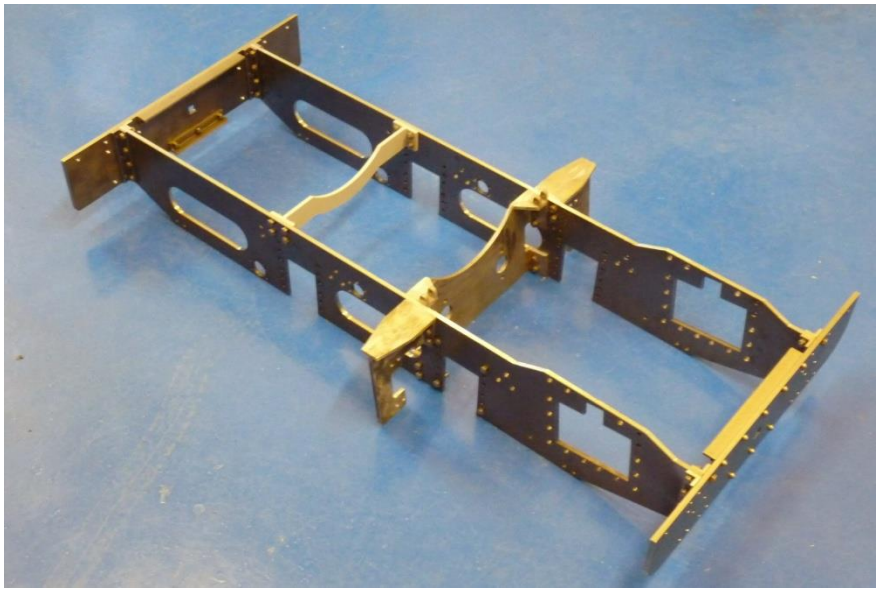
A New Hunslet – Trials and Tribulations *– Mike Brown*

After much umm-ing and argh-ing I finally bit the bullet and decided on my next loco last. Top of my priority list was something with good hauling capability, easy to drive (no fiddly scale handles, levers and hand wheels buried deep under the recesses of a fixed cab roof), no long tender to lean over and not too much tinware. So by process of elimination a Don Young Hunslet it was to be (I also like the solid chunky look of them, particularly when cabless). As luck would have it there was a nearly finished boiler on sale on eBay (my thanks to Bill Winter for spotting it). It turned out to be Maxitrak selling it. On talking to Maxitrak I found that the boiler was Tig welded and nearly finished (I am not sure but maybe it was a cancelled order). I liked the idea of Tig welding as almost any problem that may appear at a later date can easily be repaired or patched by re-Tigging (it was just a shame that it was copper not stainless steel (one for Phil!)). Anyway I went ahead and placed an order as I will feel happier building the loco to the boiler, rather than waiting for the boiler to turn up and find that it does not fit! Having made the commitment there was nothing else to do but order a set of plans and castings from Reeves (trying to ignore the huge subsequent dent in the credit card) and a set of frames from Model Engineering Laser (very reasonable). When the plans arrived I took them to the clubhouse on Saturday morning and had a chat with Keith Jones (my Guru). Keith pointed out a weakness with the boiler design - where it is fixed to the frames the fixing holes are drilled and tapped straight into the copper shell. Likewise the firebox door hinge and latch was screwed straight into the copper sheet. Now I am sure that hundreds, maybe thousands of boilers have been made this way with no problem, but the idea of drilling and tapping straight into a pressure vessel gives me the creeps (as it does Keith). A simple solution would be to fit a blind bush at the fixing points. A quick call to Maxitrak first thing Monday morning proved very timely, as the boiler was just being filled with water for its final pressure test! Anyway the TIG welding came into its own, as it was an easy matter to drill holes in the shell at the fixing points and to TIG weld in short lengths of copper rod to form the blind bushes. I believe that it only took an hour or so to do and the pressure test was completed that morning.

On arrival the boiler looked fine (if a little unusual being welded rather that silver soldered). Unfortunately the paper work and the CE marking left a lot to be desired. Eventually the boiler had to go back to be properly stamped up and new paper work sent. To be fair to Maxitrak, they were very helpful on the phone, and did everything that was required with no quibbles at all.

So, a start was made and metal cut (actually the first thing to do was to bronze weld together all the bits of the laser cut frames).



The assmbled frames

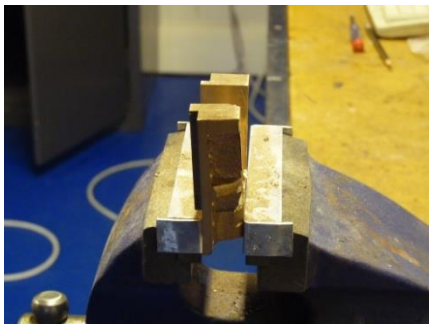
A real bugbear was having to convert all the dimensions to metric (what are all these stupid fractions of an inch about anyway?). The easiest way was to re-draw each part in 2D Design, then swap from inch/ fractions

to metric and re-dimension the thing (this would be just as easy to convert to inch/decimal in the same way). What this process did do was highlight several “anomalies” in the original drawings, in fact I have found quite a few mistakes already. So, Don Young was not such a careful draughtsman after all!

Anyway, the frames went together just so, and I started on the hornblocks. These are a bit of a cheat by Don Young. To cut corners a bit he used the castings from Jersey Lilly. Unfortunately the castings look nothing like the original hornblocks and because they were designed for a different loco an awful lot of metal has to be machined away and the final shape looks a bit weird. Still having a set of gunmetal castings I had no real choice but to set to. Everything was going well until the last operation, machining the large slot for the axle boxes to slide up and down in. Don Young recommends machining them along the length and cleaning out the rounded corners by hand. As I have a fairly heavy mill and a long reach milling cutter, I felt inclined to mill straight down the slot leaving nice square corners in one operation. I made plans to make a substantial jig to hold everything nice and rigid. Unfortunately stupidity got the better of me at this point, as it crossed my mind that I could probably get away with holding the block straight in the machine vice. Before I knew it madness took hold and the first hornblock was in the vice and the cutter was spinning. Everything went well for the first face and then complacency set in. Next thing I knew (no prizes for guessing) BANG! I think I might have got away with it, but I suspect that in my haste I had forgotten to lock the bed before starting on the second face. The damage was terminal, one arm of the hornblock was well and truly bent.

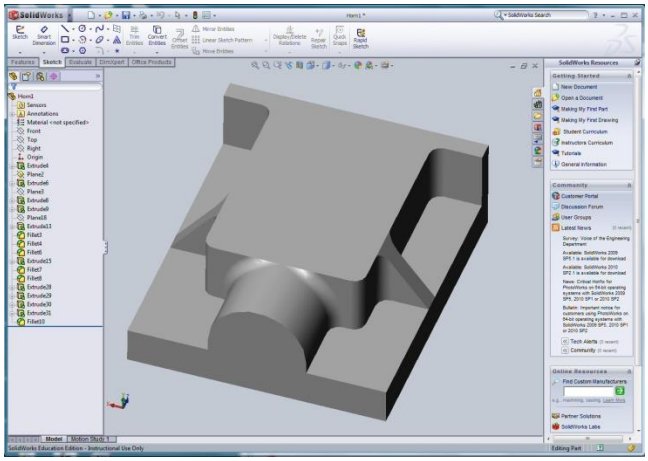
*How **not** to hold a hornblock*

The resulting carnage

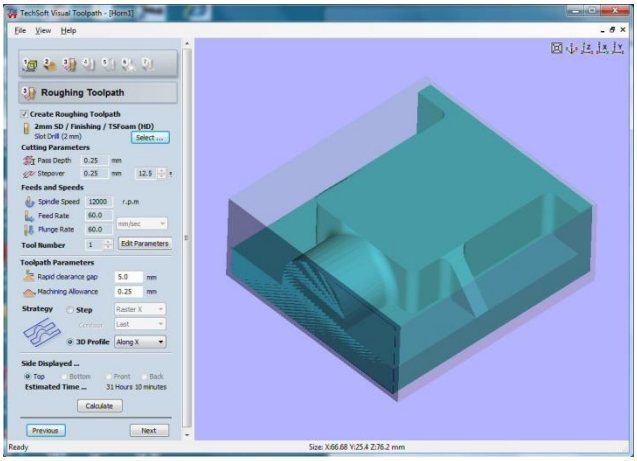


The bent arm

I said a short four letter prayer to the workshop gods, and went to enquire about the cost of a new set of hornblock castings - £190. Depression really set in at this point, I just could not justify this sort of cost because of such an idiotic moment of madness. Finally a sort of plan hatched. As many of you will know I have access to a range of CNC equipment at work, and the basic shape of the hornblocks lends itself to CNC manufacture. Unfortunately, the nearest thing to a milling machine that we sell, the Roland MDX-540E, is really designed for rapid prototyping of models, patterns, etc in the likes of wood, resin, and MDF. I have never tried to push it to mill a large block of metal, maybe now was that time. After a good deal of ferreting around the web I decided that the only metal suitable for the job that was going to be cheaper than the castings, was brass - a suitable bar would be about £60, still fairly heavy going but more reasonable. Now I had to draw the hornblock in 3D. Fortunately we sell 3D Design software called SolidWorks to schools and colleges. Unfortunately although I have played with it, I have never learned to use it properly – still no time like the present. Fortunately the software has some reasonable on screen tutorials, and it only took about a morning to get up to speed enough to manage what is really a pretty simple shape.



SolidWorks



Visual Toolpath

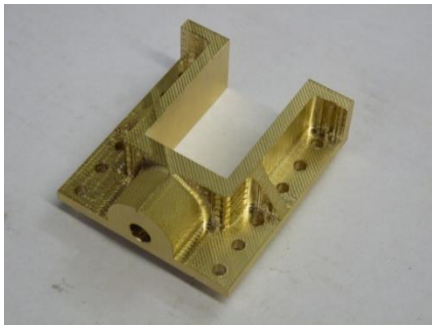
With a vice mounted on the MDX-540E, and a large lump of brass fitted it was time to make a guess at the machining parameters. The route to manufacture is to save the drawing as an STL file (this is a standard format for 3D drawings), and open it in another piece of software called Visual Toolpath. This software generates the required tool movements and effectively operates the machine. What it does not do is choose settings such as tools, feeds, speed, depths of cut, etc. There are also a number of possible different machining strategies to choose from. Never having machined brass it was all a of bit guesswork at this point. Pressing the start button with some trepidation the machine set off and fortunately everything seemed to go OK, the MDX 540 coping a lot better than I had anticipated. One and a half hours later I had a finished hornblock – well it still needed a lot of manual machining as I had only produced the basic casting shape. Now only three more to go!

The Roland MDX540E

The work mounted

Cutting in progress

The "solid" jig in use



A finished Hornblock

Back in the home workshop I now had to finish machine the hornblocks. As you will see above, I was taking no chances this time, and the solid machining jig I had originally planned was made and put into operation. Fortunately I now have four fully finished hornblocks and even more experience to learn from in future!