WHAT IS HAPPENING IN THE WORKSHOPS OF MEMBERS OF THE QUEENSLAND SOCIETY OF MODEL & EXPERIMENTAL ENGINEERS, PINE VALLEY RAILWAY, WARNER, QUEENSLAND

BUILDERS OF SCALE MODEL LOCOMOTIVES & MANY OTHER FASCINATING WORKS.
In the process of filming the events at the QSMEE I have been privileged to see inside some of the workshops of the club members and I have been amazed at the expertise and diversity of the metal work under construction which nobody ever sees.

A day at Pine Valley Railway, QSMEE, is a happy event for friends and grandparents to bring their families for a barbecue and glorious train rides around the track behind either of the club locos or members own locos lined up at the station. It is a day to remember for younger members of our community.

This Pine Valley Railway is not just a wildlife sanctuary and a fun day playing with trains, it is a club of mechanical and experimental engineers who mainly work, building their locomotives and experimental metal projects, BEHIND CLOSED DOORS. Many of their locos are lifelong projects. Scale model train building is an experimental process and a huge time consuming learning curve for the builder.

It is my pleasure to bring to you the first chapter of BEHIND CLOSED DOORS, with many members still writing their experiences for the next chapter.
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About me:

My name is Ian Crawford and I was first bitten by the model engineering bug while in high school, when we were given the opportunity to use school metal working machinery after hours to work on a project of our choosing. I chose to try building a small oscillating steam engine which sadly was never finished, but which sparked an interest that lay dormant for 50 years, until I retired about 9 years ago.

My First Project:

With no practical workshop experience, I looked for something simple and settled on a Hot Air engine, built from a kit of metal bits and a set of drawings. After acquiring a small lathe and mini-mill I set about what was essentially a learning experience, and finished with a model that didn’t look too bad and actually worked. Suffice to say I was hooked!

Transition to Steam:

While working on the Hot Air engine, I started to think about the next step in my blossoming career as a “model engineer”, and duly joined QSMEE. With the strong emphasis on steam locos, the excellent track facilities, and the wealth of knowledge in the club I decided to try my hand at building a steam loco. The Blowfly:

Bearing in mind that I am still very much on a learning curve with regard to model engineering, I decided to build a Blowfly. The design is relatively simple, castings are readily available and not overly expensive, and importantly for me, there was a manual available to guide me through the construction process. I also found that several other QSMEE members either had built or were in the process of building Blowflies.
Getting Started:

By this time it was obvious that I would need a bigger mill-drill than the little table top model that I already had, and that I would need to build a hoist of some sort to lower the new mill down to my workshop which is under the house and only accessible by stairs. Time and energy were diverted to the hoist project which was eventually completed, and the mill was purchased and installed in the workshop. Various other items of machinery were acquired along the way, and also squeezed into the workshop, which by now was getting quite cozy.

I also stumbled across some excellent websites dedicated to the model of lathe that I have, and which is very popular in the USA, and I learned that some problems I was having with my lathe were not just due to my inexperience: certain shortcomings had been identified and modifications had been developed to overcome them. The two most serious problems I had were tool chatter, and a tendency for the lathe to stall even under light load. The tool chatter I learned was common and was due to the flimsy design of the ring that clamped the compound slide, with only 2 bolts. Using plans found online, I made up a much stiffer design, machined from 5/8” plate and held by 4 bolts. This has virtually eliminated tool chatter. The stalling was due to a clutch consisting of a ring of steel balls pressed by springs into detents in a matching plate. Advice online was that these detents were often too shallow, allowing the clutch to slip too easily. I drilled the holes deeper as advised, confident that the clutch would still slip under heavy load and that the 5mm drive belt would also slip or break before any serious damage could ever be done. I have never had a problem since with stalling. For a novice like me this was very satisfying stuff.

The Blowfly:

Armed with some shiny new machinery and some newfound confidence, it was time to start on the Blowfly project. Logically though the place to start was with the riding carriage, to gain as much more experience as I could before starting the loco itself.
Step one was welding the angle iron frame and in order to avoid distortion, I decided a welding bench that I could clamp the frame to, was in order. I had a steel table frame to which I fastened four 1,200mm lengths of 150 x 50 x 5mm steel box section, leaving space between them, to effectively make a 1,200 x 600 T-slotted table. With the addition of some clamps cut from the same (high tensile) box section my welding table was complete, and all that was lacking was some welding ability!

Eventually the frame was welded, but I decided that if I was to make the body I would rivet it rather than weld it. With the aid of some professional guillotining and folding, and a lot of drilling and riveting on my part the body took shape. A brass water tank was made up, again with some professional folding and amateur riveting. In view of the distortion I was getting when soldering the filler neck and drain in place, I decided to seal the tank joints with water proof sealant instead of solder. This sealant is designed to work while permanently under water so it should do the trick.

The rest of the carriage construction was fairly straightforward except that I changed the bogie design to incorporate some features from another design that Hugh Elsol had published, and found that the brake linkages as designed would have to pass through the middle of the axle (my fault, not Hugh’s!). Obviously I had not thought the modifications through, but fortunately I was able to work around the problem, and learnt a lesson in the process: if you are going to change a design, make sure you think it through.

Given the slow progress I seemed to have made on the carriage, I got off to a flying start with the loco by purchasing a ready-cut set of frame components, which saved a lot of drilling and filing. Following the advice of fellow club members I decided the frame would be fastened together with a combination of bolts and rivets rather than welded, which would almost certainly have caused distortion.
After the frame I started on the horn blocks, axles and wheels, and in the process discovered that the spindle of my large mill-drill was not square to the table: I had naively thought that it would have been set correctly at the factory. With the aid of a DTI gauge it was simple enough to correct, but I realised why I had been having a few problems with accuracy.

I now have the axles and axle boxes assembled to the frame with the slip eccentrics in place and the wheels quartered. The cylinders and end covers have been machined as well as the valve chests, and I am currently machining the chest covers prior to drilling the covers, chests and cylinders for assembly, and will then move on to the pistons, valves, and crossheads and the other bits required to get the loco running on air.

Constructing the boiler is a daunting task and I will take advantage of the offers of assistance that I have received, when the time comes. I have already had lots of help and advice from fellow club members since starting my project, which is one of the benefits of belonging to a group such as QSMEE, and part of the learning experience. Once the boiler is done there is still the external piping and valve gear, and the smoke box, cab and side tanks, etc., but by then it will be starting to feel like I am on the home straight.
About Neil.

I am not a super tradesman or train expert. My first loco I built with knowledge learnt from school (very little) and help from my uncle. To see it run was fantastic as the equipment used to make it was extremely limited.

I’ve always liked the brutness of the American locos, so what to build next? I decided on a C&O H8 2-6-6-6 wheel arrangement. From this point my workshop had to grow. Night classes at TAFE helped me learn more about fitting and turning. This ended up taking me away from bricklaying where within 5mm is close enough. So I worked as a fitter and turner for 10 years. But now in precision metal working I have to work in thous. Some of the large machining was done at this business as well as learning some casting and moulding techniques.

I think of this as not of one big project but of a series of smaller projects that all bolt together. The knowledge and expertise received from past employment and especially fellow club members and the hobby fraternity have helped me immensely. Without this help it would not be possible. In summing up don’t be afraid, ask questions, seek help and you can build that dream loco.

Work begins on the C&O H8 2-6-6-6.

I started on the tender by making patterns for the 6 x 8 wheel Buckeye Bogies. The frame is made out of RHS and the tank out of 1mm Sheet. Approximately 3000+ dummy rivets. All tool boxes, doors and water lids work.
After finishing the tender I moved onto the loco itself.

The side frames were a birthday gift. So out with the welder and band-saw. I had lots of different thickness of steel so they were cut up but in the process I destroyed many blades on the band-saw. When I had finished the main frames I was back to pattern making.

I made patterns instead of fabricating. Some were simple patterns others were very difficult, there were a lot of them:

- Cylinders x 4
- Brakes x 2
- Lead Truck
- Trailing Truck
- Valve Gear Bracket
- Valve Cross Head
- Rear Trailing Truck Wheel
- Rear Truck Rockers
- Canon Axle Boxes

On completion of the above they all had to be machined.
I then fabricated the Leaf Springs and at last the chassis was sitting on its wheels.
Now on to the Boiler.

This is to the AMBSC Code except for one thing. The Boiler holds 70 litres. So private certification is needed. I started to prepare the plate in the milling machine which was just big enough.

Several trips to the welders after tack welding together along with the inspections with the certifier. Most Boiler fittings were then made followed by **FIRST STEAMING**. What an exciting day.

Main Rods, Side and Valve Rods, Baker Valve Gear, Cross Heads all x 4, Crosshead Halves x 8 were made and fitted.
The best part of 2 full sheets of zincanneal were used for the cladding. Now to fit the Boiler to the frame for the final time. I hope the Pressure Ball Joint works. It’s my own design.

Now it is starting to look like a loco but there is still a lot of work to finish. With the continued support of my wife who puts up with the noise and smells from my workshop, it will be finished sometime.
I came to live steam very early with the gift of an **Oscillating Donkey Engine** at the age of 8 years. In those days I was allowed to steam it after instruction, unsupervised and I spent hours watching the flywheel go around.

During my teens I accumulated numerous plans for small live steam locomotives, all coal fired, but lack of even the most basic tools prevented any construction. I would gaze in the hardware store at the 1 3/4” Super Adept lathe for only a few pounds, but it was out of reach.

Living in the bush in Tasmania I decided to start on a large locomotive just prior to the birth of my first son. It was a **TICH**. I purchased a 2” Flexispeed lathe from England - a kit of parts - in small packages to avoid import duty. A rolling chassis was produced but the trouble started with the cylinders and generating enough heat to braze the boiler - even at only 2 1/2”.

On return to Brisbane the project was shelved as raising a family of three boys took all of my time, but as they reached their mid teens in 1990 I acquired a ML10 lathe and mill drill. My interest had now shifted to geared locomotives, particularly **SHAYS**.
As this was to be really my first attempt I acquired plans from the Californian Railroad Museum of the Shays of the Munro Tramway at Hampton near Toowoomba. With no metal working skills but a lot of enthusiasm I produced boiler drawings and finally completed this locomotive in 1996-97.

After running it for some time I purchased Steve Malone’s Blowfly which I have subsequently rebuilt after a lot of passenger hauling.

However my thoughts turned to geared locos again, this time the locomotives of A.J. Price in Thames - New Zealand. I settled on the Ar Meyer type loco with the drive shaft spur gear coupled to the driving axles with a 2:1 reduction.

At the same time in a spirit of fun I decided to build a 7 1/4” gauge loco - as small as possible, so I chose a FALK No.1 - 7 ton loco which is 4’ 8 1/2” gauge. The model is only 17” long as it has a gypsy winch on the front of the boiler which is only about 9” long and 5” diameter. If I can’t power up the hills at Don’s track I will be able to winch myself up.

Completed boilers for the FALK, the Ar and the TICH lined up on Noel's workbench ready for the official boiler test.
And just to complete the trilogy I have decided to complete the TICH. The cylinders are bored, piston and valve made and the boiler is now complete. So, hopefully it will be finished towards the end of the year - my son will be 46!
With the Ar I have some plans from A.J.Price and a friend in Sydney had some others so we made many copies. The cylinder and piston valves are small, only 1” dia cylinders and 5/8” valves. The cylinder blocks have been fabricated from bronze and brass. Wheels will be the only castings used, 7 1/4” bogie wheels of a disc pattern.

The boiler is 5” dia, round topped and has already been completed. Valve gear is inside Stephensons and space between the frames of the driving trucks is quite crowded because as well as two sets of valve gear there is an axle pump and mechanical lubricator as well as 4 spur gears. There are no springs on the axle boxes just on the bolsters. The wheel base is 119mm.
With the **FALK** there are plans but these have been modified where possible to be more prototypical. Once again the cylinders are fabricated as no castings are available. The original model was gas fired in a steel boiler but mine will be a coal fired copper boiler. The boiler is complete but is being used to provide steam for an injector tester and in this guise is being gas fired with a homemade propane burner.
About Bill.

The illustration shows Bill busy steaming up his C16. He built this loco in three years, 1994 - 1997 and he pulls passengers regularly on the club Run - Day but Bill is always busy in his workshop turning metal into fascinating shapes. One of his more recent projects is the aluminium & brass chess set below. These are simple turning and milling items. The nested dodecahedrons are 3 twelve sided objects one inside the other, all the machining is done on the lathe.
Bill followed his father’s footsteps and worked at the railways where he was a Toolmaker for 20-30 years. He was introduced to QSMEE by Lloyd, a fellow member, and started his train building career with a 3 1/2” Little Virginia. Bill’s next project was a 5” Atlantic Southern Pacific.

DAVIS SAFETY LAMPS

The Safety lamp is a replica of a safety lamp as used in underground conditions, (not a Davis lamp a Spiralarm gas detector).

FLAME SUCKER ENGINE.

This is a Philip Duclos design of a heat engine. It runs well on heat from a small spirit flame.

MINIATURE RACCHET WRENCHES STAINLESS STEEL

The miniature ratchet set is made from stainless steel and uses small socket screws as drivers---handy for small jobs.
Bill had an interesting, varied career.

When I finished my apprenticeship at the Toowoomba Foundry I worked in various places including Cockatoo Island dockyard, Then Victoria Rail as a running shed fitter at North Melbourne, in the days when steam was the go. Then in W.A. at Albany Super works and Kalgoorlie goldmines. Later I went to Christmas Island to run the railways for the Phosphate Mines, where there was about 13 mile of track, 2 steamers, 3 diesel electrics and 2 O&K diesel hydraulics. The island at that time was run by the Singapore government and later by Australian government.

I also worked for Hyne & Son Maryborough and also for myself. I couldn't see any future in working after 60 so I retired and played golf and started in model engineering QED.

The Nested Turners cubes.

Consist of 3 cubes, one inside the other, all done on the lathe and were a test in turning for apprentices.
**Arrow thru the bottle.**
The wooden arrow is made from one piece -- no gluing or joining and is put through a smaller hole in the bottle, simple when you know how.

**Bill** tells me he makes the small novelty items and small engines to keep his grand children amused and because he can!

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The **Hit & Miss petrol engine** is a Philip Duclos design.

**The Elbow air engine** shown is interesting because of the unique design of the right angle pistons.

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The **8 piece star** is a copy of a common wood puzzle,
‘At present I am building component parts for a C17. I hope my life span will allow time to finish this project. The loco frames and wheels are for a 7 1/4 QGR C17. I have not done that much as I am finding it very difficult to obtain cylinder castings and I am not as young as I was when I built the C16.’
Arthur’s story.

I walked into Queenspark in Maryborough and was most interested in the trains puffing steam around the track. I had always been interested in precision metal working. I had just retired and as I had finished with the business world I would now have time to have a hobby. I decided my first venture in this direction would be to build a Garrett.
Happily steaming around the track on his completed Garrett, Arthur decided to diversify, and his thoughts turned to components necessary for: **MUSIC BOXES.**

**Spring.**

Similar to a clock or gramophone spring, made to suit the mechanism to be driven, always enclosed in a barre with teeth cut into it. These were usually wound with a ratcheted handle which could be used from the front and top. Earlier boxes were wound with a key from the end and directly into the barrel arbor.

Smaller mechanisms were fitted into trinket boxes etc. and were mostly wound from underneath with a fixed key which screwed onto the arbor. The spring barrel drove the mechanism through a steel shaft which carried the cylinder and gears to the controlling governor.
The Cylinder.

Consists of a thin brass tube with end caps machined to fit the drive shaft, also with slots for the driving pin and fittings to adjust the cylinder to play the different tunes programmed onto it. In the factories that produced the mechanisms there were musical directors which arranged the tunes to be played. A small diameter cylinder did not have the space (circumference) for a full rendition whereas a larger diameter could accommodate a more intricate tune.

The cylinders had to be fitted with pins to pluck the musical comb. To do this the cylinder was first marked where each pin was required. The next worker centre popped each mark.

Then to the next stage where each was drilled.

The cylinder was then pinned, a pin in each hole.
After all that a mixture of resin and wax and brick dust was poured into the cylinder in a molten state and spun in a lathe so it encased the ends of the pins inside the cylinder. When cold, the pins were held solid and the outside could be ground to the required diameter.

The Comb.

Modern music boxes have combs made of one piece of steel. Early boxes had segmented combs, but this method ceased about 1830. Steel specially made for combs was known as ‘Musical Steel’. Silver steel is close to the steel used today. Each comb had teeth cut into it and tuned to suit the tunes pinned on the cylinder. The bass teeth were not long enough, so to make them vibrate at a lower pitch they were loaded with lead weight. The treble teeth were lightened to vibrate quicker. The outside ends are ground to a narrow section to match the rows of pins on the cylinder.

As a tooth had to be stationary before being plucked a method of damping was employed. The bass end was metal, the mid to treble was usually quill. Where a repetition of notes, as in a trill, was used 2 to 4 teeth could be tuned to the same note. If a tooth was broken a new one could be dovetailed in, then fixed with soft solder. Any greater heat would destroy the temper.
The Governor.

Is a clockwork mechanism usually with 2 wheels and a fly or air-brake on a spindle. The fly is usually adjustable and bigger boxes had spring-loaded automatic ones. Boxes could be obtained with extras which included - organ section, drums, castanets or wood block and a ‘zither’ attachment which muted the comb. All of the mechanism and attachments were mounted on a heavy bed plate. This was usually cast iron. Some superior ones used brass.

The Box or case.

A great variety of cases were used, some were plain timber, stained to resemble exotic timbers - through to intricately veneered examples inlaid with mother of pearl, lined with brass strips.

This article describes cylinder music boxes, there is also the disc music boxes which are basically the same except a disc which could be changed to replaced the cylinder. This was also an advantage as new tunes could be available in 2 to 3 weeks whereas a cylinder was pinned for life.
I’m building a Queensland Railways B16 1/2 on 5” gauge. It is a 2-6-2 wide firebox locomotive fitted with Southern valve gear.

The photos are of the engine as it is at present. The engine has fully equalized suspension and the correct compensated brake gear as per the original. It’s a two cylinder engine with piston valves. A lot of other parts are made but not presently attached to locomotive.

The photo shows the engine fitted with a PB15 tender with extended capacity for the coke fuel.
The original was a ‘one off’ locomotive built in 1918 which introduced a few new features to Queensland Railways, such as the wheel arrangement, Southern valve gear, a large (for Queensland) wide firebox of 32 sq. ft. grate area which was designed for burning coke. It was also originally fitted with a small PB15 tender.

Later a standard C17 tender was fitted and the fuel was changed to coal. It is this tender I am modelling. Even later it was fitted with smaller firebox of 25 sq. ft grate area, similar in size to the standard B18 ¼.

The B16 ½ design remained a one off locomotive and No. 204 was withdrawn in the early 1950s and cut up for scrap. Construction of model originally commenced last century and estimated completion date is this century.
The Scissor Lift Story.

At a Sunshine Coast Railway Modellers club meeting some time in 2009 it was decided that we build a scissor lift loader/unloader to replace the archaic method we used from day one, which was a track on a ramped up hill of dirt leading down to the turntable. A few designs came up, but the one we came up with was a replica scissor lift, the same as the one at the club at the Campaspe Valley Miniature Railway Inc. club at Echuca which we thought would suit our requirements perfectly.

Our long standing secretary/treasurer Ed. Millington had visited the Echuca Club and discussed their unloader with them, and from a copy of their plans was able to make a set of working drawings to build ours.

Ross Walker from Echuca was the person kind enough to seek out their original plans for their lifter and give them to us to copy. I then volunteered to build it in my shed at home, hence this story.
It was quite a big job, but between Eddie’s excellent drawings and keeping me supplied with all the materials needed from time to time we proudly produced a loader/unloader which all members agree suits our requirements perfectly.

I have attached a lot of photos for viewing. The time taken to build it from start to finish was approximately 400 hours which of course was no charge to the club.
It was a bit difficult to keep track of the final cost for materials, but it was around the $4500 to $5,500 mark.

Since building the one above for our club, one of the members from the Innisfail Model Railway saw ours and decided they would like one exactly the same for their club, so I set to and built another one for them too.
For Christmas before I turned nine years of age, I wanted a Meccano set. WW2 was in full swing with all its shortages and my father could not obtain a set for me: neither new or second-hand.

In the course of his search for a second-hand set, he obtained a copy of a magazine (Radio and Hobbies? I am not sure of the name) which had a full set of dimensioned drawings of all the Meccano parts so that people could build parts as required for themselves.

I decided I would build a set for myself, some galvanized sheet cut out and bent and drilled as needed would suffice. My father obtained a box of the needed 5/32 screws and nuts, but a correct drill was not obtainable. The shortages during the war period were all-encompassing.

Nothing deterred: my father had the local blacksmith make up a punch of the right size and with this and a lead block all the holes were done. Bending was on the edge of a piece of angle. Axles were heavy fencing wire; pulleys came from old toys. Certainly the result was not up to Meccano standard, but a lot of quite complex, if rather crude machines, resulted.

After the war ended and Meccano sets became obtainable again, I got a ‘real’ set plus a vertical steam engine; the home-made set was abandoned.

A few years ago when tidying up at the home property ‘Gigoom’ before it was sold, I found these remnants of the home-made set. Just a few parts of what was an eight year old’s first essay into model engineering. Gordon is currently building a Tich and a BB18 1/4” loco in his workshop.
We have come to the end of PART ONE. Many members of the QSMEE are busy writing their article for PART TWO which will be forth coming shortly. Dorothy Hartnett.