



DCC Impulses Column

by Bruce Petrarca

Photos & video by the author

Quick ways to install speakers in your locomotive.

As promised in my July column, this column will show you some methods for quickly installing speakers in your locos. My examples will be in HO, as they are the smallest sized locos that can develop reasonable sound. They can be scaled up or down, as desired.

I use styrene for my baffles and enclosures. Just to review, an enclosure is a complete box that contains the sound coming off one side of it. See my August 2012 column for more details. There are lots of other ideas (wood, metal, etc.), but I find that I get good acoustic quality with a minimum of fuss with styrene, so that's what I'll show you now.

Caution!

There are a couple of things that are universal about speaker installation. Let's just cover them once. Understand that they are always issues. If you get any glues (styrene cement, caulk, etc.) on the speaker cone - either side - you will cause irreparable damage to the speaker. The four holes that were designed for screw-mounting the speaker need to be plugged. This can be done by cementing bits of styrene to either side of them or running a plug of caulk down into them.

Tools

Tools are what make this process go quickly. I was attending a clinic at a NMRA national convention when Fran Hale, MMR, was discussing tools and a technique she used. She commented something like, "Now, Miles (Hale, MMR - her husband and co-presenter) does this entirely differently. What works for me doesn't work for him."

The sidebar lists specialized tools I use. In Fran's vein, you may find other tools or techniques more to your liking. But this is a place to start. Also, there are common small tools and office equipment that I won't take the time to mention, like scissors and diagonal cutting pliers.

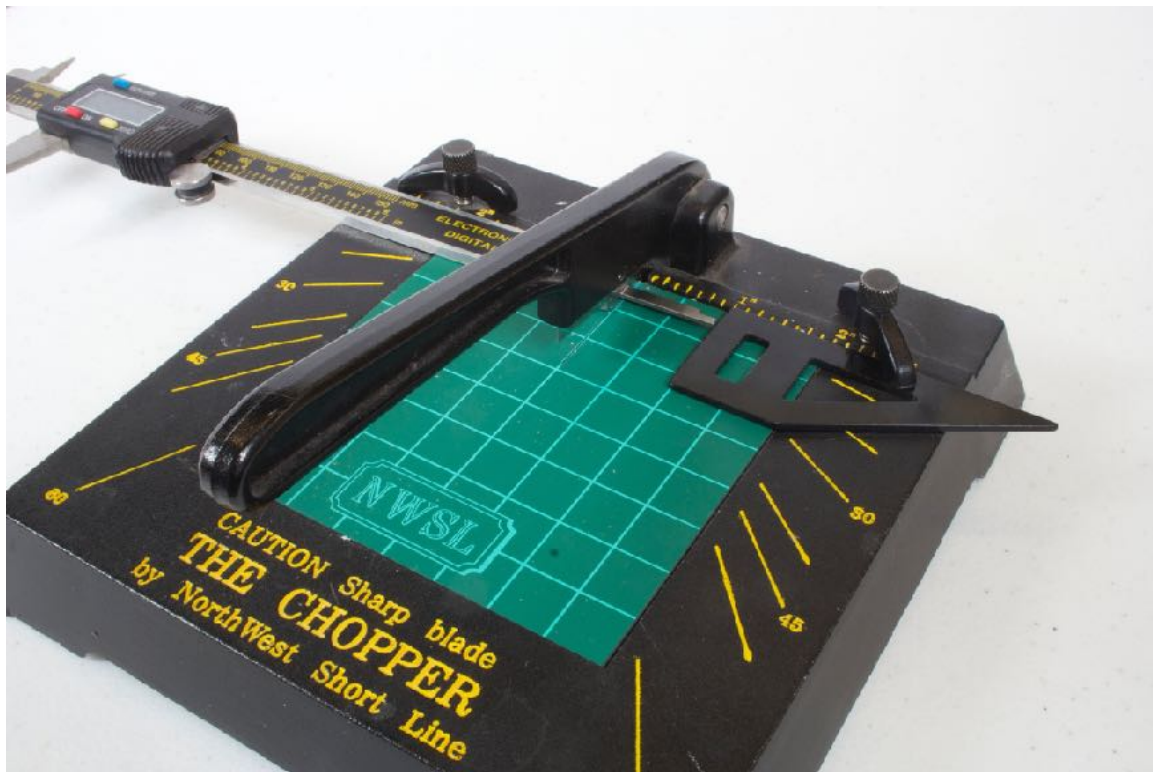
Consumables

These are the things that you use and use up. The sidebar shows what I've used in writing this column

Measuring and Cutting

Common to the entire process is accurate and repeatable cutting of styrene. So, first let's look at how to do this.

It helps if you know how to use calipers. I found a good introduction on line (http://www.tresnainstrument.com/how_to_use_digital_calipers.html). You might spend some time there before you press on.



1: Transferring a dimension to the Chopper II

I'll use calipers in some non-orthodox ways, but it helps to know the proper use. Using them to scribe lines on styrene, as I show, is not an approved usage. Yes, it would reduce the accuracy of measurements over time, due to wear on the points of

the jaws. Just like the paper cutter, I'd purchase a second unit only for such abuse, if necessary.

Let's say I want a piece of styrene the same size as the interior width of the loco shell. Here's my process to make a strip as wide as the loco shell. But, they say that a photo is worth 1000 words. What's a video worth, then? Here's a link to my video:

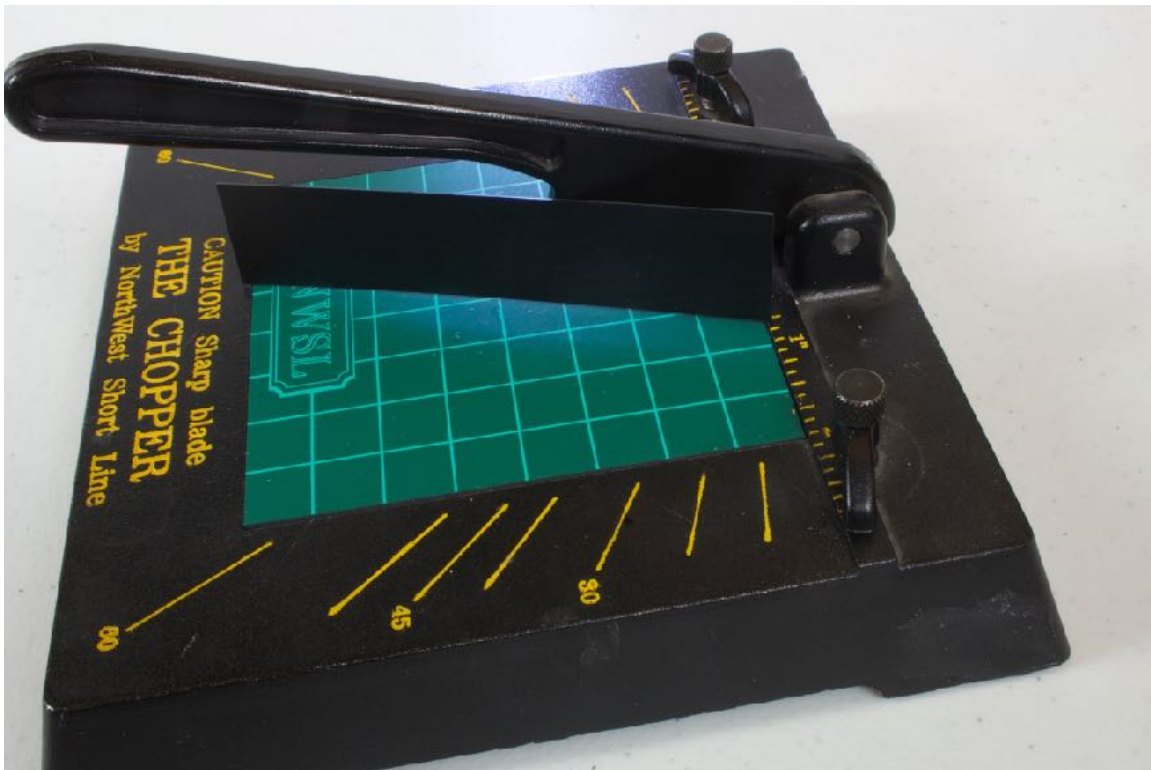


If you don't want to watch the video, here are the steps:

- Rough cut some styrene of the desired thickness to dimensions larger than the final measurements. For this example, a 1 inch wide strip x 1-½ inches long (limited by the Chopper II razor blade).
- Using the factory side as a reference, if possible, use the Chopper II to make a cut removing as little as possible to assure that one end is square with the factory side.
- Slide the strip out until the freshly cut side is lined up with the 1-½ inch mark and make a second cut. I now have a piece with three square sides that is as long as the blade in the Chopper II and a bit wider than my final dimension.
- Use the inside measurement side of the calipers to get the width of the shell and lock them to it.
- Use the extension rod portion of the calipers to adjust the spacing between the blade (be careful, it is designed to cut) and the fence.

- Cut the fourth side of the styrene strip by placing the factory side against the fence you just positioned. This strip is now square and should slip into the loco shell easily.
- Cut more pieces as needed, now that you have the dimension set by the fence.

What if you don't have a factory side to use? Then put one edge of the styrene against a flat surface (like the bed of the paper cutter or the cutting mat on the Chopper II) and look at the interface between the two. If they are in intimate contact all the length, that's as good as a factory edge for our needs here. If not, trim a bit on the paper cutter to establish a good edge.



2: Testing for straightness of a cut
notice light leaking between plastic and mat

Quick installation of some speakers

SoundTraxx sells some really slick gaskets that can be used to quickly mount some round and oval speakers to a flat surface, like a tender floor. Of course, the speaker to be mounted must match their offerings.

These are laser-cut pieces of thin mylar with adhesive on both sides. The installation consists of peeling the backing off one side and sticking it to the speaker. Peel the backing off the other side and then stick the speaker where you want it.



3: Gasket shown with a 28 mm round speaker

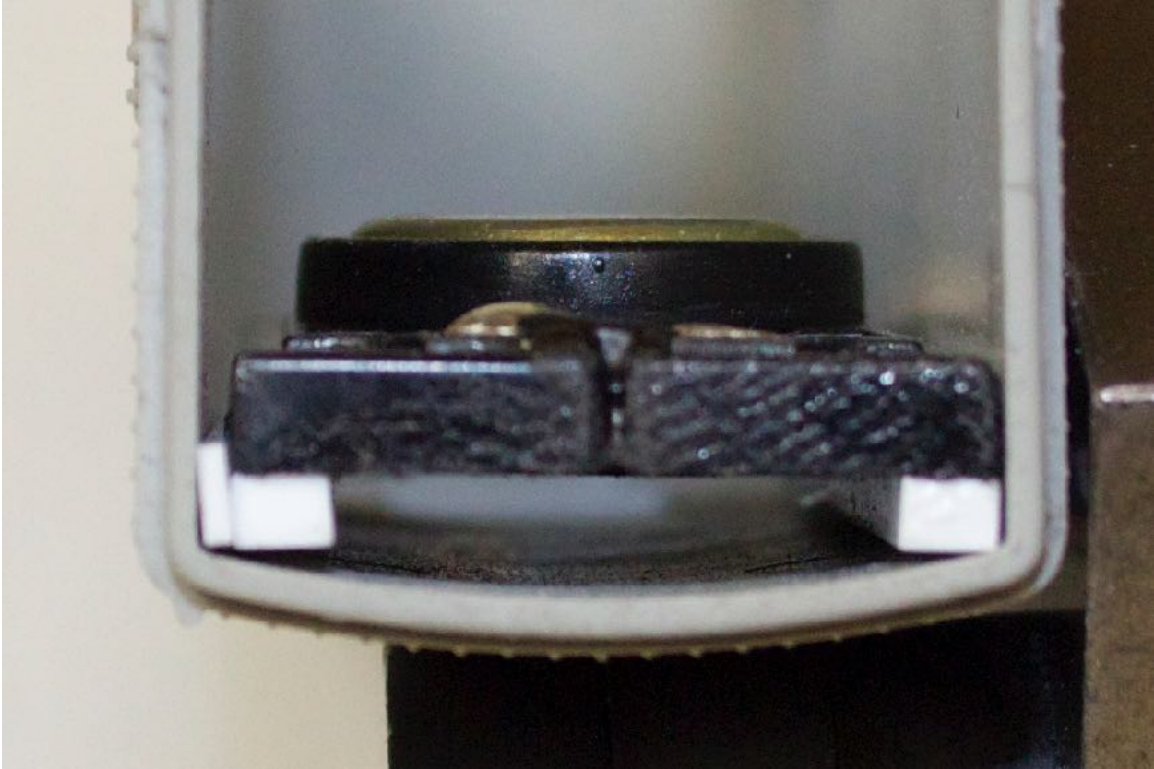
Shimming a speaker into a shell

The techniques I'm now going to discuss are only ones that I've used with speakers that have a rectangular or square plastic frame.

Many of my installations revolve around having a speaker mounted in the shell. Here is how you make the speaker wide enough to fit into the shell easily. This can also be designed to keep the speaker away from those nubs of plastic that I discussed in last month's column.

Figure 4 shows the speaker after some styrene (white) was added to it. Strips were cut the length of the speaker and glued to the cone side with MEK. These strips set the height above the shell sides for the speaker. Since the resulting assembly was 0.02 inches narrower than the shell, a strip of 0.02 inch material was cut to the length of the speaker and attached to one side.

See how it would clear the nubs? If you were building an enclosure against the top of the shell, you could choose a length of material that moved the speaker away from the top the desired amount. See the section later in this column, "Do I have enough room?"



**4: Speaker assembly being tested in the shell
spacer plastic below the speaker on both sides and shim on the left**

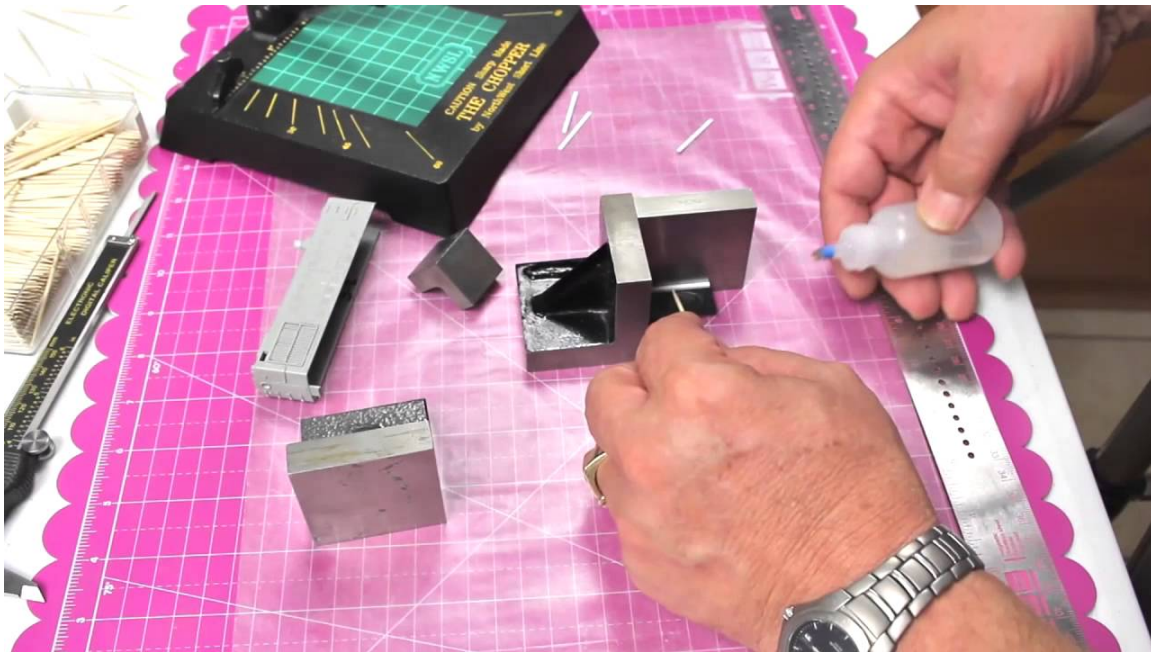
Okay, now that we have the speaker designed to fit where we want it, let's go about channeling the sound where it will do the most good.

Creating a baffle or box against the shell

The goal of a speaker installation is to channel the sound such that the maximum benefit is obtained. As I've discussed previously, I favor baffling to derive useful sound from both the front and rear of the speaker. However, there are times where the only feasible solution is to put the speaker in a box. Let's look at both. Starting with the speaker we've set up to go in this gray shell, here's how to baffle it or box it.

The difference between boxing this speaker against the shell and baffling the sound out an opening on the top of the shell is frequently only the distance between the speaker and the shell, as well as openings in the shell. The spacing in figure 4 is designed for a baffle. I'd want taller spacers below the speaker for a box. I find that the larger the box, the better the sound, at least in the smaller (less than O-scale) models.

Here is the link to the video.



Cut two pieces of styrene - or one if the end of the shell or some other internal piece completes one side of the baffle - and glue them to the speaker. Hint: be sure to keep sound from coming through the mounting holes on the speaker. Then use caulk to install the assembly in the shell.

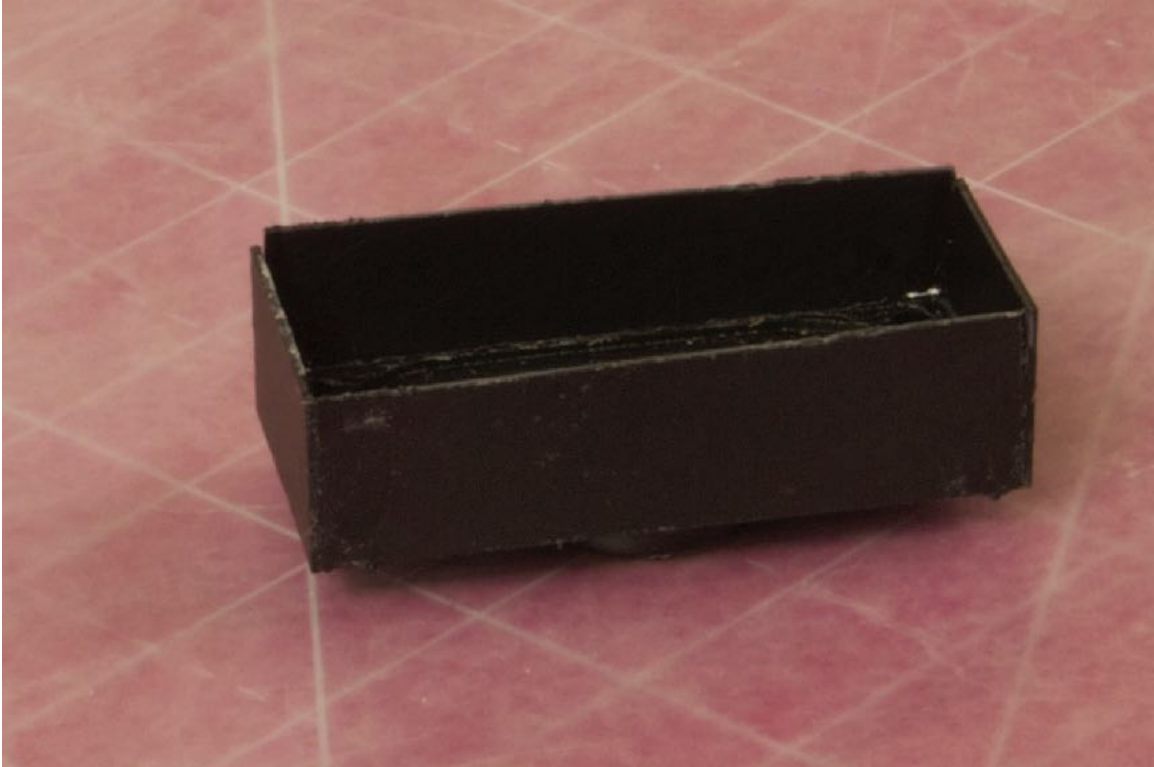
Mounting the speaker

Affix the speaker in place with caulk - for ease of removal, if necessary. The sonic installation would be complete with end pieces of the shell-width styrene cut to length and rounded to fit the interior roof of the shell. Either affix these end pieces with MEK to the speaker assembly before you caulk it in or affix them with caulk after the speaker assembly is in place.

Building a box

Sometimes I need to build an enclosure (box). This may be because I'm using a speaker that doesn't have a ready-made enclosure available, or because I need a different depth than the ready-made version. This technique results in a crude enclosure. I use ready-made if at all possible.

I use the same techniques previously discussed to cut and glue styrene to the speaker. I use the angle blocks to keep things square while I use MEK to quickly tack the pieces together. Then I use clamps to hold the sides closed while I add Faller Expert cement to the corners to create a fillet and a seal the box. Be sure to plug the mounting holes with styrene or caulk. Optionally, you may use some square styrene for the corners and to cover the holes from the inside.



5: Speaker enclosure under construction - ready for last side to be added

Do I have enough room?

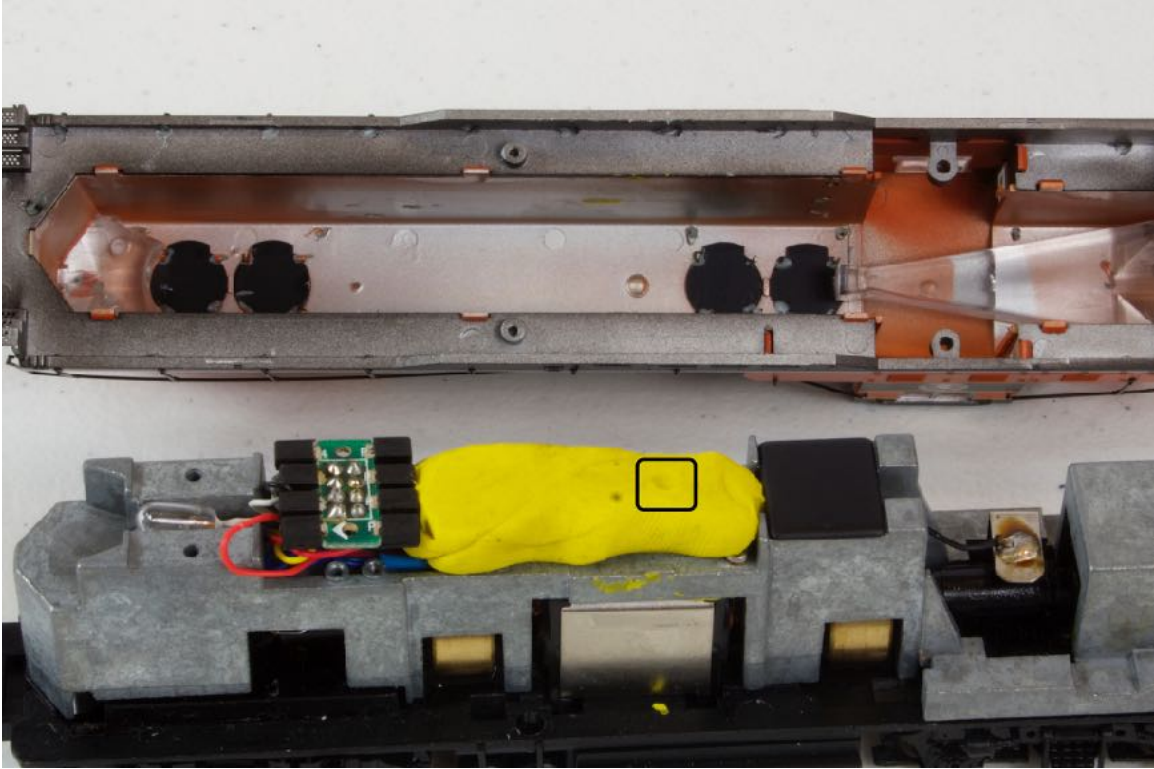
I can't tell you how many times I created the "perfect" installation and then couldn't get the shell back on when I was done before I learned this trick.

When you are looking for clearance, put a wad of modeling clay in the area of concern. Then close the shell, or whatever you want to check. Open it back up and the clay will be formed into the shape of the space. Now, you can measure and plan.

In figure 6, you can even see the dimple from the interior of the shell reproduced in the clay - black outline. A good way to know sizes of these intrusions, so you can plan your speaker offset.

There you have some of the ways I get speaker installations done quickly.

If you found this column helpful, please click on the Reader Feedback link and rate it **awesome**. Please join in the conversation that invariably develops there. Until next month, I wish you green boards.



6: The clay impression shows the room available after the shell is removed

Mr. DCC's Workbench

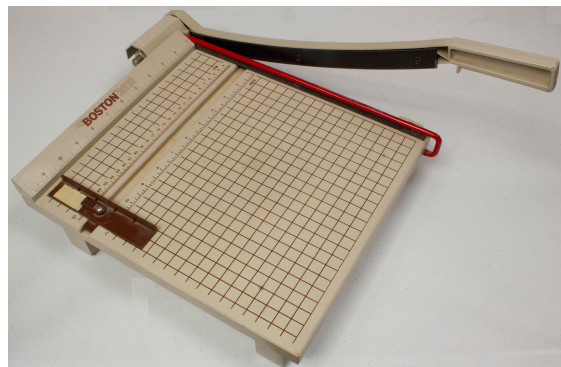
Sidebar - Tools

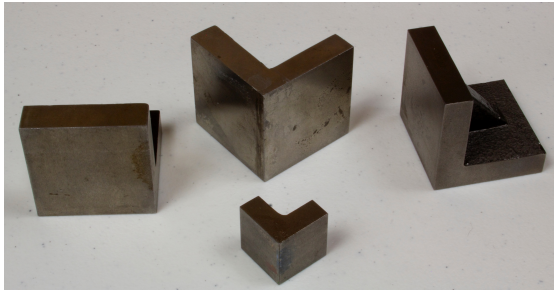
Calipers - I bought a pair of 6 inch metal digital calipers from Harbor Freight on sale. They have a lock, so I can hold a dimension. Plastic ones will allow you to transfer dimensions, but won't scribe styrene well and frequently don't have a lock. Vernier or dial (non-digital) calipers will work for what we are doing here, but I like the readout.



NWSL Chopper II - My way to make accurate cuts on styrene (and wood, too). The length of the cut is limited by the razor blade to just under 1-½ inches. The Chopper II is only a few bucks more expensive than the original Chopper and has a replaceable cutting mat. The mat makes for cleaner cuts than the Masonite on the original or the Chopper III. That's why I have a Chopper II. Change the blade frequently for the best cuts. I've even replaced the mat on mine.

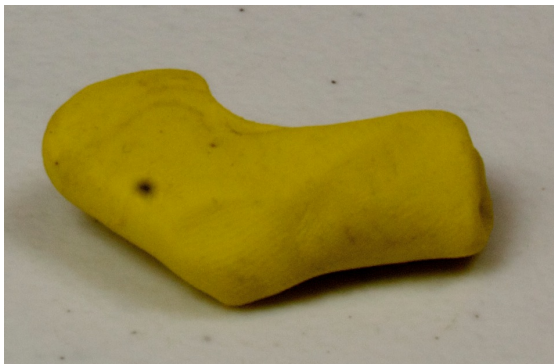
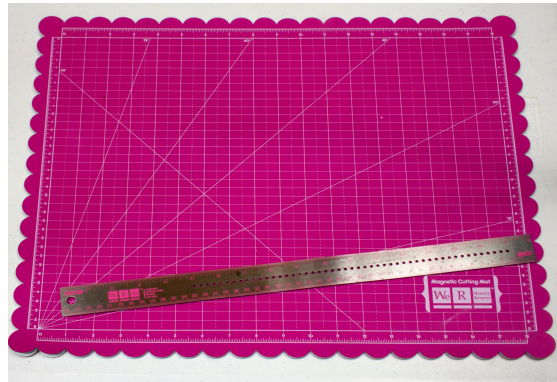
Bypass paper cutter - I bought a new one for the office and retired this one to the shop. One with the adjustable stop, as shown, is nice for repeating sizes. I use this to make long cuts in styrene. It isn't as precise as the Chopper, but it's quick. Frequently, I'll make a rough cut with the paper cutter and finish on the Chopper as I show in the video.





Machinist blocks - I use several in different sizes to keep things square while I'm gluing them together. Use the chisel blade in you hobby knife to remove any glue or foreign matter on them. If you sand them, you risk changing the exact right angle on them.

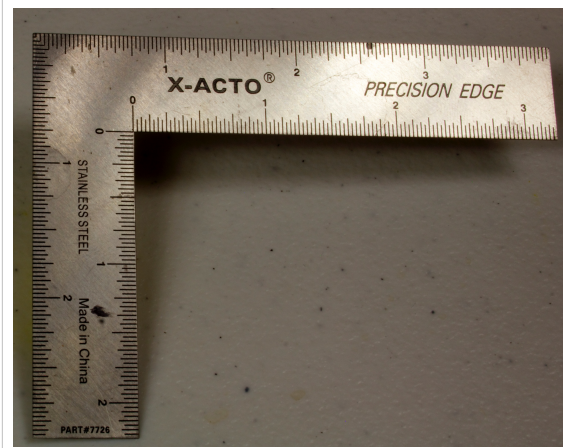
Magnetic cutting mat - I bought this one at a craft store in the scrapbooking section. I bought an assortment of magnets to use with it. The mat is not magnetic, but will attract magnets put on it. Mine came with the stainless steel ruler with a magnet attached to the rear of it.



Modeling clay - Yes, this is a tool, not a consumable. Try a toy store or craft store.

Needle applicator - I use this to dispense styrene solvent. I find it easier to use than a brush.

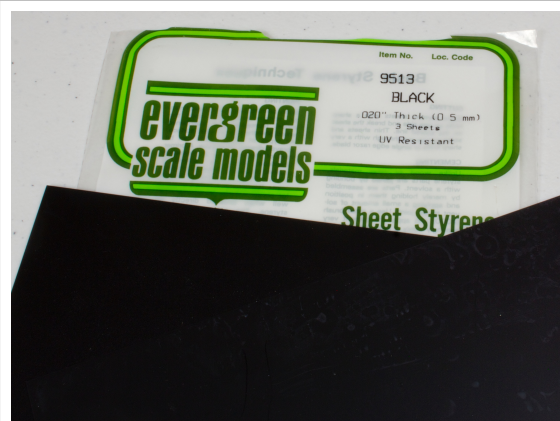




Square - I use a small metal square like this one to verify square cuts or to scribe lines on pieces too large to fit into the Chopper II

Sidebar - Consumables

Sheet styrene - I encouraged Evergreen Scale Models to make 6 x 12 inch black sheets. That's all I use - it hides better inside the locomotive. Enclosures and baffles need thicker sizes (0.06 inch or more). I keep some of every thickness in stock to use as shims.



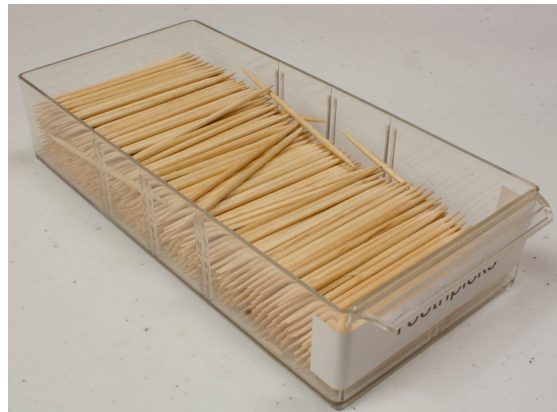
MEK (Methyl Ethyl Keytone) - My favorite styrene cement. Get it at a paint or home improvement store in quarts for about \$10. Fill the needle applicator with it. Dries very quickly.

Faller Expert (styrene cement) - This is a typical methyl chloride type cement with a twist. It has a percentage of styrene dissolved in it. It will make fillets and fill small cracks. Applied to the cut end of clear styrene rod, it gives a lens-like finish without polishing. It is much slower than MEK to set, however. To avoid clogging the needle applicator, throw away the blue cap and plug the applicator with a piece of 0.015 beryllium copper wire.



Bathtub caulk - I use clear Polyseamseal in a tube, as shown. A 5.5 fluid ounce tube lasts me a year or so, so there is no reason to buy one of the big tubes. Any acrylic caulk will do - no need to pay for silicone.

Toothpicks - I prefer the round ones. This is the drawer from my workbench organizer. I use a lot of them. I keep them in the shop. That way I don't wind up in the kitchen with something toxic on my hands, rummaging through the drawers.



Wax paper - Another item to buy at the grocery store. Get your own roll, so you don't have to run to the kitchen when you need it.

Emery boards - I buy basic ones at a dollar-store. Beauty supply shops, like Sally's Beauty, offer a line of more expensive, larger units with grits ranging from 100 to 600. I have a supply of those, too.

