MasterClass-2002

Build a 2-6-6T / 0-6-6T Mason Bogie

An Adventure in 1:20.3

By David Fletcher

Chapter 3 / Part 2 - Mr. Mason, Bogies & Boilers.

Background – Construction

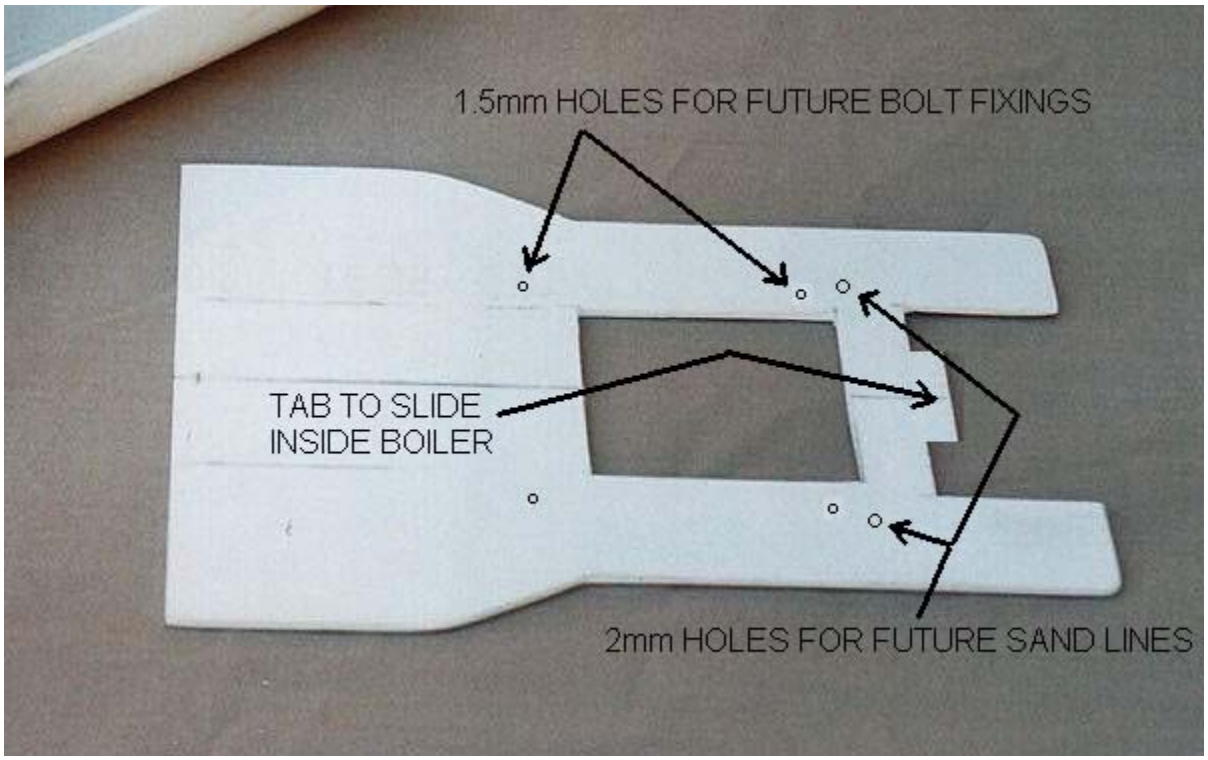
Making the Running Boards

For this step you'll need the PDF page entitled "Running Board Template", "Running Boards-Top Details" & "Running Boards -Bottom Details".

The Running boards are an integral part of the design of our Mason model. The combination of boiler and Mason secondary framing has allowed us to run the running boards across the entire width of the model in one piece. This is a great advantage because it means we can pick up our heavy model by the running boards and be assured they won't break off! The traditional method of modeling running boards required us to attach the boards separately to the curved side of the boiler. These boards had a habit of breaking off the boiler side when lifting. On the Mason we do it in one piece, easy, and fool proof.

Step 1 - The Running Board Template.

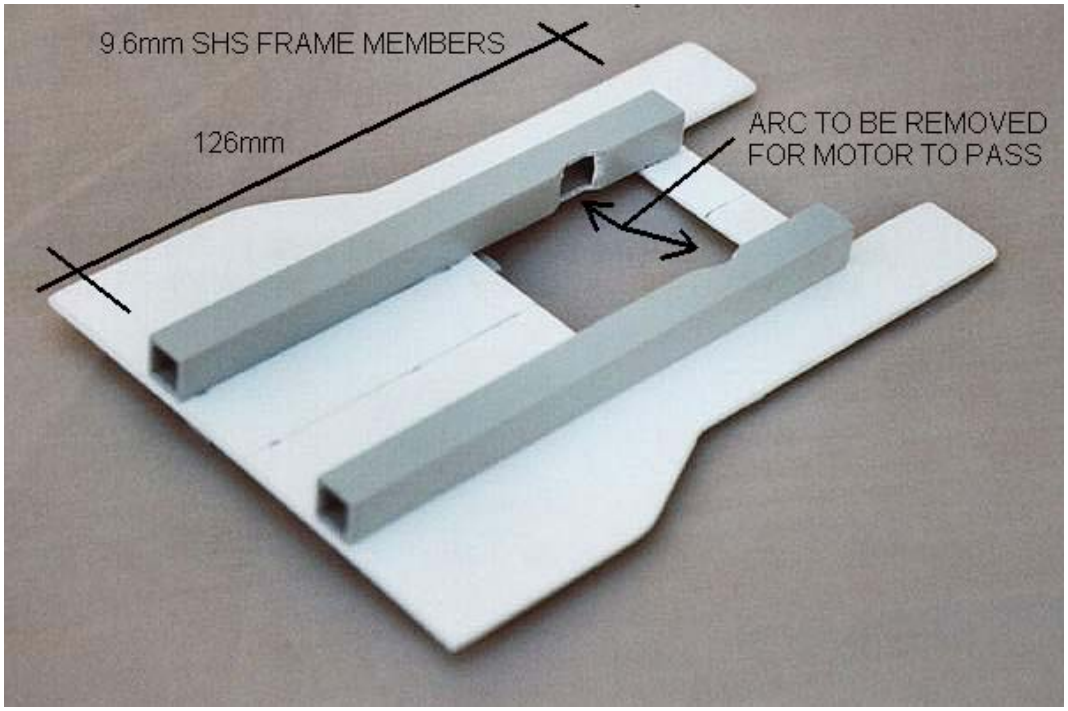
Using 2mm thick styrene sheet cut out the running board profile from the PDF template entitled "Running Board Profiles". You can drill tiny 1mm holes in the corners of the cut out areas if it helps you. Score and snap the areas to be cut out as required. Drill out the 6 or 8 holes in the styrene surface as indicated on the template PDF, that is four 1.5mm holes for future bolts, and two or four 2mm holes for installation of future sand lines. The cut out running board profile should look like this: (note options 1, 2 and 5 will have 4 sand line holes, Options 3, 4 and 6 will only have two forward sand line holes).



Step 2 - The Secondary, Sub Floor Framing.

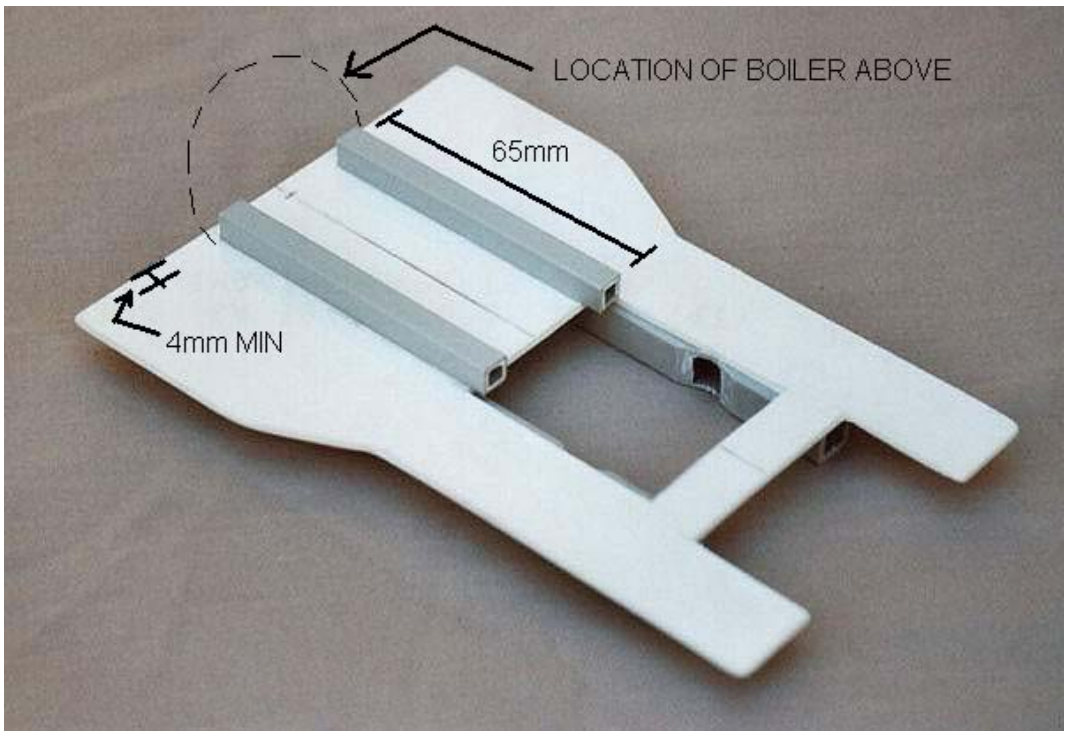
The BBT Mason Secondary Framing supports our finished boiler, but it isn't prototypically wide enough. The real framing was wide enough to just slide past the outer face of the firebox. This should make the secondary framing wider than the boiler itself. We need to pack out the sides of the BBT framing to make it look more prototypical. we also need to detail it to a prototypical finish.

Cut two 126mm lengths of 9.6mm Plastruct Square tubing (SHS). Using welder cement, attach them to the bottom of the running boards, with a clear 35mm-36mm between them (go for 36mm if in doubt), refer to the locating sketch in the PDF page (Running Boards - Bottom Details). This will allow the running boards assembly to fit snug over the 35mm width of the BBT chassis framing. Using your metal files and modeler's knife, remove two arcs from the Plastruct SHS sides as indicated on the PDF template. This will enable the cylindrical motor to pass the SHS frame members. The running boards assembly should look like this:



Step 3 - The Boiler Locators.

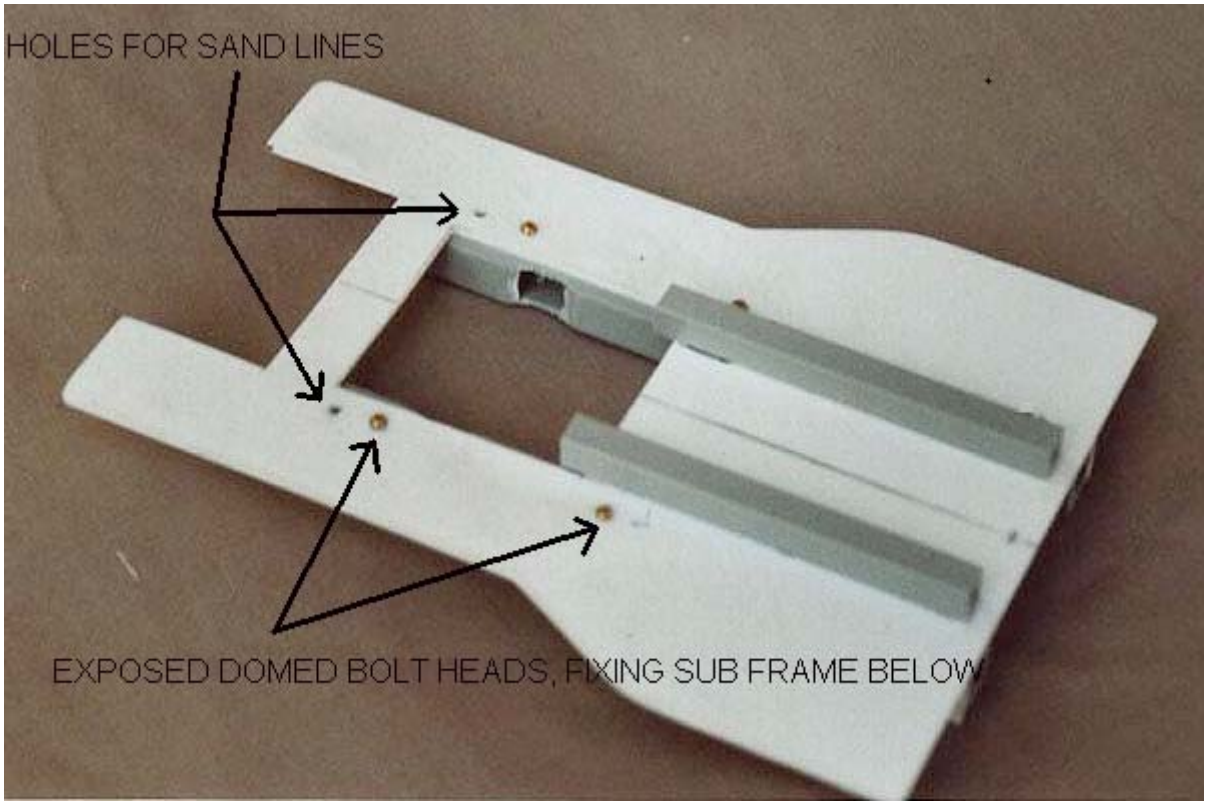
On the top surface of the running board assembly, weld into place two 65mm lengths of Plastruct 6.4mm SHS square tube. These two rods are to be placed such that they run firm against the inside face of the cut boiler. Do not glue the boiler! These two rods also should run 4mm clear of the rear edge of the running board. Refer the PDF diagram for locating help (Running Boards-Top Details). The finished upper side view of the running board assembly should look like this:



Step 4 - Bolt Fixing the Subfloor Framing to the Running Boards.

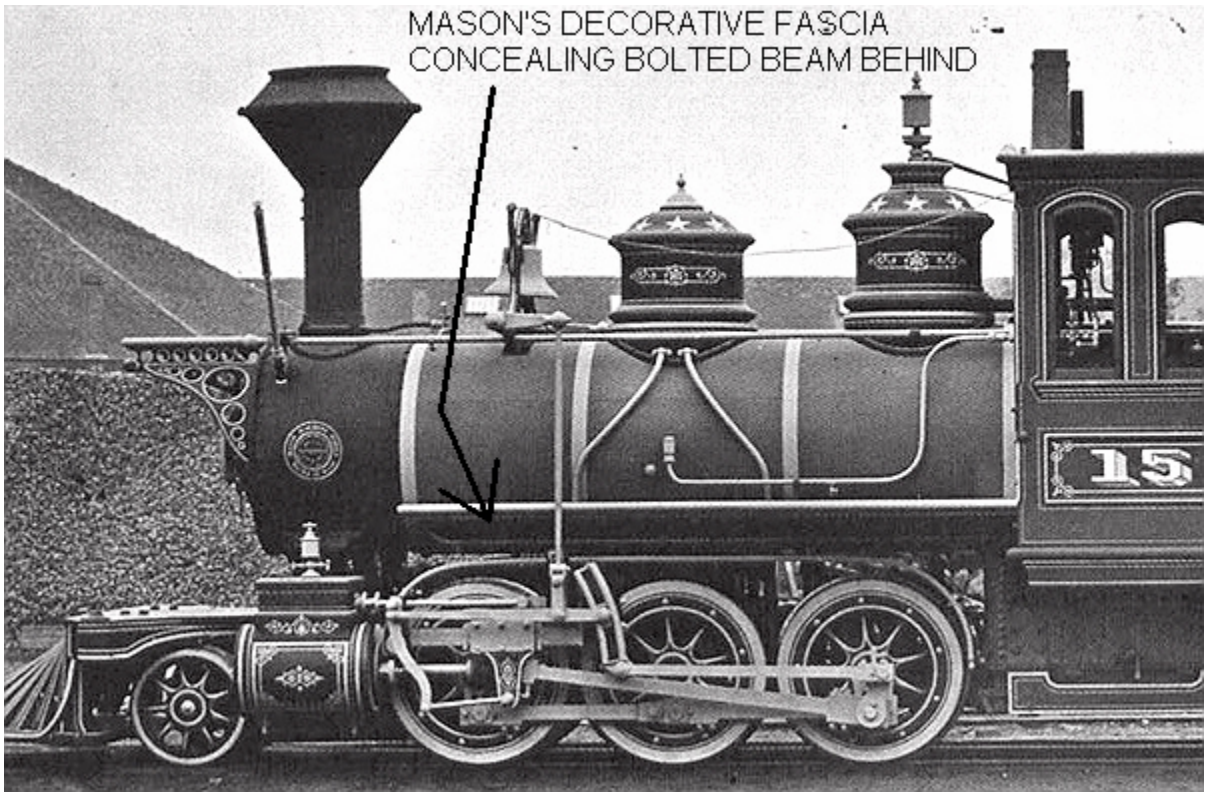
Later in this chapter we will be bolting this running board assembly with boiler attached to the BBT framing. At that point the model can be safely lifted by the running boards. In order than the running board sheet does not lift away form the Plastruct SHS members under the floor, we will now bolt the subfloor framing to the running boards. Do this by drilling out those four 1.5mm holes through into the sub framing, I would recommend drilling into the sub framing with a smaller drill bit, such as a 1mm. Insert 4 domed topped brass bolts to fit, 10BA or similar. Tighten the bolts such that the domed head is flush with the running board top. Trim off the excess brass bolts projecting below the SHS sub framing, using side cutters, then smoothen off with a metal file.

At this point also follow through those 2mm holes for the future installation of sand lines. Drill the 2mm holes right though the sub framing. The running board assembly as viewed from above should look like this:

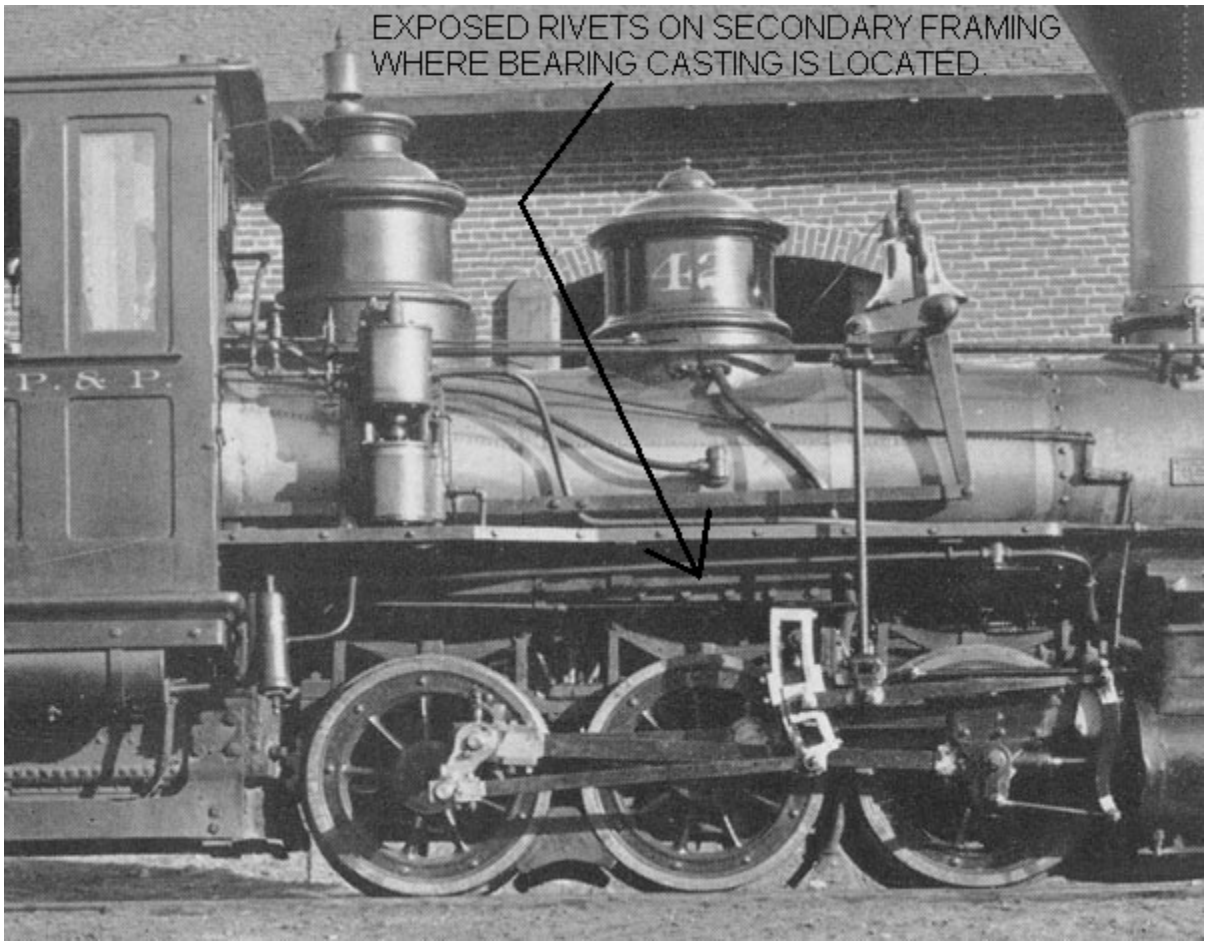


Step 5 - Detailing the Mason Secondary Framing.

On some of the 6 versions of the Mason Bogie we're building in this class, there was a row of exposed heavy rivet heads seen on the sides of the secondary framing. These rivets held the massive bearing plate casting in position. This was the pivot point for the chassis and also the location where the steam supply pipe ran from the boiler to the cylinders. For such a beautifully detailed locomotive, it seems odd that Mason would leave the side of his framing with such an industrial finish. Well that's because Masons would never leave his locos with such an unfinished look! No, Mason clad over these exposed rivets with a decorated fascia. Such fascias can be seen on the builder's photos of the heavy 2-6-6T, 'Breckenridge' and the big 2-8-6T 'Denver', Bully Boy and many others.



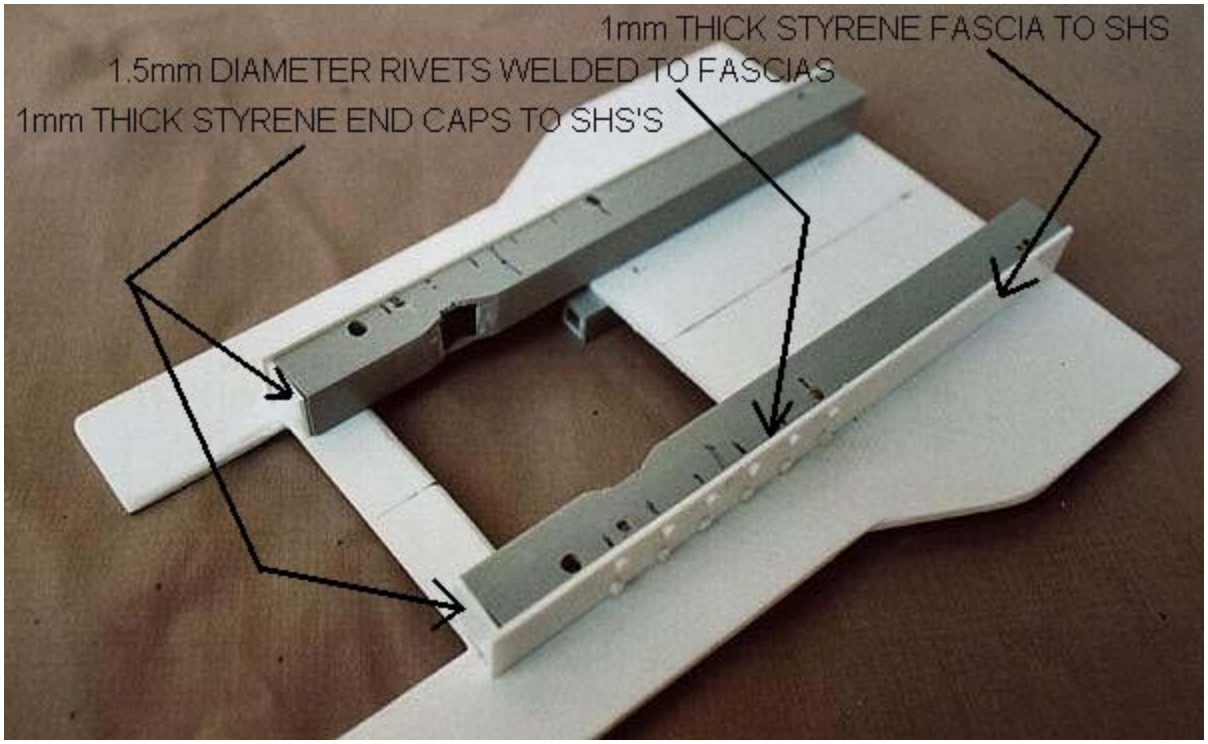
For the South Park it seems that these fascias were removed, or simply fell off relatively soon after delivery, I don't know why. All the photos of our light 2-6-6T show the fascias missing after about 1880. So I leave you a choice: you can build your Mason with the stylish clean lined fascia (seen above), or with the industrial looking rivet ridden beams that were seen behind the fascia. Thus Option 1, 2 and 5, "As Built" versions should have the clean fascias, and options 3,4 and 6 should be made will all the glorious rivets exposed! Select the appropriate fascia/beam style from the PDF drawing; Running Boards - Bottom Details..

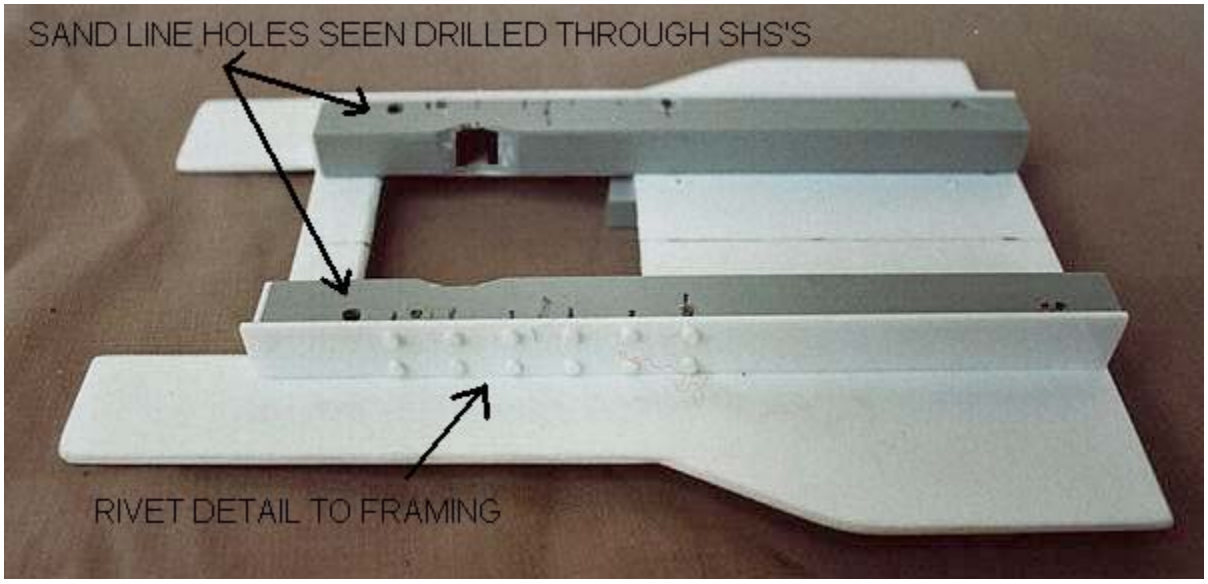


The exposed rivets seen on the side of the DSP&P #42, 'Tenmile'. The air line conceals the upper row of rivets from view.

Cut out the secondary framing detailing elements, following the PDF templates. This should be two 126mm long x 10mm tall fascia plates of 1mm thick styrene for Options 3,4, 6 or the 150mm long clean fascia for options 1, 2 and 5. Cut out the two 1mm thick end caps for the sub floor SHS members. Weld the fascia's and end caps to the side of the sub floor SHS members.

For Options 3, 4 & 6 only, use the template as a guide locate the 10 rivet heads required to both beam faces. Make the rivets by slicing 1mm tall slithers of your styrene 1.5mm diameter rivet rod. Weld the rivet heads into place. Place a daub of welder atop each rivet when located to fuse down properly. The finished running board assembly, with detailed secondary framing should look like this for Options 3, 4 and 6.:





Running Boards Edge Trim

The edges of the running boards, as built at the Mason factory, had a nice rounded wood finish. You might like to sand the edges of your running boards to a rounded finish too. Over time, as the locos aged and were maintained at the RR shops, the rounded edges were cut back, and flat faced metal trim applied to the exposed edges. It is reasonable to assume the timber edging began to break up and the retro fit metal edging helped to give the loco clean lines again, with a more robust finish. Check the 'in service' photos in the MC2002 archive and see if the version you are building could have metal edges. You can apply such edging by welding a strip of 3mm wide, 0.5mm thick styrene to the exposed edge of the running board assembly, leaving 0.5mm of trim proud above and below the running board surfaces. Using your 0.20x0.30 rivet rod, apply a

line of exposed rivets to the trim. See the photo of #42 above. This was typical. I leave the desire to model this detail entirely up to you! It is only appropriate to some locos of option 4.

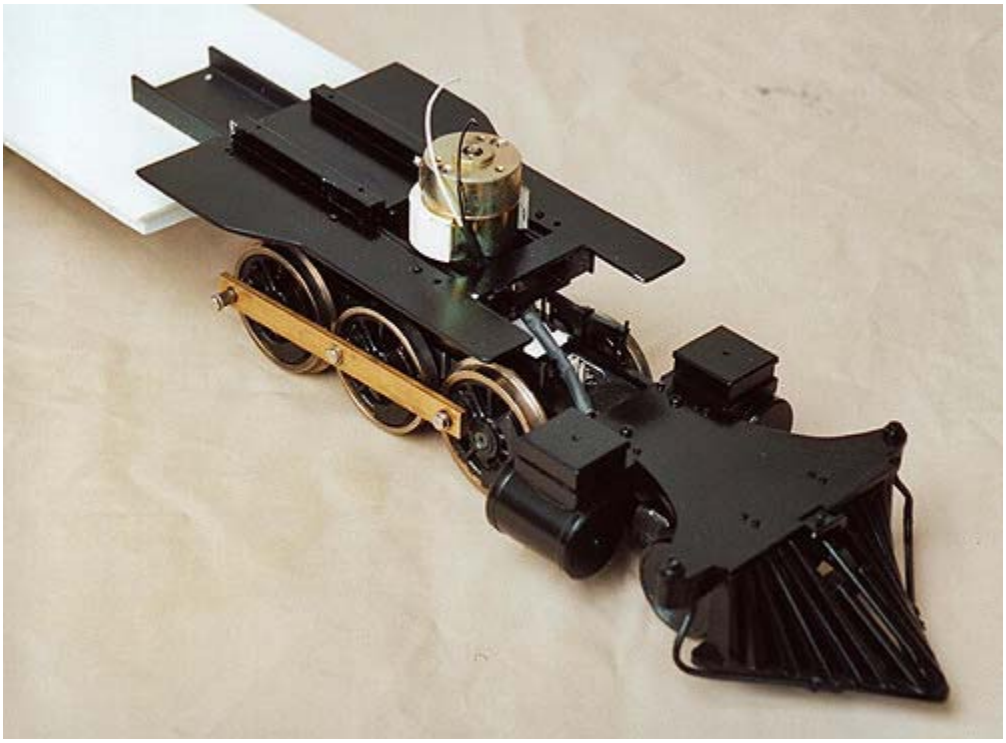
Time to Paint the Running Board Assembly!

Hopefully you know what sort of colour scheme you intend to produce for your model.

Some info from our Historic Advisor, Jim Wilke.....

> *The painted iron nosing, supports and underside of a running board should be painted to match the locomotive - so dark green, lake, blue, black, etc., is appropriate.*
>
> *The top of a running board was different - it was a walking surface, where a painted and varnished surface would be dangerously slippery to a poor fireman. So common mineral paint was used, usually with crushed sand sprinkled into the wet paint for traction.*
>
> *In the 1880s one railroad painted running boards green regardless of the engine color. At the same time, the Southern Pacific Railroad used chrome yellow for running boards, tender tops and floorboards. I suspect the chrome yellow was for visibility and safety on dark nights, so crewmen could see where they were walking.*
>
> *Because we usually are looking down onto a model, where SP chrome yellow would be so totally distracting, its helpful to use other period solutions which won't take away from all that fine work on the rest of your model. Mineral reds, for example were common for running boards and look great to boot.*
>
> *I use Scalecoat Roof Brown because it has a dark, warm tone and looks good without being distracting when looking at a model from above. I also use the Roof Brown for the top of tenders, and the floorboards of the tender frame, as all were utility surfaces and away from public view. Plus you have coal thrown on it!*
>
> *In contrast, tender trucks, frames, cylinder saddle, etc., were in public view and therefore nicely painted and varnished. This also applies to the deck on the pilot beam, which was a showy part of the engine. I've stood on many a nicely painted up pilot beam in real life and haven't slipped yet.*
>
> *So I recommend Scalecoat Roof Brown as the best. Other roof browns are grey-green and are not so good. But basically any dark mineral brownish red would be totally spot on, as well as any utility green.*
>
> *Jim Wilke*

The finished running board assembly, dropped onto the BBT chassis (not attached yet) will look like this:



Fabricating the Dome Bases

(Refer PDF pages entitled "Steam Dome Details" & "Sand Dome Details".)

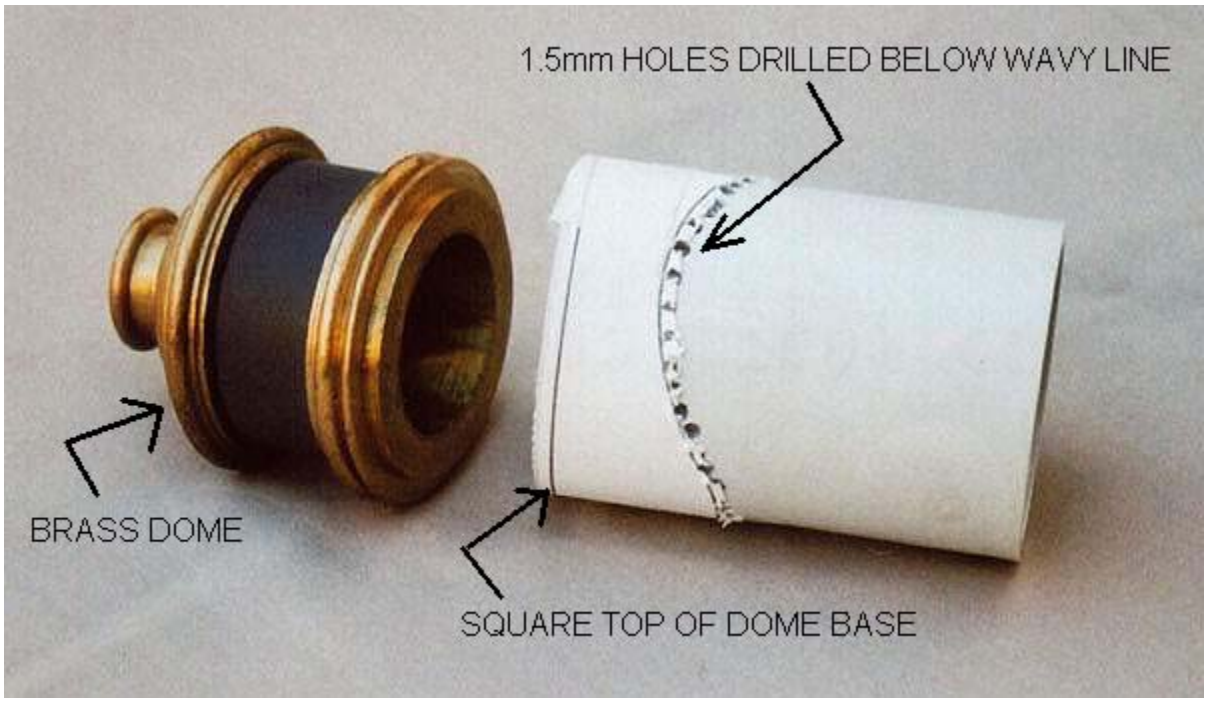
In your collection of parts assembled during the quest for Mason-like bits in chapter 1, you will have obtained two fluted brass 'steam domes' from either Aristo-craft or Hartland Trains. The domes came with a lower brass ring, an upper brass fluted cap, and a central plastic cylinder...and no base! We are now going to make the dome bases that enable these fine brass domes to be seated nicely to the top curvature of the boiler. On the face of it, this is not an easy task, but actually you're about to see just how easy it really is.

Go out into the world and find a 37mm outside diameter PVC or similar pipe. Such pipe might be found in electricians stores or plumbing outlets. Here I found the right size pipes to be electricians 'joiner' pipes...that is the small PVC pipes used to join other pipes together. Look for a pipe with a wall thickness of around 2mm. Go to the store with one of your brass domes in your pocket. When you have the correct pipe size, the brass dome base should sit snug into the pipe.

Step 1 - Cutting the Dome Base Profiles.

Take your PDF page entitled 'Dome details', and look for the wavy line templates. These two wavy lines are actually the sides of the dome base all flattened out! I want you to cut out these two templates with scissors, and wrap the 'steam dome' one around the PVC pipe. If you got a 37mm pipe, the paper should wrap right round. Make sure the end of the pipe is nicely cut square, use the masking tape method to define a cutting line to get the end squared up if necessary. Apply the steam dome base template such that the straight line along the top, matches

up with the cut edge of the pipe. Tape the paper template into position around the pipe. Next using a 1.5mm drill bit in your dill, drill a series of holes all the way round the wavy line into the pipe. Drill them as close to each other as possible. Drill away from the wavy line itself. The desire is that only one edge of the drilled hole actually touches the wavy line. Look carefully at this photograph - this is what I want from you:



Once all the holes are drilled, using the knife, slice between the holes, and separate the pipe into two halves...now here's where we're reeeeeeeeealy lucky! The Mason Bogies we're building had a steam and sand dome both of the same diameter - quite unusual in locomotive design. Usually the sand dome is smaller in diameter than the steam done, but not this time! With the pipe now in two parts, you'll notice you've created two dome bases in one easy maneuver!...like this:

The dome to the right is the correctly made dome base for the Mason steam dome height. The dome to the left is the excess pipe, and will be trimmed down from the top to create the sand dome base.

Step 2 - Sanding the Dome Bases.

Tape a piece of sand paper to a length of excess 51mm PVC pipe (or the pipe size you're using for your boiler). We will now use the boiler curvature to sand the rough dome base into a clean perfect fit with the boiler. Grind the dome base along the sand paper clad pipe and get sanding!! It'll take quite a bit of sanding and cleaning to get the dome base nice and neat.

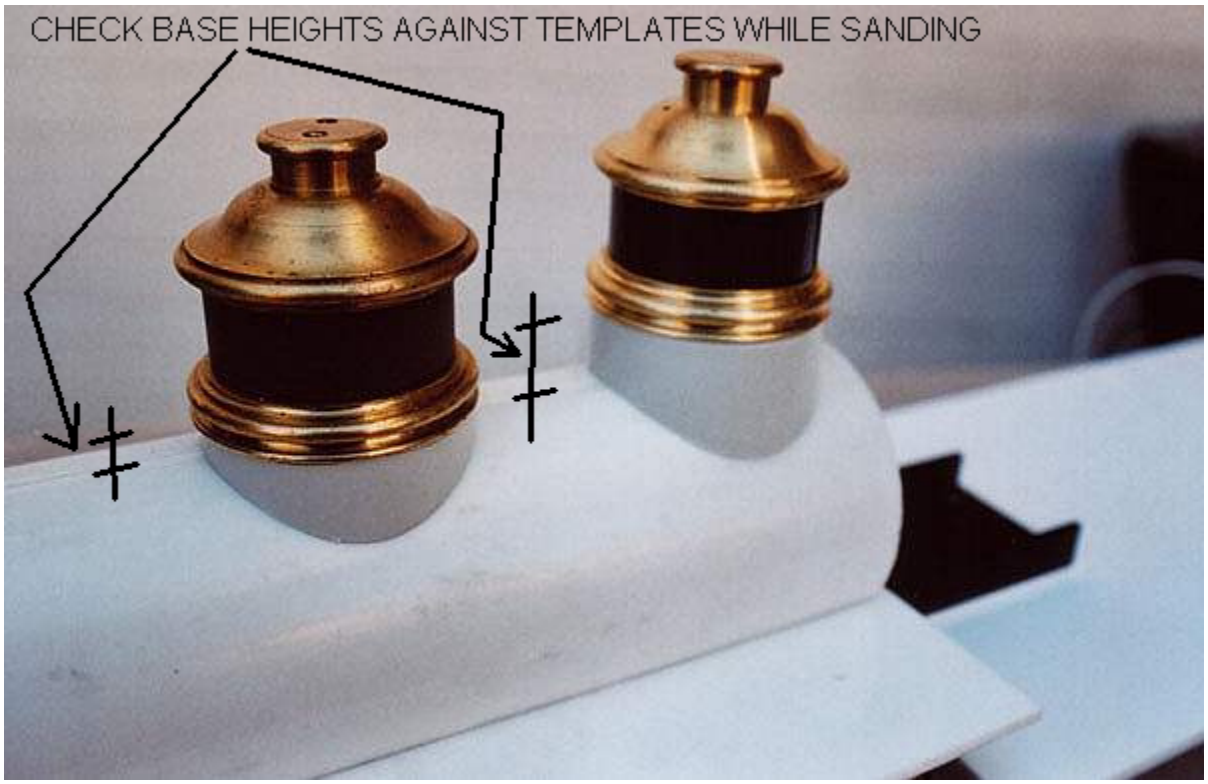
The 51mm PVC pipe clad in sand paper and my dome base being sanded to the right profile by grinding the thing back & forth over the pipe!!

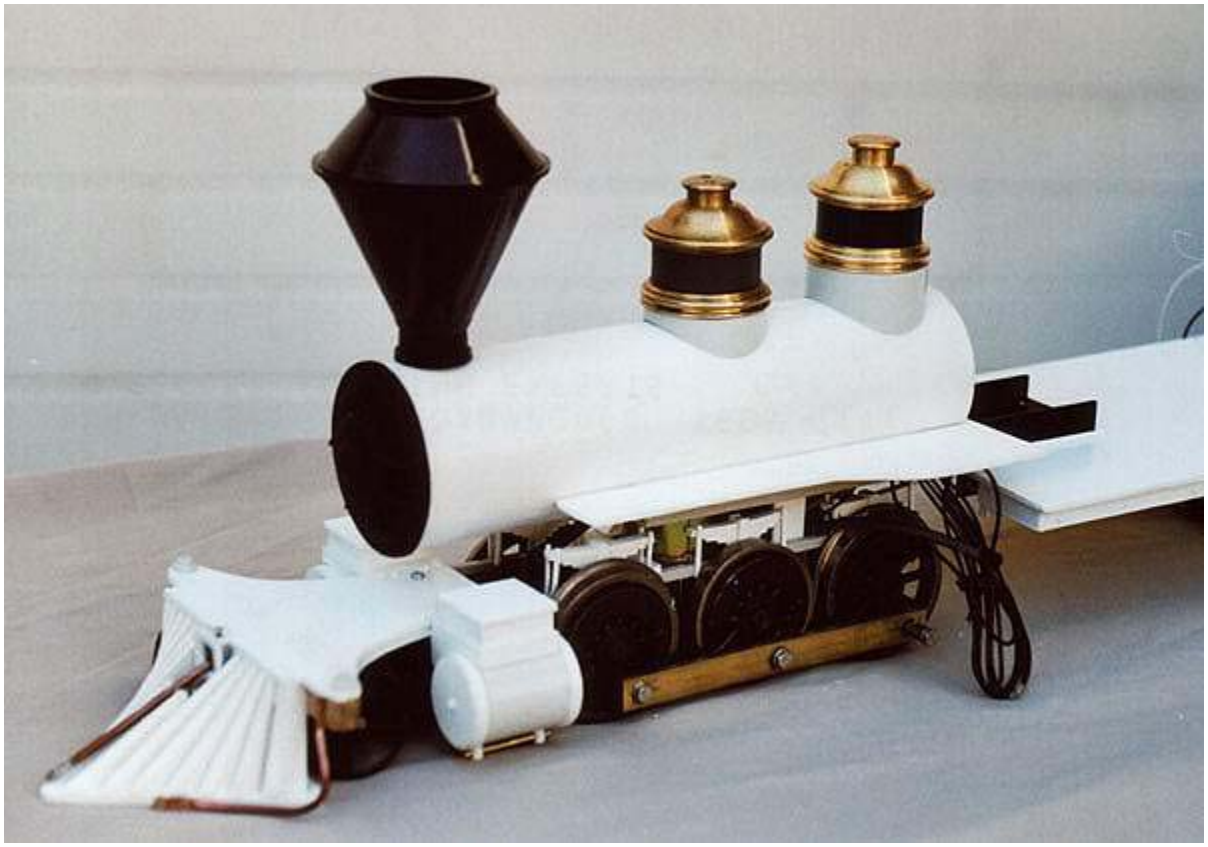
Take the sanding slowly, use a medium grade sand paper initially to get most of the meat off the bottom, then finish off using a fine grade of paper. Sand both dome bases at this time…we will trim down the sand dome base from the top in a moment.

IMPORTANT SAFETY TIP - With every few stokes of sanding, look at the dome base and see that both short sides of the dome base are the same, and also both long sides of the base are the same...it is very easy to over-sand on one side, causing the dome base to sit off-vertical when placed on the boiler. A crooked base will mean the dome sits crooked on the boiler later.

Once both dome bases are nicely sanded, and fit snug onto your boiler pipe, using the paper 'sand dome' base template, check and trim the height of the sand dome base to match the template. At this point the steam dome base should already be the correct height, while the sand dome base will need trimming. Do your best to get the dome base heights correct, or your model will not look quite right. The domes would end up too tall or too short.

The finished dome bases with the brass domes resting above, sitting atop the boiler pipe should look like this:





The boiler shown resting (not yet glued) on the running boards,
with the two domes resting in place (not attached yet), and
a H-L-W smokestack and boiler front dropped on for good measure.

Finally store your domes away while we work on the rest of the boiler.

Making the Mason Wagon Top Boiler

Refer PDF pages entitled "Wagon-top Taper Profiles 1 and 2" (2 pages)

Wimp's Way and AA Denny boiler makers can ignore this step!

OK Chaps, we're about to enter a difficult part of the project, that of making the taper in the boiler to generate the prototypically wagon top boiler profile. The light 2-6-6T and 0-6-6T had a wagon top boiler similar to a classic American 4-4-0. There was a difference however. Where the 4-4-0 had the larger diameter section of boiler in front of the cab wall, with the backhead projecting only a short distance into the cab, the Mason Bogie has the cab concealing the larger section of boiler, with the taper visible directly in front of the cab wall. The steam dome on the Mason is in front of the cab wall and thus ends up mid way up the taper....just to make things really hard for us! On the 4-4-0, the taper was in the boiler section in front of the steam dome. It is some task in working out the dome base profiles and boiler tapers where Mason had the steam dome intersecting the boiler taper. I've thought long and hard about this, and I think the easiest way to do this is to forget the taper exists when producing the dome base (as made in the previous step). We then add the boiler taper around the dome base. In working the problem this way we can:

1. Firmly fix the dome down to a known firm surface -that of the 51mm boiler pipe inside the boiler taper.
2. Avoid working up a strange dome base profile on the taper.
3. Work up an easy boiler taper section with a hole for the dome base to run through.

I know all this makes no sense at all at this point, but bear with me, and you'll see what this is all about.

Step 1 - Making the Boiler Rear End

As Mentioned early in this chapter, our 51mm boiler pipe was cut to a 189mm length. That is 4mm shy of the full boiler length of 193mm. The last 4mm are to be made now, using two plates of 2mm thick styrene that provide the 'form' to which we extend the boiler taper. Go ahead and cut out the two 'boiler backing-plates' based on the templates provided on the PDF drawing entitled "Wagon-Top Taper Profiles -1". The two plates are identical in profile and are 2mm thick. Check that the inside curvature of the profile matches the **inside diameter** of your boiler pipe. Using welder cement, weld the two plates together to form a 4mm thick boiler backing plate. This backing plate is designed to fit up against the rear end of your boiler pipe.

Next follow the template for the "Taper Packer", cut this profile out from 2mm thick styrene sheet as well. Check that the inside curvature of this profile matches your boiler **outside diameter**. It is designed to fit over the boiler pipe. Weld this plate to the face of the 4mm backing plate. Make dead certain you have centered the Packer plate onto the rear backing plate properly, check the overhand to both sides of the boiler is the same. Use the PDF template to help

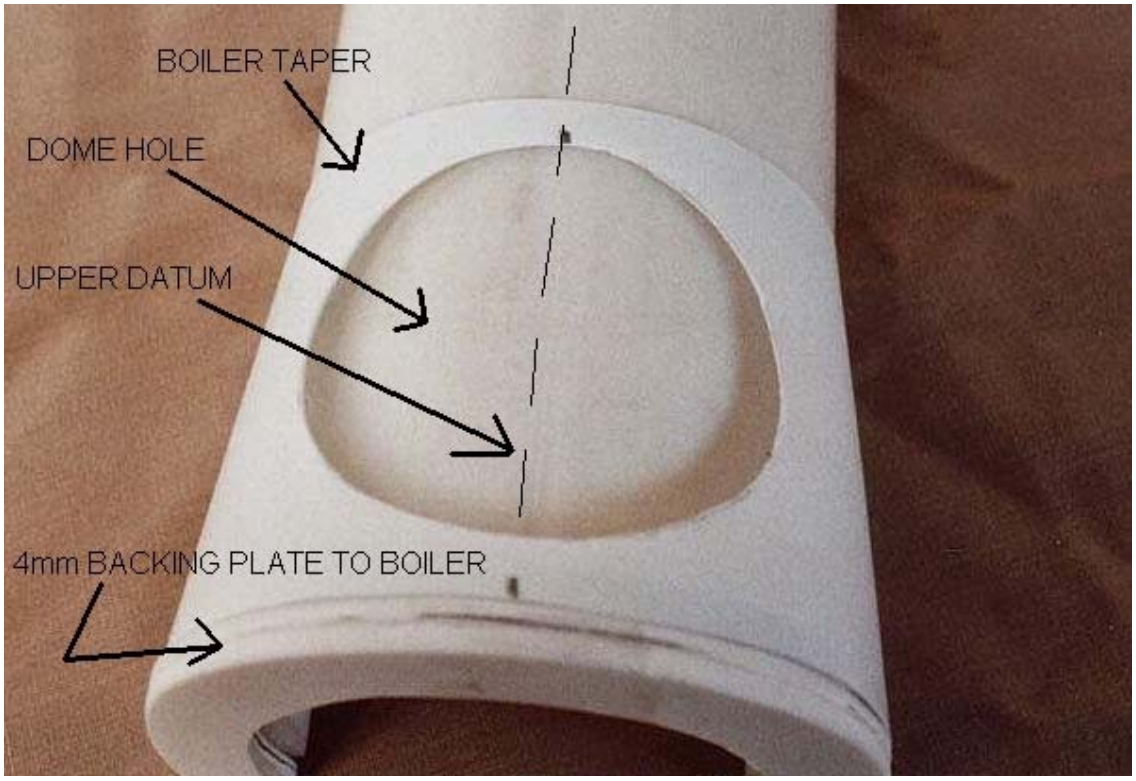
Using the epoxy glue, stick the 4mm backing plate to the back end of the boiler, the front 'packer plate' will slide over the boiler end. Your boiler is now the required 193mm length! Make sure the bottom edge of the backing plate ends in line with the bottom edge of the cut boiler base.

Step 2 - The Boiler Taper

Using 0.5mm styrene sheet, cut out the boiler taper to match the fan-shaped profile on the PDF page, "Wagon-top Taper Profiles -2". Carefully cut out the elliptical hole in the centre of the profile. Mark onto the fan shaped profile the 'upper datum' line as shown on the PDF template.

Wrap the taper profile around the boiler, keeping the upper datum marks on your template in line with the datum line on your boiler. The wider curve of the fan will sit down onto the rear boiler packer, and butt up the face of the backing plate. The smaller curve will sit down around the 51mm diameter pipe...you now have your boiler taper. Check the dome hole is square around your boiler upper datum line - you don't want your steam dome to be forced sideways because the boiler taper was applied off -centre. At this point check that your steam dome base diameter fits snug into the taper hole. You do not want any visible gaps - it must be a perfect fit. If the hole is too tight about the dome base, carefully sand the edges of the hole to widen out a bit.

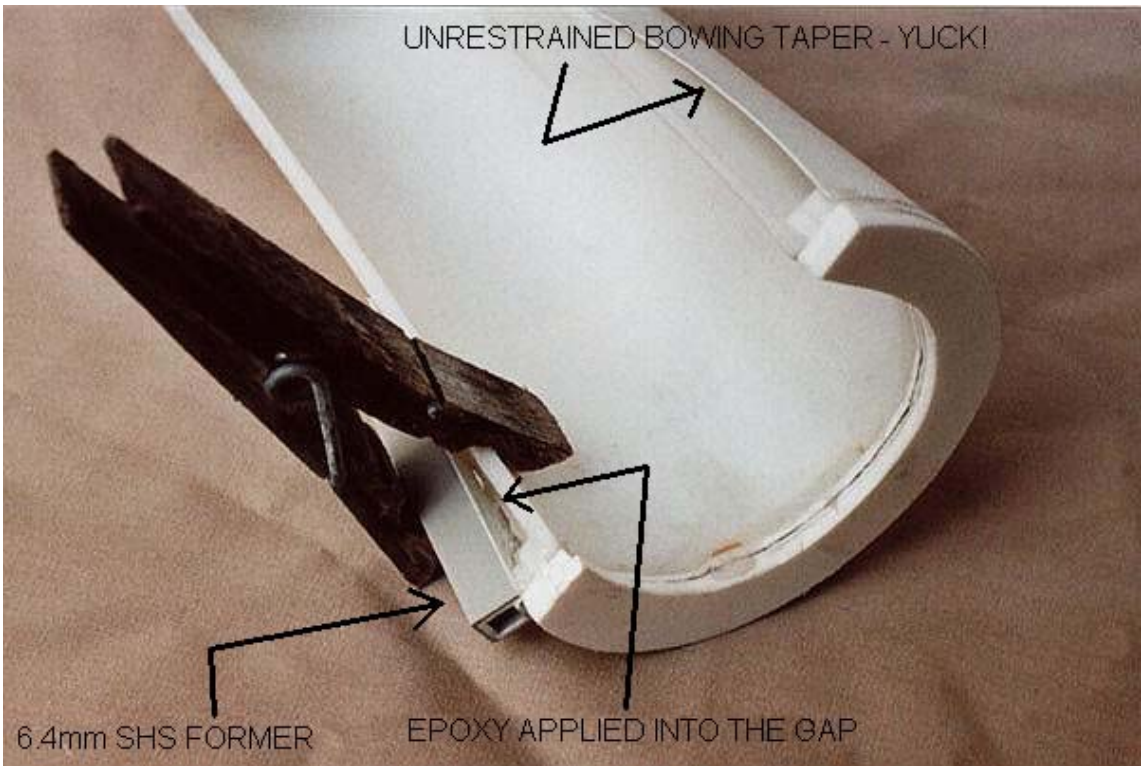
Using a line of super-glue along the two curved edges of the fan shaped profile, fix the taper into place. Once the taper profile is fixed into place, using fine sand paper, sand around the joint lines along both ends of the taper, where it meets the boiler surface. Your boiler taper should look like this:



Step 3 - Stopping the Bottom Edges of the Taper from Flapping.

After the previous step you will notice the bottom edges of the taper are not fixed against anything, and are flapping in the breeze. Worse still is that the tension in the 0.5mm taper wrapper is causing the bottom edge of the taper to bow outward. This is easily fixed. Cut an unused section of 6.4mm Plastruct SHS square tube Cut the length of the SHS to match the length of the boiler taper. Next hold the 6.4mm SHS against the bottom side of the boiler taper using a clothes peg. This will now take the bow out of the taper and hold it in a straight line.

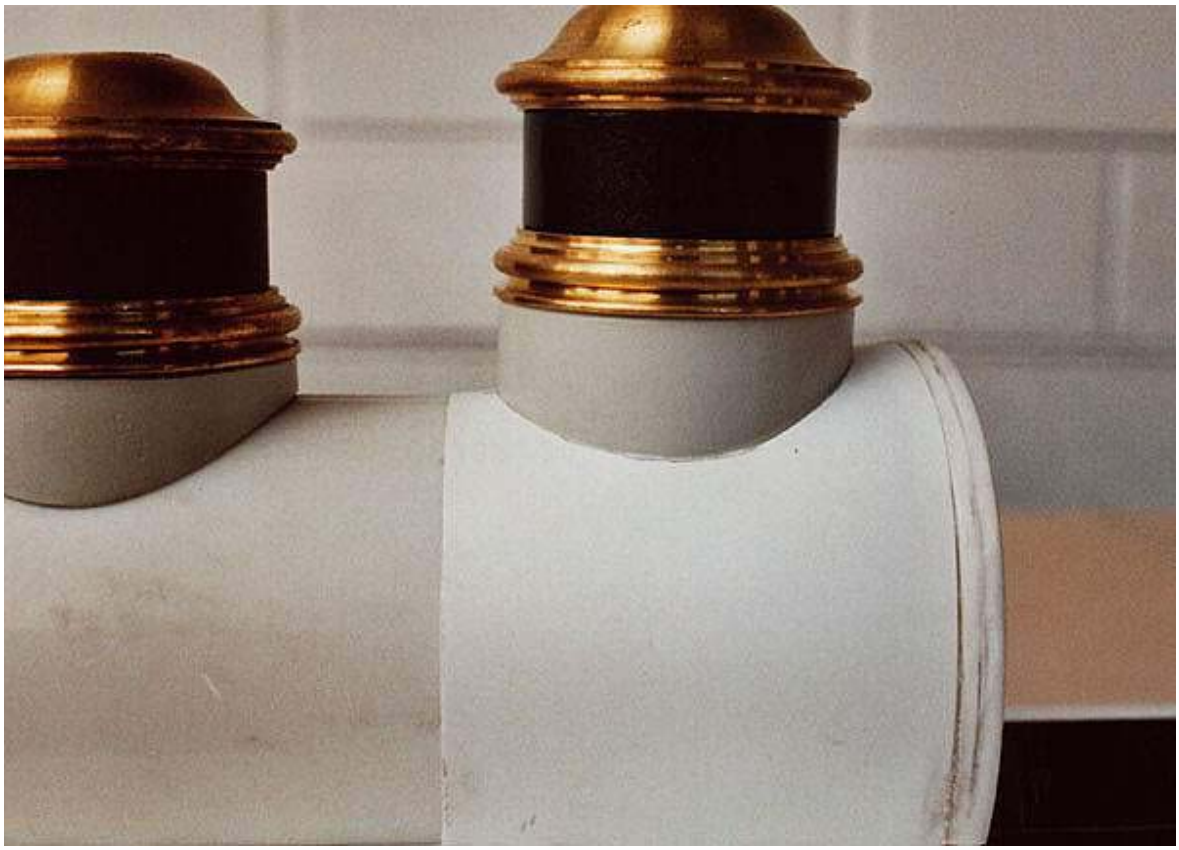
Make up a small batch of epoxy glue and apply it into the gap between the taper sheet and boiler. You need only fill the gap to a distance of about 5mm. To insert any more glue might result in the glue running around the boiler and out the dome hole. The process is as shown in this picture:



..and seen from the other side....

Now repeat the same procedure to the other side of the taper. Both lower edges are now restrained and run in a straight line.

When you insert your steam dome into the taper hole, it should all look like this...pretty cool eh?



Detailing the Smokebox and making the Smokebox Front

Decisions, Decisions

By now I would hope that you've read Kevin Strong's article about Putting a patina on your boiler jacket, a method of using sheet metal to simulate Russia Iron. If you've done some tests, and this system seems to be working OK, you might consider applying a similar boiler jacket to your Mason model. If this is the case, then you will need to make a brass or styrene smokebox wrapper as well, because the Mason smokebox diameter was equal to the diameter of the fully lagged and finished boiler. If you are to wrap your boiler, refer to the PDF drawing entitled "Boiler Wrapper Templates".

If you will be simply painting the boiler, either black, any other color, or indeed painting the Russia Iron color on, using metallic paints, then you will be using the finished boiler pipe as is. You will not need any wrappers, and will not want to enlarge the smokebox with an unnecessary wrapper. In this case, do not use the wrapper PDF drawings.

DECIDE NOW ON WHAT YOU WANT TO DO, and then read on the appropriate section that relates to you.

Option 1 - Detailing the Smokebox for a Painted Boiler - No Wrapper.

Refer to the PDF drawing entitled "Boiler Set-out Dimensions".

Do not use the Smokebox Wrapper template if you are painting your boiler, you will not be using a smokebox wrapper.

Detailing the smokebox without any wrapper is quite straightforward. You will need to apply a line of rivets at the lead and rear edge of the smokebox side. Use the boiler setout PDF drawing to help locate the rivet lines. Apply masking tape to the smokebox to find that line parallel to the boiler, and draw two lines where the rivets are to run.

Next dice up a whole bunch of rivet heads from your 0.20 x 0.30 styrene rivet stick. Depending on your Boiler pipe material, you can either weld these rivets individually onto the boiler using welder cement, or super-glue them on, if the plastic boiler does not take to the welder. Apply two lines of rivets with the rivets located at 4mm centres. That’s all there is to it. Next move onto the section about making the smokebox front. Once the rivets are in place, your smoke box should look a little like this - borrowed from the rivet line applied to the MC2001 2-6-0! The Mason requires two lines of rivets...one at each end of the smokebox.

Rivets along rear end of smoke box.

Option 2 - Detailing the Smokebox for a Fully Lagged Boiler Using a Sheet Wrapper.

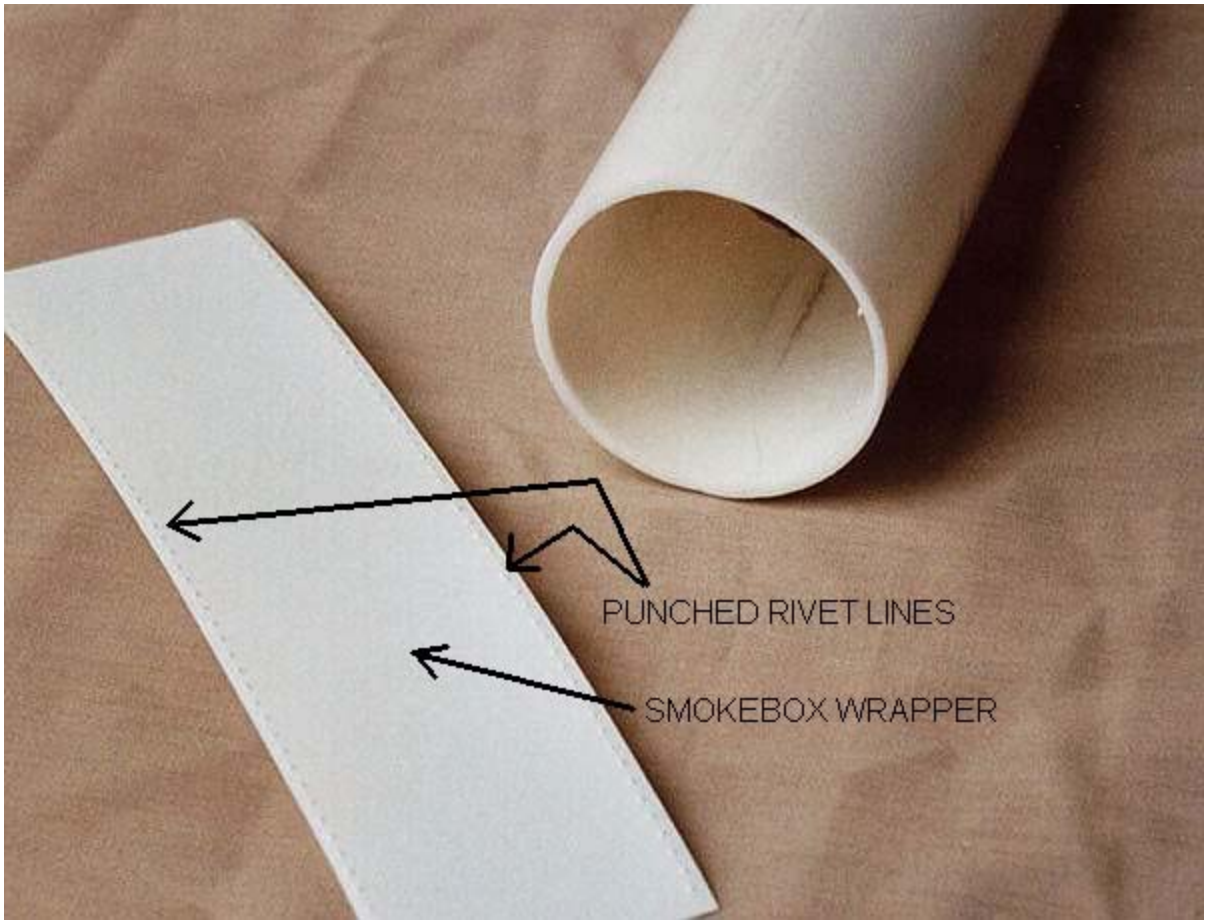
Refer PDF page entitled "Boiler Wrapper Templates".

This is the option where you make a boiler jacket to Kevin Strong's instructions and thus you will be needing to provide a smokebox wrapper as well to match the enlarged boiler diameter.

You can make the smokebox wrapper using 0.25mm styrene sheet (Evergreen make some of this), or use the clear plastic found on a shirt box. You will be wanting pretty thin plastic. It is also possible to use more of the same brass sheet used in making the Patina boiler jacket. You will be needing to paint the wrapper whether brass or styrene.

Follow the PDF template for the smokebox wrapper. Using a pointy implement, such as a heavy gauge blunt needle or a cake baking spike etc, punch each rivet into the styrene or brass sheet. This is done by placing your wrapper onto a firm base such as a block of wood, then pressing the needle into the back of the sheet styrene until a domed bulge appears on the other side of the material, forming a 'rivet'. Punch the rivets in a line at 4mm centres, along both long edges of the wrapper. When punching, support the wrapper on a firm base. The firmer the base, the cleaner, and more dome-like your rivets will be. A perfect base is a block of pine wood or similar, it is firm enough to keep the styrene in place, but allows the spike to punch into the wood, taking the rivet dome with it. Practice a little to see what the optimum punch pressure is, you don't want to punch right through the sheeting! For styrene wrappers, punching can be done by hand, simply press the spike into the styrene.

The styrene wrapper should look like this:



The Mason Bogie Smokebox Front

(Refer PDF drawing entitled "Smokebox front".)

Chaps, here you have some options. The most desirable option is to use the Aristo-craft/Delton C-16 smokebox front for the Mason Bogie. The styling is very close to accurate and the is good looking. Problem is that the C-16 has been out of production for a while now, and the limited number of smokeboxes left in the Aristo Parts dept have dried up as a result of MC2002 folks buying up. Some of you will have been lucky, some not. If you are one of the lucky ones and have a C-16 smokebox, but decided not to use it because of the hand rail stanchion holes drilled into it, fear not, a tiny bit of filler is all that is needed, and even then the location of said holes happens to occur right where the headlight bracket is mounted, so the hole is concealed. On the whole, as they say, USE IT!

You'll need to cut the C-16 smokebox front away from the rest of the C-16 smokebox, use a razor saw, and follow the scribed lines on the smokebox side. Also carefully remove the headlight bracket mounting plate at the top of the smokebox front. Try and retain a circular profile at the top where the bracket was. If you have packed out the smokebox with a wrapper, you might need to run a rim of 0.5mm styrene around the perimeter of the smokebox front, but this depends entirely on the exact pipe size you've used. You will note that the Mason fronts did have such a rim, where our Baldwin C-16 front does not, thus the rim is actually prototypical. The 0.5mm rim strip should be cut to about 1 - 1.5mm wide.

The only option left to the rest of us, who do not want to make their own smokebox front, is to use the Hartland trains 4-4-0 front. It is the right size, but stylistically not very close. it will however fill the bill, and is amply elevated to the status of 'Wimp's Way' smokebox front! Test the size of your H-L-W front against the finished size of your boiler. In some cases the H-L-W front will be slightly wider than the boiler pipe, forming a lip around the edge. This lip is typical of the Hartland models generally. If you don't like it, I suggest you sand the edge of the H-L-W front down by 0.5mm, matching its size to the boiler you have.

The rest of us make the smokebox front out of layers of 1mm and 2mm styrene sheet, with rivets welded on in the normal fashion. For those making their own smokebox fronts there is nothing to it, but to follow the templates in the 'Smokebox Front' PDF page. Cut each circle as indicated in the correct thickness, Apply the 1.5mm rivets as shown around the perimeter. Cut the hinges from 0.5mm styrene forming strips as shown. Go ahead and do it.

Right -its now time to paint your smokebox front. Whether Delton, H-L-W or scratch made, paint your fronts! I used Tamyia 'Metallic Grey' MS-5, a very dark graphite colour, then over sprayed it with Testor's Dull coat 1260.

All of us shall meet up here, where we are all to apply the same number board details to the smokebox front....and learn about the 'Great Australian Gooop'.

The Great Australian Gooop.

I build a lot of models, but I can't say that many of the methods used on them are entirely my invention. Phil Creer invented the use of dress snaps, for valve handles, Kevin Strong, the boiler jackets, etc...but one thing I can claim is the use of the 'Gooop' to simulate ornate 1870s brass details.

The boiler front of the Mason bogie is unusual in that there is a typical number disk, like so many of the US locomotives, but there is also an ornate vertical handle seen just behind the disk. US steam locomotives are remembered as generally having clamped smokebox doors. The Mason Bogie however has no clamps. The door is held shut entirely by the locking mechanism associated with that handle. Like so much that Mr. Mason has employed on his locomotives, the central locking of the smokebox door is a British innovation. The handle worked as a 90 degree turn locking mechanism. To close the door, the handle points to 3 o'clock. When the door is to close, you turn the handle to 6 o'clock, and in doing so the door tightens closed.

We will be making the ornate door handle for our model.

Quite the norm on British locomotives was the use of lever handles to secure the smokebox door. This one I can't resist...LNER #4472, "Flying Scotsman", first man made object to officially record 100MPH, way back in 1934...this claim is also now disputed!! (might have been actually 98MPH).

Step 1 - The Gooop

Cut a 16mm length of brass 1.5mm rod. Approx. 3mm from the end, you shall insert a sliver of your 2.4mm styrene tube (widen the hole in the tube with a drill bit, just held in your hand, no power tools needed). Next comes the Gooop. Mix up a small batch of epoxy, vertically dip the end of your brass rod into the epoxy and pull away. You should now have a dribble of gooey glue on the end of the brass rod. Hold the rod vertically such that the gooey blob stays hanging at the bottom end, forming a perfect pair shape...this, dear friends, is the Gooop. When the epoxy hardens, and you paint over the rod, styrene sliver and gooop in gold/brass paint, the finished effect is of a carefully turned brass ornament. You can use the same technique on brass hand rail ends, cab railings etc. This styling however is only appropriate to the 1870s-1900. This 16mm rod is your Mason Bogie smokebox front door handle.

Step 2 - Making the Number Disk

Follow the smokebox front number disk template in the PDF file. This is a 19mm diameter disk in 1mm styrene sheet. Next cut a 1.5mm wide strip of 0.5mm styrene, and weld it around the edge of your disk, this forms the rim to the number disk. Finally wrap a strip of your 0.20x0.30 rivet rod material around the outer rim, centered in the 1.5mm wide rim. All of this simulates the ornate cast brass edging to the number disk.

Take your 3.2mm Plastruct tubing, this will have a hole down the centre of it. Drill a 1.5mm hole into the side of the tube near the end. Drill only one side, don't let the drill go right through the tube. Trim off the tube about 1mm away from the hole near the end of the tube. Trim off the other end of the tube about 8mm away from the hole... making a tube about 10mm long. Weld the end of the tube into the back centre of the disk, with the hole near the number disk. Next insert your door handle with gooop into the hole. Finally paint the whole shebang a brass/gold colour. You will be applying a special decal to this plate later on. It is important the disk is totally golden at this stage. Your finished door handle and number disk should look like this:

Finally take what ever smokebox front you have, and drill out a 3mm hole in the dead centre of it. The Aristo and H-L-W fronts will already have a hole, you need only widen it out. file out the hole a tiny bit more to allow the 3.2mm styrene tube to slide in. Allow for it to be a tight fit. Slide the tube, with disk etc attached, into the smokebox front as far as it will go, to the point where the brass handle is against the smokebox door. Weld the assembly, while keeping the brass handle absolutely vertical, and the number disk parallel to the smokebox front. The door hinges should be pointing in the 3 o'clock direction.

On my prototype model, I have use the C-16 front. The finished front should look like this:

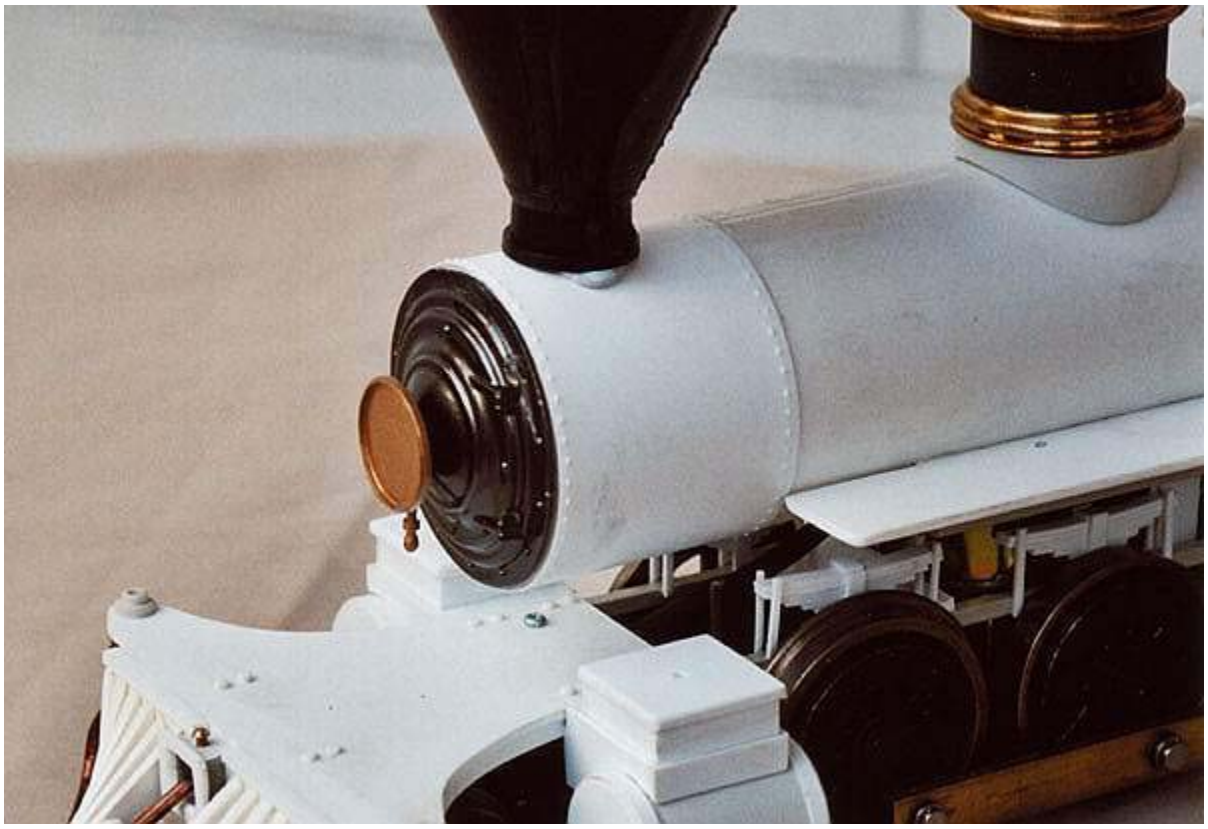
Fixing the Smokebox Front to the Smokebox.

You have two options here: glue the smokebox front to your model and leave it permanently fixed, or provide some backing styrene to the back of your smokebox front, such that you squeeze the front onto the boiler like a cork in a bottle and thus provide an access way into your boiler forevermore.

I have no particular issue with either approach. Usually I recommend the front be removable, but since the interior of this boiler is so easily accessed from the motor hole and one can reach all the way into the smokebox quite easily, I see no reason why you can't just glue the front on.

To build the packers to the back of the smokebox for a removable front, follow the diagram in the PDF smokebox PDF page. There are also many other ways of doing it.

The smokebox with front attached/inserted should look like this:



Again I have blue-tacked the H-L-W stack onto the smokebox just to demo where the stack goes. No I just couldn't help myself…and I know you'll do the same!!

OK looking ahead, the fully painted and fitted smokebox with number disk will ultimately look like this. Note the tight fitment of the number disk and lever.