

James Sanders' brand new 5" gauge Manning Wardle sits in the steaming bays just before one of it's first runs after completion. Read more about the construction of this marvellous little engine on page 11.

February Running Day

Our February running day dawned to very pleasant weather conditions. The temperature was significantly lower than what had been experienced over the proceeding days, however it had brought with it the threat of an afternoon storm. The prediction certainly wasn't wrong!

On display in the clubhouse during morning tea were Warwick's detailed Britannia tender backplate, in addition to James' Manning Wardle, now with it's spectacle plate and cab roof fitted. Liz showed us a sectioned injector, which was of much interest to those present. Its not often that we get to see how the insides go together! I handed out my first newsletter as editor, admittedly with some degree of nervousness. However I was overjoyed to receive positive reviews and commendation.

Operations started somewhat earlier than usual, with the local

Korean Cockatoos group having been allowed special entry into the grounds at 12:30pm. These consisted of a group of carers and disabled children who were being given the opportunity to learn experiences and have some fun. They were given a safety briefing by David L, before they enjoyed rides behind Mick's Shay and Ross' Fowler.

Ian Tomlinson was on the gate, with crowds growing slowly throughout the afternoon. On the whole, the number of passengers was somewhat less than usual, with train loadings generally medium but with the odd one full. Ian later reported that as people arrived, others left keeping the numbers in the grounds down. Later Ian was assisted on the gate by Gai. We did have a couple of birthday parties in addition.

On the ground level inner main we had Ross with Toneya, who seemed to run smoothly all afternoon. Steve Border and Tony Eyre alternated as guards. The other inner train consisted of



Small engines unite! Evan and Simplex, Nick with Blowfly, and Simon with his Simplex drift downgrade with 5 cars on the February running day.

Warwick with V1224. Warwick drove initially, however later in the afternoon David T took the regulator, allowing Warwick to get some photos for the weekly email. Guard was Tony K, who was relieved by Bruce H later in the afternoon. The inner stationmaster was Carol L, with Bruce or Tony assisting.

On the outer main we had Mick and Scott M with the Shay. They alternated between driving and guard duties. The second outer train was ably handled by Graeme K and 2401, assisted initially by Max G on Lionel's Tasmanian R class. About mid-afternoon a loco change occurred, which saw the R return to loco to be replaced by Ray L and 3506. Lionel and Geoff H alternated between guard duties on this train and stationmaster. The ground level operated smoothly throughout the afternoon, however two point issues were attended to by Warwick, Mark, and David L. Once sorted, no further problems occurred. Signalmen were Martin D, Barry M, and Mark G. They also took on the task of being our weather monitors for the afternoon, accurately predicting the storm to hit about 4pm.

On the elevated, we had a wide array of motive power. Myself with Blowfly 'Hart' and Simon with Simplex as train engine took 5 cars. While things were a bit slippery initially, eventually things got easier and we handled the 5 cars with relative ease. Later in the afternoon our double-header was augmented by Evan and his Simplex, who coupled up in front of the Blowfly. With this combination, the load was barely noticeable! Towards the end of the afternoon, Zac did some driving on the Blowfly. Nigel W was guard for much of the afternoon, however I think there was a bit of swapping! Paul Taffa ran 2 cars, with Zac's friend Jai

fulfilling guard requirements. Garry B with Impala and James with 2604 as train engine took four cars, making easy work of this not too heavy load. James had his headlight and marker lights turned on later in the afternoon, and they certainly looked the part! David J was guard. Arthur's 2-8-2 and John H's Nigel Gresley spent the afternoon in loco, as we had more than enough locomotives to get by. Instead, Arthur and John controlled the elevated station with great efficiency. John Lyons also assisted and provided our much appreciated refreshments.

Towards 4pm, ominous black clouds began to loom over the horizon. This did not seem to deter the crowds a great deal until rain started to fall. As a result, most of our last laps were undertaken in light rain. The predicted thunderstorm soon hit, and there was a mad rush to get everything stabled! On the elevated, John H gave the directions for carriages to be shunted into the loop, and all engines to be stabled undercover in the station. It was a quite unusual situation, but made for some good chit-chat as we waited for the storm and accompanying hail to pass. The whistle on Gary's B1 stuck open at this time, and had to be muted by a cloth placed over the device!

The canteen was staffed by Liz, Di, Joy, Gai, and Margo, while ticket seller was Peter W. Overall, we sold 1994 rides for the day. This is 300 above the February average.

March Running Day

A bit of a different running day today! A week of fairly consistent wet weather had painted a rather doubtful picture for the day's activities. Simon informed me that overnight we had



David T hurries back to loco with V1224, in an effort to escape the conditions!



Zac and Tich scurry upgrade with one car during a brief moment of sunshine on what was a very damp March running day.

had about 40mm of rain, while a further 7mm fell during the day, mostly in bursts of heavy showers. As a result, member numbers were comparatively low compared to the norm for running days, and we certainly would not have had enough to put on our usual full show. However, we did manage to run a reduced service on the elevated for a small number of patrons who turned up, with the entrance gates being left open for anyone who wanted to come in and have a look. As the afternoon rolled by, about a dozen or so came in for some rides free of charge. The few that came in seemed to enjoy it very much, even in spite of the rain and muddy grounds, and a couple even made a voluntary donation out of appreciation.

Tony K, who has gained a reputation for being anything but a “fair weather sailor” when it comes to live steam operation, had his recently acquired Jim L built Ten Wheeler out for a small load test of two elevated cars and a van. Many of us were given the pleasure of driving this engine during the day, including myself (mostly during periods of heavy showers when few others seemed keen). The engine is a pleasure to drive, being very free-steaming and sure-footed, and with a deeply satisfying chime whistle to boot! When

he took some passengers, Zac’s friend Jai rode as guard. Zac steamed up his 5” gauge Tich and pulled one car. Again, several members were offered a drive, including myself. I must admit I was rather surprised as to just how much Tich seemed to be able to pull— on one occasion I came up the grade with four passengers in addition to myself without any difficulty. John H did a good job of manning the station.

Overall, it was a very quiet day and a relaxing change from our usual running days. Many thanks to Jo for providing some of the photos which were used for the weekly email and this report.

April Running Day

The April running day turned out to be a beautiful one weather wise, with sunny conditions and fairly mild temperatures. During the week, Arthur had assisted in the removal of a sizeable gum tree branch that had broken off in the carpark adjacent to the grounds. When I arrived at the grounds during morning tea, I became aware that the number of members present were considerably less than usual, this having been expected due to the fact that the annual AALS convention coincided with our public open day. However, as it turned out, we had ample staff for the day, as public attendance was not overwhelming.

After morning tea, James and Warwick gave some much appreciated assistance with my Blowfly’s mechanical lubricator, which was failing to deliver adequate oil due to a slipping sprag clutch. James disassembled the clutch mechanism and we degreased it all. It appeared to be working properly when put back together, however subsequent investigations would reveal otherwise.

On the elevated we had a somewhat eventful afternoon. Tony K with his Ten Wheeler and myself with the Blowfly (train engine) started off double heading on six cars with Brad as guard. On the first lap with passengers it became apparent that something was leaking around the front end of the Ten Wheeler, with a loud hissing sound occurring whenever the regulator was open. Tony uncoupled and ran back to loco, whilst I reduced



Ray Lee’s 3281 pauses as passenger loading takes place on the April running day.



Arthur's heritage Mikado has steam to spare as it leads David Lee's Commonwealth Railways GM down grade on the April running day.

the load to two cars. It was soon discovered that there was a split in the lubricator delivery pipe to the cylinders, which was causing steam to escape. After about two laps on my own, I noticed that my mechanical lubricator was again failing to deliver oil, so the cars were returned to the carriage sidings and the Blowfly run back to loco. Warwick very kindly offered to repair the lubricator at home, and it has since been reinstalled and successfully tested. Meanwhile, Tony, with assistance from Neal Bates, had made a temporary soft solder repair job on the oil pipe, so steam was once again raised in the Ten Wheeler and he ventured back out onto the track for a test run. Unfortunately, the soft solder repair gave way during the first lap, and so the engine was once again returned to loco and packed away.

The other long elevated train comprised of James' 2604 as pilot and Gary's Impala as train engine, hauling a load of four cars. David J was guard. They seemed to run for most of the afternoon, however towards the end of the day the coupling rod pin retainer on the leading driving wheel of James' 26 class sheared. James returned to loco, whilst Gary continued alone for the remainder of the afternoon. Paul Taffa ran a two car train with the Hunslet, and seemed to have a trouble-free afternoon. He had Jim M as guard. James' father did a marvellous job of managing the elevated station, being assisted by a number of members at different times. I believe there was some guard / station staff swapping during the afternoon. John L provided us with our greatly appreciated tea and biscuits— it is marvellous to be given the opportunity to have a cup on the run

and we are very lucky to have such a service on the elevated.

The ground level outer main saw Ray with 3281 leading Graeme K and 2401, with Peter W as guard. They seemed to run very well all afternoon, and were the only train on the outer. The inner main had the interesting combination of Arthur with the Mikado as pilot and David L with one of his Commonwealth GMs as train engine. Steve Border acted as guard. Part-way through the afternoon the GM gave trouble, so David swapped it with its sister that had been sitting on display in loco! The other inner main train was handled by Warwick and V1224, with Geoff H as guard. Warwick had come down from the convention to be present for our running day, and so was able to report on how the event had been over the previous couple of days. He seemed to have a trouble-free afternoon. I am sorry to admit that I failed to make an accurate record of the ground level stationmasters, however I do believe that Jo-anne T managed the inner, while Martin Y took care of the outer. I apologise if I have left anyone out.

The public left the grounds comparatively early, allowing us to pack up with plenty of light left. In fact, some of us were at the bowling club eating dinner not long after 5:30pm! The total number of tickets sold for the day was 1598, with Margo Wagner acting as ticket seller. The canteen was ably handled by Liz and Diane, whilst in the signal-box were Barry M and Martin D. Greg C kindly volunteered to fill in as gate keeper for Matt L who was unable to attend.

March Member's Day

As is if a sign of what was to come on the following running day, our March member's run turned out to be a very damp one! However, it did not seem to deter our members, with a good number present. In addition, there were a few locos present. Tony K steamed up his Ten Wheeler, with numerous members trying their hand at the regulator, including myself. Tony ran on the elevated, as did James with 2604, who had the engine in steam to entertain some relatives. Although only coupled up to one car, the wet conditions made the rails very slippery indeed, so much so that he was assisted in the rear by Tony's Ten Wheeler at times. It did look strange seeing such substantial motive power on only one car! Graeme K had 5035 in steam for a boiler test, this being officiated by David T in pouring rain. He had a couple of minor issues, however all came good in the end. In addition to this, David also inspected John H's Foden and a Pansy boiler that Nigel W had brought along. Warwick had Tich in loco, but didn't end up running.

On display in the clubhouse were Ross and Jim's Fowler ploughing engine wheels. These are beautiful pieces of workmanship, and it is with much anticipation that we await the final products. Paul B showed us the axleboxes and some other components for his O class bogie, while James had the chassis for his Manning Wardle, now complete with wheels and valve gear. In addition to this, James had a laser cut plywood Gauge 1 tipping wagon for us to look at, whilst Warwick displayed his 3.5" gauge Britannia tender, now with water filters fitted. John Lyons assisted David J with his Manning Wardle project, with the hornblocks being rivetted to the chassis.



David Thomas officiates a boiler test on Graeme Kirkby's 50 class in rather dismal conditions, during our March member's day.

We all enjoyed a delicious lunch of sausages, bacon, tomatoes, onions and rolls, cooked to perfection by our chefs Jim M and Barry M. Thanks must also go to Graeme K and Peter W who did the washing up, and David T who obtained the bread rolls.

The rain came in quite heavy spurts and things didn't dry up until about 3pm, by which time most members were heading home. However, the last of us did not leave until about 5pm, following much pleasant chatting and consuming of tea and biscuits.

Post-Convention Run at SLSLS

Unfortunately your editor was unable to attend on this day, so the following report has been provided by Warwick.



Tender-first running WAGR style- James takes Warwick's V1224 and scale goods train for a run. It seems a couple of young passengers have jumped the freight!

Our post convention run was held on the Thursday following convention in perfect conditions and was attended by about 35 people.

Visitors included Shane Ferris (QSMEE) with his PB15, Bill Whale from Bankstown with his X100, Jim Auld from Wascoe with a PB15, Dave Archibald (SSME) with his 32 class, and Warren Jones (Wascoe and NWME) with a 48 class. There were others who came along for a look too. Members locos in attendance included Tony K with the 10 wheeler, James with the Manning Wardle, Garry Buttel with the 36 and train, Neal B with his Butch 0-6-0, and I had the V complete with a Western Australian train of rolling stock. A lovely sausage and onion in a roll lunch was cooked by Ian Tomlinson and Paul Taffa and was much appreciated too. Thanks to Neal who obtained the rolls and to Wendy,

Joy and Mandy who womaned the kiosk, buttered the rolls and looked after the morning and afternoon tea. A highlight was Barry M driving the 48 on the Central West set, and the tender first goods train working. Thanks to James who opened up at 7am and beat Shane to the gate! Thanks also to Arthur who did a lot of set up and to all members who came along to make a great day of it. To finish the day off Warwick changed some elevated signal lamps to a revised LED arrangement which incorporates a voltage regulator. Of interest is that the elevated signal power supply has dropped from over 5 amps to just 1!

Member's Run at Brian Carter's Track

Again your editor was unable to attend this event, so Warwick provides our report. Many thanks to James who provided the pictures:

What a perfect weather day today! Some 23 (or so) members and family attended today's visit to Brian and Sue Carter's railway. Brian has been working hard to provide some fancy facilities including a very nice station and elegantly fitted out too.

In attendance were Simon and David J (no loco!), Ray and Di with 3281, Max with Bitza, Garry Buttler with the 36, Graeme K with his 50 class, James and the Manning Wardle, Tony K with the 10 wheeler having its inaugural ground level trip, Andrew and Warwick with 411, Arthur with the heritage 2-8-2, John Lyons and 1915, Paul Taffa with Hunslet, Neal, Jo and Daniel with Butch, and friends Simon D and family with his 4-6-0 and DNC Diesel, and Mark and Jenni with Blowfly. As well Geoff H and John H, and Mark and Clair G also attend-

ed. Brian and Sue put on plenty of cakes and other eats, and an enjoyable lunch was had around a BBQ in glorious Southern Highlands sunshine.

This was an excellent roll up and with the two goods trains of Garry and Graeme combined into one and hauled by various locos, there was an interesting load to haul. John L had 1915 on the ground (its third ground level outing we believe) as it hauled its short goods consist around.

About mid afternoon some left and others arrived, but Warwick & Andrew bade farewell around dusk leaving Graeme K and Mark R to bed down for the night and no doubt continue on early the next day!

Many thanks to Brian and Sue for a lovely day.



Andrew blasts upgrade with James' Manning Wardle at Brian Carter's track.



Gary Buttler prepares to take his 3658 out of loco, during the member's run at Brian Carter's excellent 5" gauge track.

Duty Roster

June: M. Murray, A. Allison, M. Gibbons, W. Fletcher, G. Kirkby, J. Noller, P. Sayer, I. Tomlinson, G. Scott.

July: W. Allison, S. Collier, G. Buttel, B. Millner, S. Murray, V. Scicluna, G. Tindale, P. Brotchie, J. Sanders.

August: D. Thomas, B. Courtney, G. Croudace, S. Larkin, L. Pascoe, S. Sorensen, D. Lee, N. Bates, R. Murphy, B. Wilkinson, G. Hague.

September: J. Hurst, J. Leishman, J. Lyons, D. Mulholland, J. Mulholland, M. Yule, R. Bishop, G. Olsen, E. Lister, N. Woolley.

Gate: June. D. Lee, July. Z. Lee, August. S. Larkin, September. G. Kirkby.

Model Engineering Activities:

It is with much excitement and anticipation that we recently witnessed the first steaming of James Sanders beautifully built 5" gauge Manning Wardle. It is based upon locomotive No. 4 of the West Ryde Pumping Station, which worked for many years within a stones throw (almost) of our club grounds! It is wonderful to finally see a model of our local engine. The little 0-4-0 had its first, and on the whole very successful, run at the grounds on Friday March 31st, and was then steamed up again the following Saturday to the delight of all present. I can report from first hand experience that it runs like a sewing machine!

We continue to see progress on Warwick's 3.5" gauge Britannia, with the tender now complete. The tender itself is an amazing piece of work, with lots of prototypical detail.

Likewise, much progress has been made on David Judex's Manning Wardle project. He continues to be supervised by John Lyons, usually of a Saturday morning at the clubs grounds, and recently we have seen the chassis with hornblocks, buffers and couplings fitted, in addition to two very nice wheelsets. David's enthusiasm towards this project, along with his quick attainment of many of the various skills required, is very pleasing to see.

John Lyons has showed us his connecting rods and crossheads for his 5" gauge Avonside, while progress has also been made by Geoff Hauge on his Speedy, with a very nice monel buffer beam having been displayed recently in the clubhouse. In addition to this, he has machined much of his smokebox and smokebox door. Ross Bishop and Jim Mulholland continue to progress with their Fowler ploughing engines, recently having displayed some beautifully crafted front and rear wheels. Paul Brotchie has completed some more components for his 5" gauge O class, most recently the axleboxes, whilst I have exhibited my 3.5" gauge Stanier 2-6-4 tank, now with side tanks completed. The aim is to have it in steam for small gauge day this year. Evan has recently purchased a part-built 2.5" gauge LBSC Uranus, with already completed components comprising the boiler, smokebox, and rolling chassis. It is a very large engine for the gauge, with the grate area appearing to be larger than that of my Blowfly! Zac Lee has constructed a 5" gauge 4 wheel QR guards van, while James has produced a very nice gauge 1 Isle of Man bogie coach, made from laser cut plywood. David Thomas has presented his very impressive chimney and exhaust plumbing (a complicated piece of work) for his 620 class, while Andrew has shown his 21 class cowcatcher and

Diary

May 20th: Running Day.

June 3rd: President's Breakfast.

June 6th: Annual General Meeting.

June 10th-12th: Illawarra Hot Pot.

June 17th: Running Day.

June 24th: Central Coast Interclub.

July 4th: Director's Meeting

July 15th: Running Day.

August 1st: Member's Meeting

August 19th: Running Day.

August 26th: Wascoe Siding Interclub.





Two new loco owners experiencing the joys of their steeds for the first time– Neal Bates steams upgrade with ‘Butch’, to be followed a short time later by Tony K with the Ten Wheeler.

newly assembled 38 class front bogie frame. Most recently we have seen James’ new front bogie for his 5” gauge 12 class, complete with leaf springs made from bandsaw blades with the teeth ground off! James has also had his 3.5” gauge Buffalo boiler at the grounds for a hydrostatic test.

Loco & Rollingstock News:

Tony K has recently taken ownership of the 5” gauge Ten Wheeler built by Jim Leishman. It was wonderful to see this locomotive in steam again after an absence of several years, and several members have already been granted the opportunity to take a turn at the regulator.

Neal B is the new owner of the 5” gauge ‘Butch’, previously owned by Arthur Hurst. Like Tony, he seems to be quite happy with his new purchase, and has steamed ‘Butch’ on several occasions already, including our post-convention run and day at Brian Carter’s track.

Peter Sayer’s recently had his 5” gauge Springbok at the grounds for a boiler test, however a leaking fitting prevented him from gaining a ticket temporarily. Wayne Fletcher ran his 5” gauge American 2-6-0 for the first time in several years at the grounds, the tender (a beautiful piece of work) now complete. The test run was reported to have been very successful!

Club Works & Maintenance:

James, Mick, Bill, and Vic have all assisted in the replacement of 3 seat backs. James drilled and tapped the 3 holes, whilst Mick made the fastenings, and Vic did the painting. Martin D continues to inspect and work on our signalling system nearly every Saturday, whilst David T has been engaged in the ongoing task of keeping our greenery in shape. Peter W has been assisted by Mick in installing a new terminal strip into B box that terminates the new cables they installed some time ago. Peter has doubled up the power mains to reduce voltage drop as well, whilst Warwick installed RCBO safety switches into the clubhouse switchboard.

At the last member’s meeting, John H spoke about a proposal to operate the level crossing deck as a slide rather than a swinging deck. He is further developing this concept to con-

firm its viability. Mick continues to attend to our carriage bogie fleet, while James recently applied a yellow line to one of our ground level carriages that was lacking this decoration. Bernie attacked No. 9 signal, thoroughly removing all its paint and then proceeding to prime it all ready for a new coat. Warwick remarked that he had not seen such a professional preparation job in many years! Most recently, Warwick, James, Bruce, and David J have been engaged in releveling 3 beams situated at the bottom curve of the elevated track.



Metal From Megabytes

Ross Bishop

Members would be aware Jim Mullholland and I are building a pair of 1880 Fowler Ploughing Engines in 1/4 scale. We purchased a crate of castings and materials from Station Road Steam in UK. Drawings were virtually non-existent so it has been necessary to make “a design to suit castings” rather than “castings to suit a design”.

Thanks to the Internet, much information, people and photographs have been unearthed from the comfort of my bed! Articles by John Haining for three variants of 2” scale PE’s (Model Engineer - 1984) have been a useful reference given our castings were scaled up from these designs. A rare, full size example of a similar engine from this era is in the Powerhouse Museum Collection stored at Discovery Centre, Castle Hill. Jim and I were given access to measure and photograph this machine too.

One nice feature we noticed was the John Fowler & Co branding that arches across the backhead forming a spreader between the hornplates. (Hornplates are roughly the equivalent of the “frame” of a locomotive). Later engines replaced the cast iron arch bar with a riveted steel plate structure. Wanting to reproduce the old iron version on our models, I began thinking about several options to do so: Laser-cut letters, engraving, Dremel, pantograph & 3D Printing. This is a story about producing this part using a 3D computerised workflow.

With no specific knowledge of such processes, enquiries at the club suggested Fusion 360 as a drawing software – free to hobbyists (for now at least). Watching some Youtubes and tutorials, it was but a few hours to begin to see the outside shape of the Arch appear on the screen. Text was another matter. This took many hours of tweaking to get it right, probably because of my inexperience more than anything else.

Wanting the letters to project from background by at least 1mm and have a “cast” rather than “machined” appearance, my first thought was to sand cast the piece in gunmetal. Two engines – two pieces required. The letters would require 4 to 6 degrees of draft to release from the mould. It was another extremely tedious exercise to highlight all the side facets of each character and apply “draft”. Again, I suspect my lack of knowledge made the job a lot more difficult than it should be.

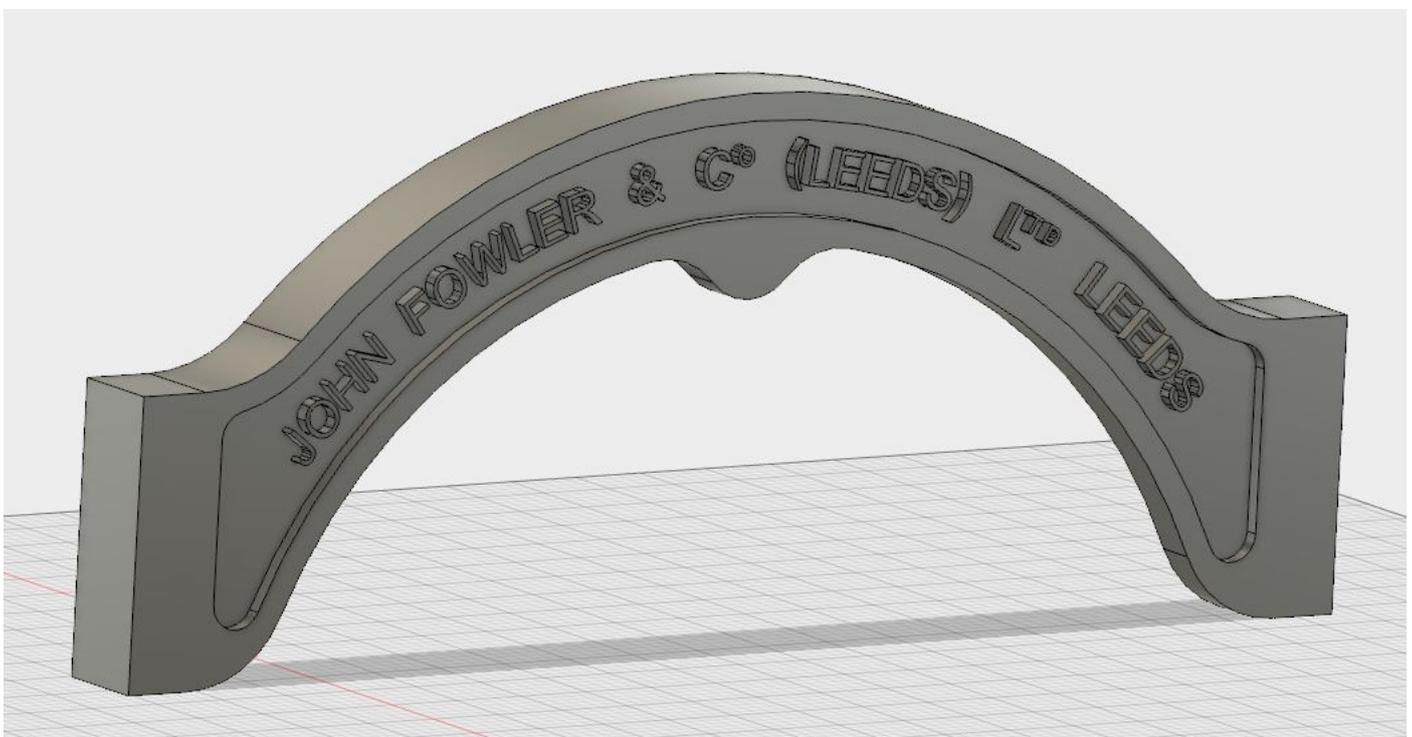
However, the computer is a marvellous thing! Even dummies with little knowledge can produce impressive looking shapes in less time than learning the basics of a lathe. Proceeding to grope on blindly in the dark I wondered, “What next”? For sand casting to transform my computer image into metal, I needed a traditional pattern and a foundry prepared to cast only 2 off. Initial enquiries in this direction did not overwhelm me with confidence!

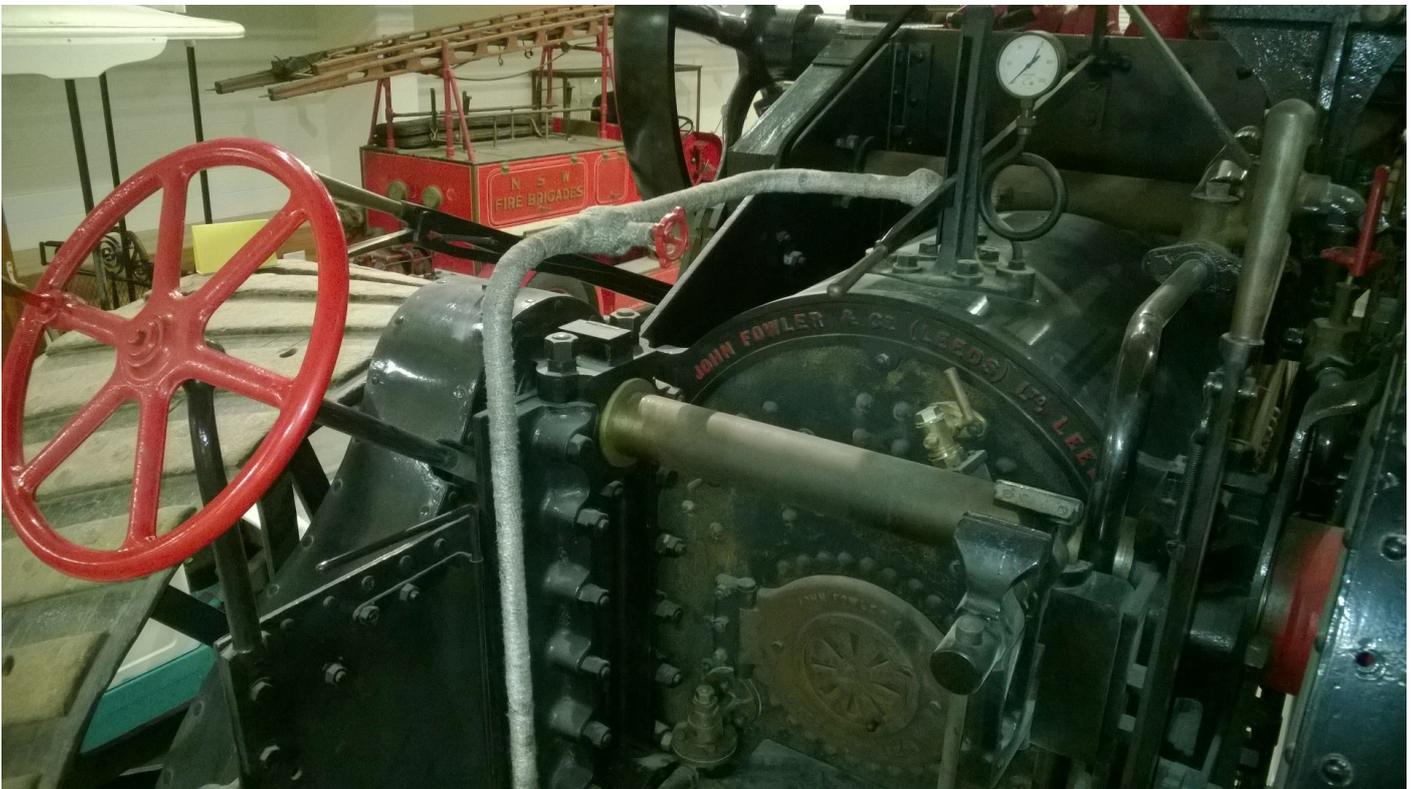
For a pattern, I needed to print the part in plastic. I learned next that cost of 3D printing is based on volume of material to be deposited by the printer. It would not be cost effective to print a solid piece of plastic of this size. Foundries usually price small castings “per board” so ideally, I needed to print at least two patterns, mount them as a pair, provide feeders etc and at that point I decided this was the wrong approach altogether.

Back to engraving. If I had to pay to engrave the text into a pattern, I might as well have it engraved directly on a finished metal part. For that, 3D modelling is overkill as a simple 2D drawing is all that is required. Engravers often work from a lot less specific detail than that! So, could the use of 3D technologies to produce this part offer any advantages at all?

Approaching Companies such as Shapeways (an online printing & casting company) as well as Australian “Rapid Prototyping” or “Investment Casting” firms I soon learned my 2 off job was dimensionally too large, likely to cost more than \$2000 and with no production run to follow, not commercially attractive anyway.

At that point I went on Model Engineering Clearing House





Forum with the story and my re-affirmed conviction that good old traditional techniques will never be obsolete. There is always a way. While these new techniques certainly provide additional capabilities, it is my view that they are not a direct replacement for the traditional, especially in an amateur sense where cost and a “do it yourself” mentality are prime drivers of choice.

I received a variety of responses from members of the MECH Forum. Following them up one by one guided my thinking towards a composite production method meaning we would produce the detail – the text – using 3D Printed Wax Patterns / Silicon Bronze Castings and insert them to a steel arch bar milled out the old-fashioned way. Strength and detail. We have a winner! Good combination!

An enthusiastic model engineer, Phil, an expat Aussie located in the Netherlands, extracted the text portion of my 3D drawing and broke it into four pieces manageable by the processes to follow. By casting the text with just a thin back plate, the volume was minimised and direct printed Wax Patterns became affordable. The new files were sent to Mike of Stanier Engineering in Auckland. Mike supplies high quality pattern printing and foundry services to model engineers and other customers.

Phil is a former Shapeways 3D Printing Engineer now working for Philips on new shaver products. His advice reduced the price from “thousands” to \$150 per set. Phil comments, “Until the volume cost of 3D printing comes down; this combination approach will remain the most cost-effective method to produce larger investment castings (>150cm³)”.

The pictures tell the story:

Photo 1: The Computer Model

Photo 2: The Original at Powerhouse Museum

Photo 3: Printed Wax Patterns

Photo 4: Castings

3D Printers follow a STL file (Stereolithography) which slices the model into layers and coordinates at a resolution of 33 microns or smaller (increments of approx one thousandth of an inch). If the part has “overhangs” or “undercuts”, the printer deposits support material upon which the layers of blue wax are deposited until they become thick enough to be self-supporting. A bit like building a brick arch. (Support material is not shown in these photo’s)

Once the printing is completed, the support wax is dissolved in a heated bath of isopropyl alcohol at about 40 degrees C leaving the blue wax untouched. The red sprues are glued on then it’s off to the foundry where the waxes are encased in ceramic. Once the ceramic hardens, it is fired and the wax is burnt out leaving a cavity behind. The mould is pre-heated and the molten metal poured or squeezed in under light pressure where it solidifies in the shape of the mould cavity. Not unlike the creation of a dinosaur fossil! This is the “Lost Wax” or “Investment” casting process. https://en.wikipedia.org/wiki/Investment_casting

The moral of the story is that anything can be sculpted out on a computer once you know how. However, translation of that into a practical result, requires knowledge of the subsequent processes to navigate the route to a practical outcome. Direct printed waxes are ideal for small quantities or prototype work.





For longer production runs, the waxes are best produced by a quick shot in a metal mould. I see potential to use this process for some components on our engines – notably the various cast builder’s plates – and others where my time is better applied directly to making the part by traditional means.

There are many motivations among model engineers. Diversity is a strength. I’m not sure why the legitimacy of computerised manufacture in the hobby is argued so passionately. For myself, I enjoy the traditional. I value hand work. I believe I’m attracted to old machinery because the human element of its creation and operation is so obvious. Others see it differently. So what? Some things must be outsourced. This is a good option for detailed, custom parts.

Future model engineers will leverage the possibilities of computerised processes more and more. Acquisition of the knowledge to master those techniques and manipulate them for one’s own purposes is brain food in itself. Change is in the wind. I feel confident the joys of self-creation will flourish going forward and the model engineering fraternity will be stronger for it.

Building West Ryde Pumping Station Number 4

James Sanders

Introduction

Many people ask why I chose to build Number 4 or the Manning Wardle as it has become known in SLSLS. The choice came about following building 2604. I had and still have limited space to operate in at home so a small locomotive was all that was really permissible despite the fact that John Tulloch continues to suggest that I have more space besides the garage

for engines! I also hoped that Number 4 would also be small enough for one person to pick it up and thus it makes it easier to transport in a small box and go traveling with it. The choice of 5” gauge was based on the fact that it could basically go anywhere as 5” is more predominant than 3.5”. I did like the idea of building a model of a Sydney Steam Tram or one of the Vulcan tanks that worked alongside the Manning Wardle’s in the construction of Potts Hill Reservoir, however the Tram obscured the works being “shown off” and the Vulcan was almost ¾ the size of the 26 – it is a pretty chunky 0-4-0. Number 4 is also the West Ryde engine since it worked at the Pumping Station for much of it’s life. It just so happens that the model was constructed only a few streets away from where the prototype worked.

Planning and Construction

A bit of a search started for possible drawings of the engine. The engine is a patterned standard design that Manning Wardle of Leeds made to order and did modifications as required depending on the customer. Despite the fact that it was built in 1911, the design dates back into the 1870s. It formed one of two orders placed by the Department of Public Works to Manning Wardle. Number 4 worked in the construction of the North Coast Line in NSW and in construction of Pott’s Hill Reservoir and was then transferred to the West Ryde Pumping Station in the 1920s. As Number 4 was a standard design I searched around for information on it. It is very similar to what is known as the H class and so this was pursued. Andrew stumbled across a site in the UK which allegedly had plans and castings and even a photo of a model of the design, contact was made and money transferred. The drawings came in a few weeks however no castings arrived and then began an incredibly frustrating exchange with the “owner” of the business who made all sorts of silly excuses as to why the castings were not sent. A dispute was lodged with PayPal and they failed us,



Left: Before and after shot showing the wheel blank straight from the laser cutter and following the first machining operation.

Right: Laser cut gaskets using the drawings done for designing the fabricated cylinders. Made assembly of the cylinders very easy.

thankfully the Commonwealth Bank managed to get our money back some 6 months after the order was placed. As a result of this trouble two major stumbling blocks were encountered. There were no castings for wheels or cylinders.

I started the planning stage by transcribing the drawings we received in AutoCAD. This took a little while however it meant I could get very familiar with the locomotive design and that much of the plate work could then be laser cut. When these parts arrived it meant the frames went together very quickly indeed. I had tried to redesign the boiler to meet the AMBSC code but got stuck when it came to laying out the stays, Andrew fixed the design to make it legal. Following the boiler design being finalised I started making formers out of form ply and then started cutting out copper. The boiler came together fairly quickly, Simon assisted with Bronze brazing a few bits, including the boiler barrel to the front tube plate. As the boiler was nearing completion I fretted about the prospects of not having any wheels or cylinders. I talked with various people about my troubles and came to the conclusion that the best way was to fabricate them out of brass and bronze. An article on this has appeared in the May/June AME. With the cylinders complete, axle boxes, frames, running boards, smokebox and boiler the engine looked largely complete apart from the wheels. I sent off drawings to Nigel Woolley to arrange for them to be cut, and when they arrive I machined then built them up. I designed the wheels so that the centre boss could be pinned and silver soldered into the recess following machining, then this too could be faced and the wheel tread machined to profile. I did have some concerns that the wheels when complete would look boxy however this was not the case. Because they are steel there is no need for tyres and they were fairly straightforward to machine, the silver soldering was tricky however I would certainly consider using this method again, replacing the silver soldering with riveting or screws. In the end the steel tyres help with the overall tractive effort of the little machine as it only weighs in at 22 kgs empty so it needs all the help it can get.

Another Saddle Tank

The saddle tank differs from the one required for the 26 as it is a box with rounds on the top edges. The saddle tank is the water supply for the axle pump and hand pump. Injector water is sourced from a NSWGR 6 wheel water gin which is just as big as the engine!

The saddle tank was made up from brass using my home made rolls to get the basic shape. Since I had drawn this up in CAD I was firstly able to accurately calculate the exact size of the sheet that I needed which was cut to size as well as where the bends had to go. I utilised the laser cutter at school to cut out an MDF former which consisted of 12mm pieces laminated together and held with threaded rod to do the final forming of the tank in a large woodworking vice, just like a press. This worked very well and did not take a great deal of effort. The ends were cut out from 1/16" brass sheet and a laser cut template assisted greatly in the marking out process. It has to be said that CAD is a powerful tool, not only from the point of view that it can be used to laser cut components but also plan and work out measurements for complex shapes. This planning is especially important when you have invested a fair amount of money in the materials you are using not to mention the time spent on the project.



The fabricated cylinders attached to the frames, note the untidy machining marks on the unusually shaped crosshead made from free cutting mild steel. The crossheads were later painted as per the prototype. Drain cocks were purchased from GLR Kennions in the UK.

Valve Gear

As much as many little locos similar in size to Number 4 have been fitted with slip eccentric gear which works very well I really wanted to have something I could reverse without putting my foot down, not to mention reducing the cut off so I opted for a path which involved a little more work than slip eccentric. The reality is that it is only two more eccentrics and straps to make plus some other bits and pieces. Some people are baffled by the subject of valve gear and I would highly recommend that they try to familiarise themselves with known reputable sources of information to assist in their understanding.

The valve gear on this engine as on the drawings from England was Launch Link Stephenson with underhung suspension, similar to that on some traction engines (just upside down). Having heard various opinions on the gear I became convinced that it was less than ideal for application to a steam locomotive, the main reason it being drawn this way to simply make it easier to construct. I do believe that the prototype had underhung suspension too, however it would have been doing a lot of bunker first working so it would not have been such a major issue, also too it would probably have been working at full cut-off doing shunting and underhung suspension is set in favour of reverse. As I had read some of Don Ashton's writing on the subject, sought advice from Ross Bishop and spoken with various others it became clear to me that I needed to do something serious about improving the design. I set to work with both Don Ashton's writings and some notes prepared by Ross Bishop on improving it. I must say I did get some of the way with Don Ash-

ton however I became confused when it came to finding the optimum point of suspension for the expansion link. Don Ashton specified a way to find it using templates and this was a little over my head. I pondered a little more and then stumbled across a Model Engineer magazine from 1951 with a model of the engine I was making basically with minor detail differences. I read the article with great interest and noted that the author gave credit to G. S. Willoughby who had written a series in Model Engineer in 1937 on designing Stephenson's valve gear. I obtained the articles from the club library and read his very clear description with excellent drawings attached. He explained in simple English how to find the point of suspension graphically and this was done in AutoCAD. In practice the gear works well, notches up to mid gear and the beats do not deteriorate. Also in redesigning the gear I shortened the cut off in full gear as the design had about 89%, I opted for something more like 82 – 85% and in the process made up a little setting template out of metal shim to accurately set the angle of advance. This little jig made life very easy when it came to setting the eccentrics in relation to the front and back dead centres for forwards and reverse. Whilst many are still engrained in the method described by LBSC of watching the valve as you rotate the wheels this method speeds up the process and takes out the guesswork and I would highly recommend it. I had the timing set in 10 minutes flat, bolted the covers on and ran on air with very satisfying results first time. In fact following the engine's first 3 or so runs one of the eccentrics shifted when some nuts came loose and a valve rod found itself moving in ways it wasn't designed to. The little jig meant I could reset the eccentric without seeing the valves. Following rectifying this I tried the



First steam up of the Manning Wardle at West Ryde, Friday 31st of March 2017.

engine on compressed air and wasn't completely convinced of the evenness of the beats as I couldn't really hear what was going on so I took the boiler off so I could see what the valves were doing. This might sound like a contradiction of using the jig but I just wasn't sure. With the jig I rechecked the settings on both sides in case it was not just one eccentric and I think another one may have slightly shifted. Again I tested on air and things were a little better. It was still hard to tell the beats but it certainly did run smoothly on air. A test of the track verified that the settings were correct and I am happy with the result.

When you assemble an engine, make sure you do up the bolts as if you weren't going to take it apart, you will avoid the disappointment of things coming loose when you are trying to break the club lap record.

Testing

After several runs with slight adjustments to steam valves and clacks I turned my attention to the front end and steaming performance. Initially the blower ring I fitted was very similar to the one I fitted to the 26 as I figured it worked well there so why shouldn't it be the same this time round? Well it had to be proportioned didn't it as Andrew pointed out! I pulled the blower ring out and tapped out the blast nozzle, fitting a 1/4" x 40 threaded nozzle so that a different one could be exchanged if necessary. The nozzle I went for is 4mm diameter and this reduction from the previous 7/32" has improved steaming quite markedly. At that stage I had not done anything to the 3 blower ring holes, these were left at a whopping 1mm. I had always thought that the blower took ages to raise pressure whilst stationary so I took the ring out again and filled up the 1mm holes with silver solder and redrilled 3 new ones at 0.5mm with a quite noticeable improvement in operation. The blast combination has now meant that when the engine is working hard it blows off easily and one can run with the door open to counteract this.

Conclusion

The engine took 6 months and 2 weeks to construct and there were several periods of waiting for bits to arrive before progress could continue. Several people have remarked at how quick this is. I suppose that it does seem fast however it is a dinky tank engine and it pays to be organised. Saranne has been very tolerant of my construction progress and thankfully I am able to work most afternoons after I get home from work. I strongly believe that a little each day means you can get progress and maintain momentum in construction which is vital if you wish to see a finished engine. Several lessons learnt on the 26 have been applied to Number 4 and I have also learnt various things in its construction too – particularly in the realm of fabricating cylinders which in many respects is easier than using castings. With this in mind it means that one is not so restricted in terms of castings that are available for the locomotive that they wish to build and it gives you more control over the result. Whilst model engineering has been so often dominated by the availability or otherwise of castings this should no longer be the case and prospective loco builders should really choose a prototype they really want instead of opting for what they can buy.

Building Number 4 has given me much enjoyment and it is also very satisfying to see others have a drive and seem to get it to go better than I can!



The grin says it all! James has just lit the fire in No. 4 for the first, in preparation for a boiler test, on Friday 31st of March.



The diminutive size of No. 4 is very apparent in this photo, taken during the pre-convention run at Wascoe Siding.

Editorial:

Over the last 69 years or so, our club has changed in ways that would have been totally unpredictable in the times of our founders. Our infrastructure, rollingstock, and general work capabilities have grown and developed with the onset of more modern technology and new skills. However, perhaps the most salient symbol of change can be observed in the development of the landscape that surrounds our club grounds. West Ryde is experiencing the effects of rapid urbanisation, with our once laid-back town steadily taking on the resemblance of a miniature metropolis. Only time will tell if this urban sprawl continues at the rate at which it is currently occurring, however one can't help but feel that a certain amount of warmth and charm is briskly being swept aside from the town. However, set amongst this stark backdrop, our club remains a piece of West Ryde history relatively unhindered by modern progress. In a world of computers and microchips, we continue to provide the public with rides behind miniature steam locomotives, more or less as we did almost three quarters of a century ago. As stated, our rollingstock has developed and grown in size somewhat, however the concept remains unchanged. That surely must be something to be proud of.

Revisiting this editorial in 30 years time will no doubt be rather interesting. I wonder what things will be like then?

The story of a lathe, as understood by the wife of a turner.

This rather amusing story was given to me by the wonderful ladies in our canteen:

Even before we were married I was jealous of his rotten lathe. The first night he took me home he told me he was a turner.

“Oh” I said, “that sounds interesting”, not having the faintest idea what a turner did! Now 25 years and six children later, I know one thing a turner does well; but to get back to the lathe. It was brought into our garage one Saturday afternoon shortly after we were married; by my hopeful and four of his mates, who after skidding it down from the trailer with great care and ceremony proceeded to celebrate its arrival with a dozen bottles of Foster's.

A succession of cars since its arrival have never been able to get right into the garage. The first one was lucky, it got about three quarters the way in, about three years later the next one got about half way in, until over the last ten years our cars have never even pretended to get their respective noses past the door, because of the collection of bars, wheels, brackets, car parts, etc, that the cursed lathe seems to accumulate.

Mates are always dropping around to get a few thou. Off this, a thread on that, a bush made for something else. No money ever appears to change hands, but my husband would have the best lubricated tonsils in the street. The lathe is his escape from TV, or unwelcome relatives, a valid excuse for the visits of countless mates, an alibi for having the worst garden in the street, a reason for never having time to fix gates, etc, attend children's speech nights, or do anything normal human beings usually enjoy.

I looked up the meaning of “LATHE” in the dictionary the other day. It said “A machine for use in working metal, wood, etc, which holds the material and rotates it about a horizontal axis against a tool that shapes it”.

“You could have fooled me”.



‘Your mother should know!’- the editor's mother Kim found this beautifully preserved Guinness engine on a recent trip to Ireland.



**Above: John Lyons pauses with 1915 in the idyllic surrounds that is Brian Carter's home track.
Below: Warwick at speed with the B2 during the recent AALS Convention at Edgeworth.**



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Public Running Day is the **THIRD** Saturday in each month from 1.30pm. Entry is \$2 adults, \$1 children. Rides are \$1 each.

To ride on the trains, enclosed footwear must be worn.