

Modell Ost

Miniature Lokomotive u. Wagen Bau, England

www.modellost.co.uk

info@modellost.co.uk

+44 (0)1308 897 911

BUILD NOTE

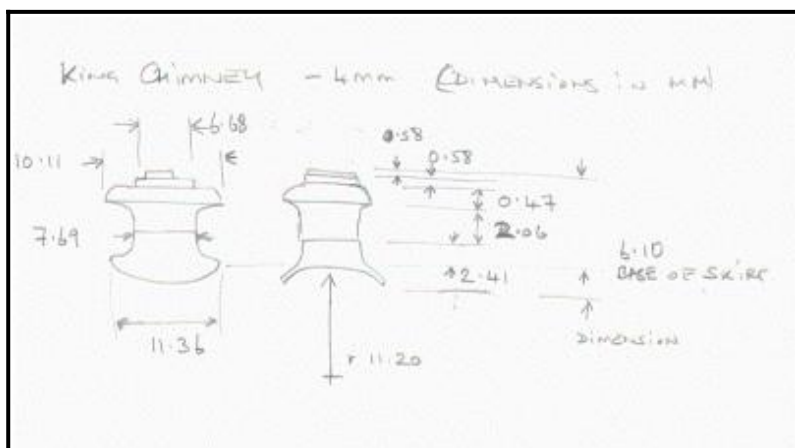
Malcolm Mitchell GWR 'King' Class Single Chimney in 4mm

Flycut Method - 19/10/17

Using a lathe to turn up fittings for small scale locomotives as an alternative to buying off-the-shelf lost wax or whitemental castings is a useful skill to acquire. Especially if you plan on building in an odd scale or perhaps have a fondness for more obscure prototypes.

There are two main schools of thought as to how one should go about making domes and chimneys for miniature locomotives. One way is to start by flycutting the boiler curvature, then turn the fitting down to the highest point of the 'saddle' that sits astride the boiler, and finally blending the sides of the fitting to form the mounting flange with careful use of needle files. The other way is to turn the base of the fitting 'in the flat', hollow out the base, and then force the fitting - either between the vice jaws or by gentle taps of a mallet - onto a piece of metal that is the same size as the finished model's boiler. For the record, there is also a third method, which is to either flycut or file a 'U' in the base of the fitting, and then to solder on a disc of brass, letting the molten solder form the transition curve - though you will probably find that some fettling with a file will still be required.

For the GWR 'King' chimney in 4mm, I used the flycut method, starting off with a dimensioned sketch to give me a better idea of the best way of tackling the job. I decided to flycut the base first, then measure off from the highest point - i.e. the top of the flycut curve - to give me the various datums for chimney cap, lip, and then the smoke deflecting capuchon at the top.



'King' chimney pencil sketch - obviously 'not to scale' - but the dimensions in mm are their 1/76 scale equivalents for 4mm/foot.

I had made a small flycutter some time previously for exactly this kind of work, and this was set up in the 4-jaw chuck to run true with the aid of a dial test indicator. Because the diameter of the flycutter body is a known dimension, it is then possible to work out just how far the cutter bar needs to project to give the exact radius of cut needed for the fitting to sit upon the finished model's boiler.

Here's a tip I picked up elsewhere on centering material in the 4-jaw lathe chuck - use two chuck keys, and only adjust one opposing pair at a time.

Setting the copper stock at centre height

I am fortunate in having a vertical milling slide with a matching machine vice for my little lathe, so setting a piece of 12mm copper bar at the exact centre height was merely a case of aligning the bottom edge of the bar stock by fingertip touch with the tailstock centre, and then winding down the slide by 6mm. A bit rough and ready, I admit, but good enough for this sort of work.

Once everything is set up correctly, it is a case of advancing the cross slide towards the cutter, and then taking a series of light cuts back and forth until the arc described by the cutter is the full depth of the bar stock. I have to admit that the finish on my chimney left something to be desired - a consequence of copper's natural tendency to 'tear' when being machined, and on account of the the vertical slide being mounted way out to one side of cross slide where it waves about in the wind a bit. But again, the marks are all on the underside, where it will not show.

With the copper stock now neatly radiused, the cutter can be removed and the embryo 'King' chimney set in its place within the 4-jaw chuck. Again, the dial test indicator is employed to make sure that the bar is running true.

The 'King' chimney is essentially a thick 'H' on its side shape - apologies in advance to the GWR purists! With something as small as this, it is possible to use a round nosed tool - mine was a 2mm radius item from a Unimat 3 - to rough out the inside of the 'H' - finishing off with careful use of a round needle file. The top underside of the cap is actually the most critical to form, and being at the headstock end of the lathe, will be turned correctly by the cutting tool. The base of the chimney - unless you go to the trouble of selecting a back facing lathe tool, which will have the correct rake and clearance angles - will however be unavoidably rough. But this is OK, because this area will be hand filed anyway later to create the chimney skirt.

Parting off tool used to define edges at top of chimney

Forming the top of the chimney is best done with a parting off tool, which will give you the sharply defined edge between - working inwards towards the headstock - the copper cap, the main chimney wall, and the cupucheon.

Only then can the final shaping of the cap be done with a with needle files. The copper cap top/outside radius is relatively easy to do with a flat file, but do be careful. The undside edge should be almost there if you have managed to find a tool with the right radius. Hold the file with two hands, wind the cross-slide as far as back as it will go to give you room to work, and keep knuckles and fingers away from the rotating chuck jaws.

I'm no expert on these matters, but the copper cap appears to be just that - flat copper sheet bent around and beaten into that distinctive Swindon shape. In model form, the 'step' between main chimney casting and cap would be foil-thin, so I elected instead to turn a fine groove to mark this transition. This will both more clearly delineate the beginning of the cap, and also make it easier to get a uniform edge to the black paint used for the rest of the smokebox when the chimney is mounted upon the model.



Getting ahead of ourselves here: chimney on push fit brass mandrel set up for polishing of cap.

The base is more problematic and though it is possible to work at the bottom flange with the chimney on its side, rotating the chuck by hand to bring each section into the right position for filing, I think that having done it like this 'on the side, you may want to wait until the chimney is off the lathe and on the bench, rather than run the risk of inadvertently marking that now nicely formed copper cap.

The last stage before parting off the chimney is to drill it right through. I used a 5.5mm drill, which leaves about 1mm or so of wall thickness. The final parting off cut needs to come about 0.20mm above the main chimney for the capuchon - but 0.5mm or near enough will do to be on the safe side. Easier to file it down than to put material back....



Chimney on mandrel held in 'V' notch of machine vice for shaping of smokebox flange skirt with needle files.

It is possible to hold the cap between the fingers, using a block of wood underneath the saddle, whilst working the sides of the base into shape. However, an easier method is to make a mandrel to suit the bore of the chimney. Just because it is drilled with a 5.5 drill does not mean that it will be to that size. Mine was about 5.70mm across when measured with the calipers, and the bore was tapered to boot... You just have to turn down a scrap piece of brass or whatever, and keep trying the chimney on the end every 0.05mm or so until it is a force fit.

Here, the mandrel is not to allow the chimney to be put back in the lathe for more turning operations - it won't be accurate enough for that - but only to assist in hand filing of the base and capuchon.

Final fettling

When working on the base, I find that a round file is the best shape, and this is best worked with a gentle 'push and twist anticlockwise' motion. Check frequently with the chimney held against the light to ensure that you are creating a concave rather than convex surface. When you think you are getting close, use varying grades of wet and dry paper to start the final shaping of the finish. Double over a small piece and then press the folded edge against the copper - this forms a flexible 'O' shape that will better smooth out irregularities in the contours.



The completed article. Left - 3/4 view from front. Right - side view. Both images approx. x 3 life size.

Once the top lip of the chimney has been filed down to form the capuchon, the chimney and mandrel can be put back in the lathe for a final polish with fine 000 grit fine wet and dry. For the final touch, the top of the bore of the chimney can be 'thinned' using a craft knife to go around the inside edge so as to remove any excess copper that may have become burred over as a result of any filing or machining operations.

The mandrel can also be drilled out - say to about 4mm in this case - and parted off to form a tube, which is then pushed partway up the chimney bore to form a mounting peg.



Job done. Much better than a cast version, even if I say so myself....