions. To solve this problem, the federal government in 1926 proposed a formal program of painting town names on barns, buildings, water towers, gas storage tanks, and hangers. The black letters were to be 10 to 30 feet high on a chrome yellow background. An arrow pointing to the nearest landing field was also to be included.

Volunteers, including Boy Scouts and an organization of women pilots called the

Ninety-Nines, painted the air markers. During the Depression, signs were also painted by WPA and CCC workers. Radio stars Amos and Andy, both veteran pilots, began a campaign called "Let the Air Know You're There" to further the efforts.

After December 7, 1941 and Pearl Harbor, the War Department insisted that all air markers within 150 miles of the Pacific or Atlantic coastlines be obliterated except those within 50 miles of air fields conducting flight training. After the War, support for air markers faded as navigation charts and radios became more standard. However, even today, many smaller airports still paint the town or airport name on the runway or other surfaces to help pilots confirm their location since radios are not required equipment in most small aircraft operating in rural areas.

The sign on the roof of the Standard Oil building in El Portal did not have the suggested yellow background nor the directional arrow. Since it was on the top of a small building at the bottom of a 2,500-foot-deep V-shaped canyon miles from the nearest airport its value as an air marker would be limited and maybe was only painted as part of local pride. However, the lettering was still there on the building when I first visited El Portal in 1968.

Replicating such signs by making a custom water-slide decal is easy with a program such as Adobe Photoshop or Adobe

Elements. Begin by creating a new 8" wide by 10" 600 d.p.i document. Using the Text Tool, type in the desired lettering. For my signs, I used 48 pt. Arial Bold. However, this lettering needs to be manipulated so that it extends to the ridge line and edges of the building roof. To do this, you need to rasterize the lettering so that it can be manipulated like a graphic. Select Layer/Rasterize/Type (Layer/Simplify in Elements). Then stretch the text by using Edit/Transform/Scale and drag the "handles" as needed to change the length and width of the text to fit the roof. (Handles are automatic in Elements.) Print a test to check the dimensions and continue to adjust the width and length as necessary until it is satisfactory.

While the resulting graphic can be used to make decals as is, one more step may be appropriate. The normal technique used to "fade" decals after application is to overspray them with the color of the material under the decal. However, when a decal is applied to unpainted corrugated metal, this approach won't work well. Instead, we can apply an initial "computerized" fade to the lettering. If the Layers Tab isn't visible in Photoshop, click on Window/Layers; the layer with the text should be active. Click on the arrow next to the Opacity control in the upper right corner of the Layers box and slide the slider to about 60 percent or less. (In Elements, click on the Layers Tab to get to the same control.) Changing the opacity reduces the intensity of the black, giving the effect of faded paint. Even at 60 percent, the resulting decal will print darker than shown on the computer screen so you might want to reduce the opacity even more.

If you need more than one decal (or a spare just in case something unfortunate happens during application), copy and paste additional copies of the graphic.

I used inkjet decal paper from Micro-Mark (Item No. 2272) for this project. If you originally created an 8"x10" document, move the graphics to the top of the page before printing. You can then cut off the top part of the decal paper after printing and use the remainder for another project. I sprayed a couple of light coats of Krylon Crystal Clear (available from the hardware store) onto the decal paper as a fixative right after printing (required with the inkjet decal paper). Micro-Mark also sells their own fixative and includes complete directions with their decal paper.

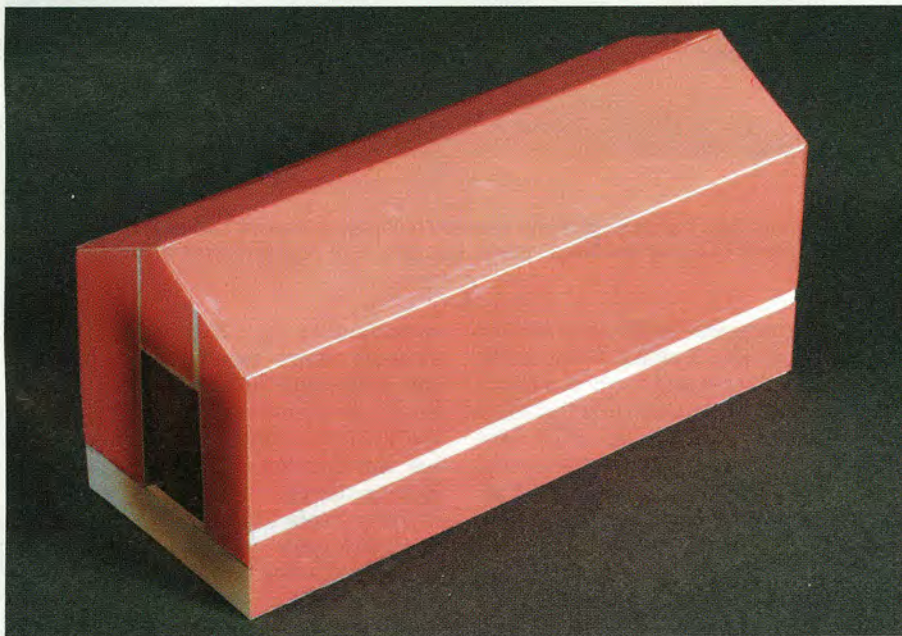
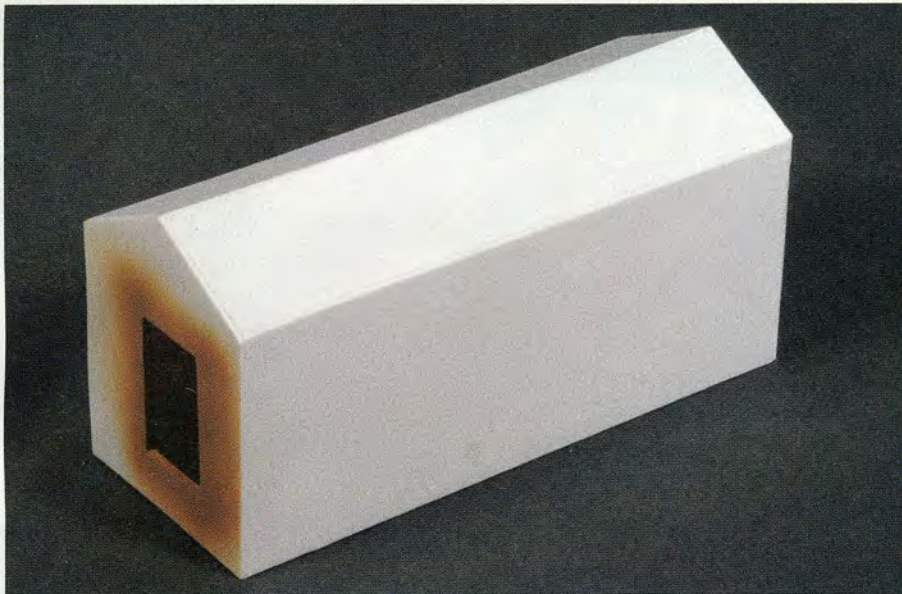
After the fixative dried, I applied the decals with a liberal application of Micro Sol so the decal would settle into the corrugations on the roof.—JACK BURGESS

much more involved project.

Campbell Scale Models suggests using Walther's Goo® for bonding their corrugated material to a substrate.

However, Goo can be stringy and doesn't hold the material tightly to the substrate, resulting in siding and roofing that looks like it is ready to fall off.

Contact cement is also messy and requires that both the substrate and corrugated material be coated with the cement, which is then allowed to slightly



A substructure (top) was constructed using .040" plain styrene with a door opening framed with .020" styrene to replicate the wood framing of the prototype (and airbrushed a wood color). The shell was covered with Bron Killer Red tape, which leaves an adhesive layer behind when the carrier film is removed; sheets of pre-cut corrugated aluminum siding and roofing will be pressed onto this. The red carrier film is still on in the photo above.

dry before the pieces are pressed together. These cements are even more difficult to use with framed buildings.

It would seem that cyanoacrylate would be ideal for bonding corrugated metal, but it tends to migrate into the "valleys" of the corrugations, resulting in a weak bond. It also won't bond well to a wood substrate. After trying many of these alternatives I settled on using five-minute epoxy back in the mid-1970's. However, this approach is slow and laborious, and it is easy for the corrugated panels to move before the bond sets. Glue which escapes the joints is also difficult

or impossible to remove.

I've long thought that a double-sided tape would be ideal for bonding corrugated metal to a substructure, but the double-sided tapes available in office supply stores are weak and unsuited to our needs. Recently, garden railroad expert and friend Jack Verducci introduced me to an industrial-grade, double-sided tape that he was using for a garden railway project. These industrial-grade tapes are utilized in lieu of metal fasteners in a variety of industries and include automotive, aviation, electronics, and construction uses.

The tape I used is called Killer Red, and it is produced by Bron Tapes ([www.brontapes.com](http://www.brontapes.com); 303/534-2002). It is similar to 3M's VHB tape but is only a fourth of the cost. It has a very aggressive adhesive and calling it tape may be a misnomer. Many double-sided tapes simply have adhesive on both sides of the film, but this tape consists of a carrier with adhesive on just one side. When the protective film is removed, only the adhesive is left on the surface.

The tape costs about \$15.00 for a one inch wide by 36-yard long roll. Unfortunately, the distributor has a minimum \$100.00 order size, but seven or eight modelers can easily make a group purchase. I put out the word on our YV chat list and among scratch-building friends and within a few days had orders for 26 rolls of tape.

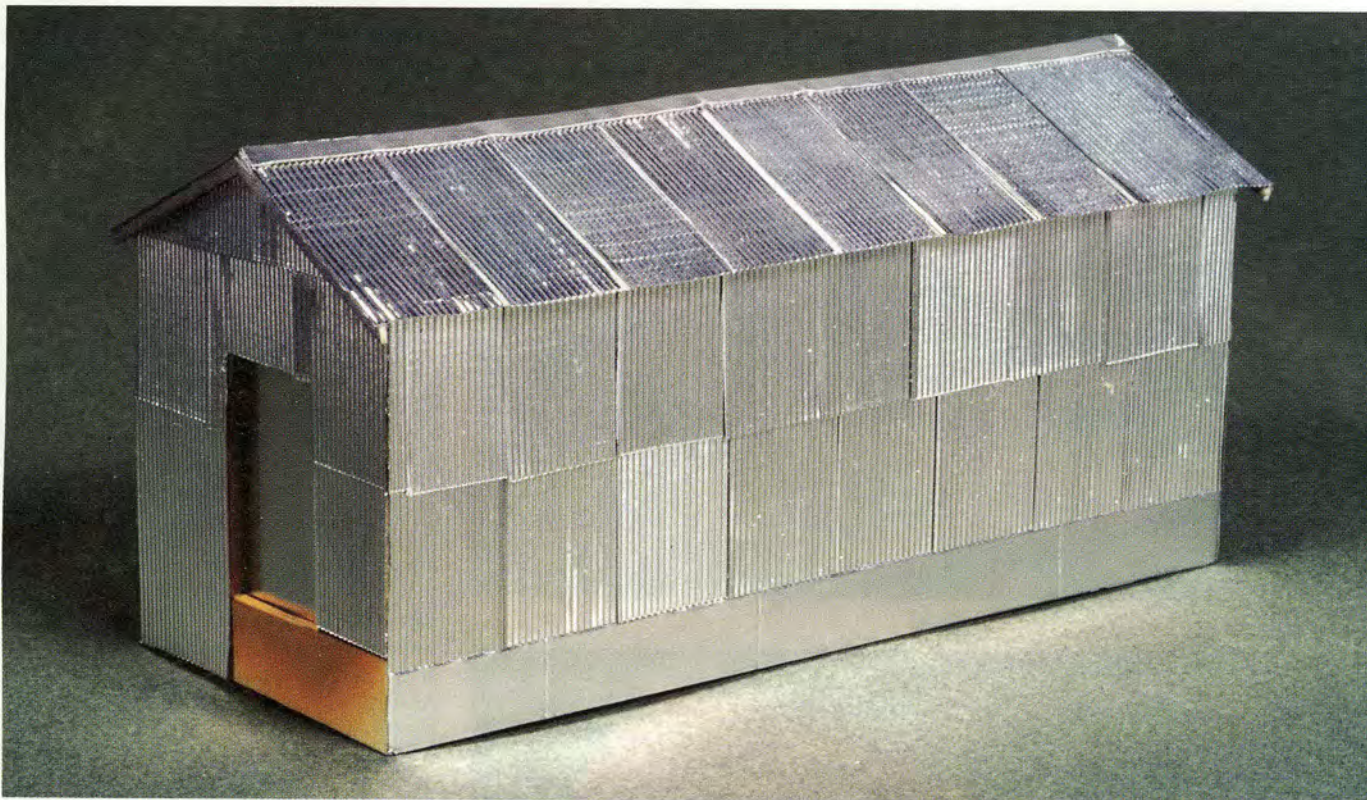
I have since found that this same tape is available from TAP Plastics online only. From the TAP Plastics website, [www.tapplastics.com](http://www.tapplastics.com), click on Adhesive Tapes and then click on Double-sided Tape. Only half-inch wide Bron tape is available, and the price is more than ordering directly from Bron, but TAP Plastics is an alternative source for single rolls sales.

For structures without an interior, my preference is to build a substructure from .040" plain styrene. Add pencil guidelines if needed to ensure that the pieces of corrugated metal will be square and plumb. Apply tape to the exterior, one wall at a time, leaving the protective carrier in place. It is easiest to cut the tape slightly long and trim it after applying it. Once all of the walls are covered with tape, remove the film from the tape on one side and apply the panels of corrugated metal, starting at the bottom and working sideways.

For the bottom panels, I have found that it works best to hold a piece of corrugated metal at an angle to the side and lightly align the panel with the bottom of the building. As the piece is lowered onto the tape make sure the edges are square. Overlap the panels by one or two corrugations side-to-side and two to three scale inches vertically, and work your way across the side of the building. If you allow too much of an overlap you run the risk of "unglued" edges getting accidentally lifted later during handling.

If the side of the building is tall enough to require three or more sections of panels, draw guidelines for all the pieces except for the bottom and top ones before you apply the tape. When I get to the uppermost section of panels I hold a steel ruler or drafting triangle on the roof and tuck the last panels up tight to the underside of the ruler as they are applied. This ensures that the

# Modeling corrugated metal



After applying the corrugated siding the building will look like this. If a panel goes on crooked it can be pulled off and replaced. (The adhesive layer from the tape will be left behind.) The next step is to spray the building with Dullcote. See *pages 54 and 56* for the result.

corrugated panels on the sides will not be too high to allow the roof panels to be applied.

If the building doesn't have protrusions on the sides, you can apply the corrugated panels "long" on the outside edges of the building and then, after all of the panels are applied on that side, turn the building over and cut off the excess corrugated material with a sharp hobby knife. This works especially well on gable ends.

Because of the aggressive nature of the adhesive on this tape, you need to carefully align the panels of corrugated metal as you apply them and then use a light touch until you know the piece is square. You only get one chance to do it right! If a panel ends up crooked, it can be removed, but the effort needed will mangle the piece. Fortunately, the adhesive will remain usable and you can try again with a new panel.

Once you begin using this tape, you will find a lot of uses for it. It can be used to bond paper or wood shingles to a styrene sub-roof, bond pre-stained wood strips to a substructure to replicate board-for-board construction, and even apply pre-painted trim to a structure. For the latter, cut a piece of tape slightly longer than needed, place it sticky-side up on the workbench and hold it in place with pieces of masking tape at each end.

Stick the trim pieces to the tape and cut around them with a sharp hobby knife. Remove the carrier and apply the trim.

Builders-in-Scale also sells flat plain metal which can be used to cover ridge lines. Cut this material to size, crease it, apply tape to the underside, and apply the tape as described above. Then press it in place.

## Painting corrugated metal

Years ago modelers discovered that scale corrugated metal siding could be carefully dipped in circuit board etchant to produce a rusty, disintegrated panel typical of an amusement park ghost town. While appropriate in some circumstances, this effect is too exaggerated for the majority of everyday corrugated metal buildings.

To replicate well-maintained corrugated metal siding, Campbell Scale Models suggests painting the finished structure with Floquil SP Lettering Grey and then adding oversprays of other colors. However, this approach tends to disguise the metal itself, compromising one of the major advantages of using actual metal to replicate the prototype.

Instead, after bonding all the material in place, I apply light coats of a flat finish. For this step I typically use one or two light coats of Testors Dullcote lacquer. While it would seem that spray

cans should work for this step, they tend to apply a fairly heavy coat, rather than the light coats needed. Using an airbrush is therefore preferred, thinning the Dullcote slightly with lacquer thinner. For those who wish to avoid lacquer-based paints at all costs, Microscale Flat or Polly Scale Flat Finish can be used, but more coats will be needed and the flat finishes need to be thinned significantly. Coats can be dried with a hair dryer to speed this step. However, the airbrushed Dullcote is still superior in its final appearance. Once the corrugated metal is completely flat, it will look just like brand-new galvanized metal.

For larger structures, variations in color can be added to the structure using light oversprays of Floquil Primer, Southern Pacific Lettering Grey, and Reefer Grey. I prefer to use pastel chalks or Bragdon weathering powders for small structures or applying rust since they provide better control.

Corrugated metal siding was a fast, easy to use, and practical siding for many prototype buildings. By overcoming the problems of cutting, bonding, and painting scale corrugated metal siding material, building models with this material can also be quick and easy. The result is a very realistic rendition of a very typical building material of the late 1800's and much of the 1900's. 