

The Robinson 4-6-0s

An passing interest turns into a major change in direction - John Bateson



Robinson Class 8G, B9/2 '6113' in LNER days. This engine has been superheated (evidence the rivets around the smoke box wrapper, the Gresley 'snifter' and the whistle on the fire box) but the wheel on the smoke box door is still fitted. The date is after 1925. Note the pseudo - GCR chimney for the LNER loading gauge. Apart from a raised pitch of 4" during superheating this engine looks almost as it was when built in 1906 apart from some obvious untidyness and wear.

Let's start at the very beginning...

I really don't know what came over me. I should have known better, but there I was somewhere to the north of Derby enjoying the rolling hills and the hay fever (and a Society AGM in the H.M.R.S. building) when I spotted in the library some surplus copies of the RCTS "Locomotives of the L.N.E.R." and purchased a few of them.

I like books with lots of words that dig deeply into things, it sets me off on all sorts of paths that I would never normally consider, it broadens the mind - and the seat - but the material in these books was way out of my modelling period. This was at a time when evening television had gone down the tube, pensions were in the future, I had an unpaid job and lots of free time - so I read, in particular, Part 2 of the R.C.T.S. series covering the Robinson 4-6-0s, not once, not twice, but several times over. I failed to spot it the oncoming express!

Let me be clear about this, my modelling period is very definitely post WW2, big steam and stuff. I have always thought the Robinson 4-6-0s were plug ugly engines and every time I heard somebody expound on their beauty and style I had always concluded that the world in which we live is truly a strange place. The bug was, however, eating away and I began to realise that there really was something about these 'ducklings' that did catch one's attention. I noticed that in quite a few classes there were so many similarities that it was a wonder that there seemed to be no models for these ex-G.C.R., L.N.E.R. and then for a while, B.R. engines. They lasted quite a while so must have been useful to somebody!

Then in conversation with a modeller of note, it was remarked that very few models of these engines existed in model form, probably due to a perceived shortage of kits and interest. I opened my big mouth and indicated that it should be possible to build the whole set of Robinson 4-6-0s using a large number of common parts and run them as P4 models. Big mistake, huge!

Further investigations

The more I looked around the more engrossed I became. I was able to view a few of the G.A.s (General Assembly Drawings) from M.O.S.I. (Manchester Museum of Science and Industry) who then promptly closed down their archives over a two year period for a major rebuild of the whole site, aimed at persuading small children we were about to run out of water. In Manchester?

Motive

At about this time *Scalefour News* and *MRJ* ran articles about using etched brass or etched nickel silver to produce kits, there were some discussions and a few minor disagreements about methodologies but the consensus seemed to be that models could be built by the private modeller for private satisfaction using modern tools and at a cost that would be within modest budgets. A rough calculation indicated that a model could be completed at a similar cost to a full fitted kit.

I'll have some of that, thought I.

Before I realised it I had scanned some of the GAs into computer files and added them to some CAD (Computer Aided

Design) drawings. I was committed (although that is not quite how a certain young lady of my acquaintance so very kindly expressed it) and started work in earnest. I had opened my big mouth in public and now had to deliver something.

Means

I suppose being slightly computer literate is a start. I have been fortunate to be in at the leading edge of a number of information technology tools, not as a designer of course, but as an enthusiastic user. Way back in time when Peppercorn ruled the East Coast Main Lines I was told by a headmaster at school that the best way to get things done was to give the job to the laziest boy in the class, this would guarantee the best and most efficient outcome. Not that I admit to being the laziest boy in the class - although I had to edit a few school reports before they were inspected.

Information technology was a god-send to me. It allowed me to be lazy while appearing to be extremely busy. It took many years to discover how false this premise really was!

The kids leaving home was another enabler. They earned their own money after leaving school (most of the time) and then moved out. Result!

This left us with a couple of spare bedrooms, one of which immediately became 'the office'. While I had always thought this was a small space (by comparison with newly built houses this ex-bedroom is huge) it rapidly became filled with shelving, desk and a work-bench. It is now really a small, crowded space and very cramped.

Opportunity

I retired from my part-time job recently which gives me a lot of spare time. Daytime television is not an option. Pensions have started to arrive which now give us a slight excess of income over expenditure, so any new work could be funded, albeit over time.

And so it begins - a GCR Group Standard 4000 Gallon Tender

What began as an accident has become an obsession and is consuming much of my spare time.

I planned to make an easy start, just designing the etch for a G.C.R. Tender using some original drawings as a basis. This seemed to go quite well at first, although I learned very quickly that my C.A.D. experience wasn't as great as I had thought and entered a steep learning curve in translating original drawings and later drawings such as those from Isinglass and PDH into viable drawings that could be used to generate an etch diagram.

The technique adopted was simply to stick with the original dimensions in all the drawing details, in that way no translations would be needed except for the final drawing to be sent to the etchers - although I had nightmares about forgetting the final down-scaling and sending a full scale locomotive etch to them.

Compromises.

Trying to use exact measurements was only the start. While I could read from the original drawings the true measurements for the frames, the 0.012' that most etchers can supply is the nearest I could get to absolute accuracy. At this width in model form the frames are decidedly flimsy so it was necessary to include all the frame stiffeners in the design, irrespective of complexity. 0.012' equates to metal thickness of 0.91" so this is passably close to the steel sheets used which were 0.875" or 7/8".

Foot plates at 7/16" were a dilemma and forced the second of further compromises since the same applied to much of the tender body.

The third major compromise was in the Well Tank area of the tender. This was really just a water-proof box stuck under the main tank in order to increase capacity overall for the least cost. There were internal frames for the tender which were separate from the Well Tank, but the space between them was so small as to be almost invisible. It was a considerable relief to amalgamate the two into one structure and simplify the whole design.

The last major compromise was the width of the conjoined well tank and internal frames. The measurements stated in Digest 1.2 on Wheel Standards meant that the actual inside frames had to be set inwards a little to ensure the wheels would be clear of them. Since the wheels in P4 would be sprung there is also a possibility, even with restricting vertical movement to +/- 0.5 mm, of them catching and thus shorting on the frames. So I set them inwards a tad more. Precision engineering this is not, but being careful is also good engineering!



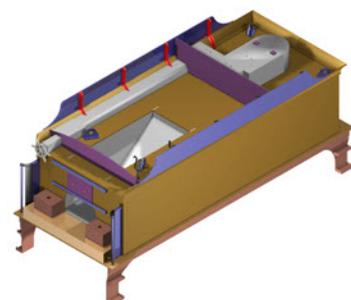
A surviving example of the GCR Group Standard tender - almost. Lots of detail changes but this picture, taken at Llangollen, was a good start in building something that looked a bit like the real thing.

Once the material sizes for all the parts were determined it was time to reflect these back into the original C.A.D. Drawings, all using the 3D capabilities of most drawing software. This was how I arrived at the final CAD rendered diagrams shown below.



The final version of the frame shown here with the current collecting PCB fitted. There is plenty of space for both lead weights and a DCC chip.

The tender viewed from the top showing the scoop mechanism covers and actuating wheel. This is the original tender version, later versions were self levelling but with the same frames.



The release of the Bachmann 04 provided an interesting comparison.

Help from other sources

It was very nice of the Bo'ness people to send D49/1 No. 246 all the way to Llangollen for the Festival of Steam in April 2009, I got a lot of insight into how things fitted together. It was doubly fortunate that Morayshire was fitted with a GCR tender when built by Gresley in 1927.

The first test etch

The submission of the drawings for the first test etch and the receipt of the etch was quite interesting. I was still at the stage where I was doing this for my own interest, nothing else was riding on its production except some satisfaction at what I had done so far.

Then I spotted all the mistakes!

While most of it fitted together far better than I had thought possible, although since I had chosen for exact measurements for the tabs and locating slots some care was needed when fitting parts together. This is the main advantage of using software rather than pen and ink, and in principle any design should be so well fitted that alignment tools are rarely needed. I shall probably have to eat my words on that statement later!

There were little niggles all over the place and I made 37 changes to the layout on the drawing and to some of the components where assembly didn't quite work out as I had intended.

A second test etch was duly prepared and this turned out to be so much better, albeit a couple of minor changes were needed. I showed this to a few people and received some favourable comments back.

Then things began to get *really, really interesting*.

The locomotives

I had settled originally for the GCR Class 8F as the first target to be tackled, which along with the GCR Class 8C seemed to be fairly straightforward with a lot of commonality with other 4-6-0s from Robinson, but it was the so-called "Fish Engines" that attracted my interest in the end.

I began to concentrate on these but realised very quickly that were were complexities within complexities.

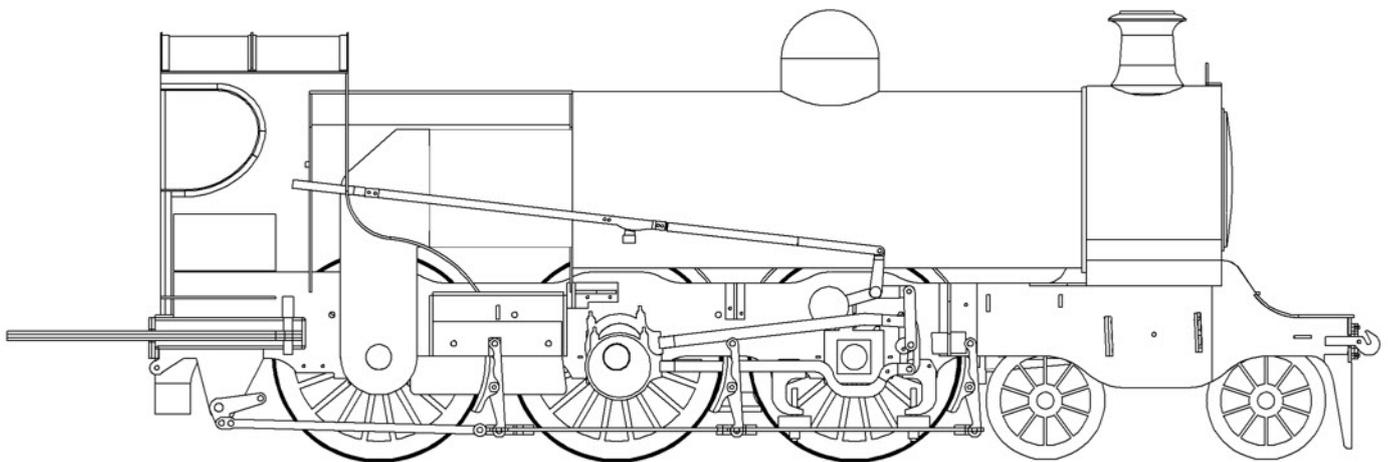
After the grouping the Class B5, as they had become, were super-heated. The most obvious change was that the boiler was now 7.5" higher (using the Q4 boiler) and the cab front had a different arrangement of windows. The saturated and superheated versions became LNER B5/1 and LNER B5/3.

When starting the drawings I found that the most difficult thing to do was to get organised. So many of the ideas were new to me that I floundered for quite a while and there were several iterations of the first set of drawings.

One of the nice things about current CAD software is the ability to put different parts of the design onto different layers. It permits visualisation of the whole thing in much easier terms than trying to do the whole thing at once. Although starting with the frames, I soon found that I needed to separate out the dimensions onto its own layer so that the creation of the 3D version became a fairly simple extrusion. I had started from the other end by tracing the GA into the software and then attaching dimensions, it was far easier in the end to create all the dimensions independently and then create the 3D component.

I ended up with 20 layers including the etch layers. These were:-

1. Layer 0 - default repository of crucial measurements such as wheel spacing and gauge
2. GA
3. Frames
4. Frame Dimensions
5. Footplate
6. Footplate Dimensions
7. Boiler (including firebox and smoke box)
8. Boiler Dimensions
9. Cab
10. Cab Dimensions
11. Brakes
12. Brake Dimensions
13. Wheels
14. Wheel Dimensions
15. Motion
16. Motion Dimensions
17. Etch
18. Etch Half Red
19. Etch Half Blue
20. Etch Text
21. Documentation for etch



This is an early composite of the Class 8 or B5/1 showing the general layout with cab, firebox and boiler, brakes and motion. The gearbox outline is for one of those excellent High Level affairs to be powered by the usual Mashima motor. Stephenson's valve gear is shown but this really should be an optional item since it is barely visible even when using the CAD rendered version to examine the internal works up close.

In addition to the above I found it convenient to add three spare layers. Sometimes I found it necessary to amalgamate layers to work out a problem and the spare layers were very handy for that.

I have always been keen on documentation because I tend to jump around between enterprises, so when I come back to something I had shelved a while ago I always find it useful to have a note of what I had done and where I was up to.

The extra layers were also to be used for producing the construction drawings - although this was for the future.

Along came an arachnid

I really don't know how it happened, but somewhere around June it became apparent that there could be some wider interest in what I was doing and before I knew it, small daughter, she of the book-keeping tendency had me attend an HMRC seminar on starting a small company.

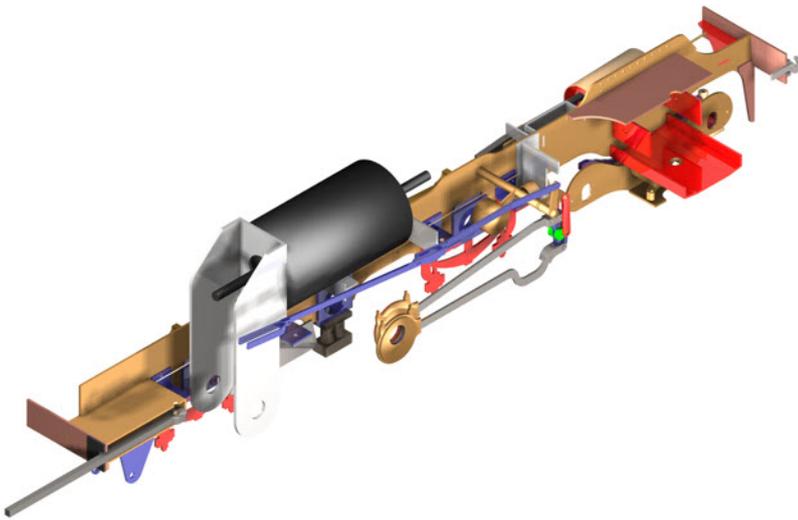
I soon found out that this was ice-berg territory and the prospect of setting up shop appalled me so I had a cunning plan.

In early September 2010 I put forward a proposal to the Scalefour Society Committee and this was accepted. In effect whatever I can produce (which of course is subject to my own budget restrictions) will be available to modellers through the Society Stores.

And finally

On my workbench at the time of writing (mid-November 2010) I have the first test etch for the Class 8 (LNER B5) chassis, which is for P4 and EM. It looks interesting and as I start to build it I will also be writing the construction notes.

I'm going to be quite busy over the next couple of months!



This is the 3D CAD version of the frames and motion just to give some flavour of the complexity. It is a half version of the whole engine which, subject to a few minor details is simply a mirror image about the centre line.

Using the 'viewing' tools within the software it is possible to travel through the mechanism and see where all the spaces are - or where they ought to be. Because of the compromises I had made earlier there were a few surprises and these usually involved creating more compromises.

I am full of admiration for the draughtsmen of the turn of the last century for the way they resolved all this - a full 100 years before computers made life so much easier.