



Enthusiasm shone, if not the sun!

IT tried to rain on our parade, but the enthusiasm of members for the vertical boiler day shone through and the event on Sunday, June 10, was a big success.

In addition to six vertical boiler projects in various stages of construction, there were other pieces of model engineering works in progress on display, from Andrew Manning's Caradoc boiler to Ken Cooper's V4 oscillating steam engine and Andy Davis' partly constructed "Twin Victoria" horizontal engine.

There were two working models in steam, Paul James' vertical boiler which was operating Clive Chapman's Sirius engine and Jim Clark's O. B. Bolton No. 7 Horizontal Mill Engine.

Paul's vertical boiler is one of several constructed at the Wednesday Boiler Group, each one having its own unique style and finish. Clive's Sirius engine is one of a type that was produced by Stuart Turner during WWII and many were dropped behind enemy lines to allow members of the resistance to recharge batteries and operate radios.

Jim's Yarrow marine-style horizontal boiler was built in the late 1990s and is loosely based on plans in the K. N. Harris book on boiler-making, adapted to use materials on hand, but it was not completed and certified until last year at the Wednesday boiler group!



Paul James silhouetted against a stormy sky, firing up his vertical boiler.

The horizontal mill engine was Jim's first serious ME project built back in 1996 — and the kit of castings and plans are still available from E. J. Winter.

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Right: Interested members watching the two operating steam plants.

Left: Paul James' vertical boiler and Clive's Sirius engine.

Right: Jim Clark's horizontal boiler and O.B. Bolton No.7 engine. Both boilers were gas fired and steamed reliably for a couple of hours.



Update on recent events

AS you all probably know, there have been a lot of changes in the Committee structure in the last month. John Shugg, who stepped into the position of President of the Club, unfortunately, due to poor health, had to resign, but the Committee is grateful for his contribution while in the position.

Harry Roser also resigned, but he continues to be a tireless worker on public run days, and he is a stalwart of the Club. So now we have Tom Winterbourn as our new Vice President, who previously guided the Club skilfully as President for the last three years.

We also have two new Committee members, namely Paul James who, as a former president, will bring a lot of expertise to the role, and Charles Coppack, who will bring a fresh voice to our Committee meetings. So, all in all, I am looking forward to our first meeting of a slightly revamped group.

AMRA — Despite a shaky start, AMRA was a positive experience due to a number of members who kindly, after reading my email asking for help, stepped up and made the long weekend very successful. Members exhibited stationary models and some of the models were working, much to the delight of the passing public. See page 6 for some more details and photos.

Thanks also go to Ron Collins, Steve Reeves and Paul Costall for bringing their traction engines along and drawing large crowds as they steamed up and drove around the area. Hopefully, next year we will have more time to organise displays to show the engineering expertise of the Club.

Boiler Group Display — At the last Club Run Day members were asked to bring along vertical boilers for display under our patio. There was a good turnout with about a dozen assorted boilers, some in steam, while others were shown under construction — see lead article on page 1. There were also some interesting Meccano models which evoked for me, memories of childhood and my first interest in engineering.

Public Run Days — It is becoming more apparent that we have a lot of goodwill within the community because of our public run days. The support we have had from the public and the comments made on the Stirling Miniature Railway Facebook page emphasise this goodwill. We have had eight reviews from customers, all with five stars. I would urge you to read these reviews, which echo the wonderful way our

President's Report



By
Steve Briggs

members host the public on run days. Thank you to all members who drive locos and the staff who operate the platform, kiosk and the barbecue areas. We have a regular group of about 20 members who always turn up to make these events successful. If you haven't attended a public run, I urge you to do so and come and see the joy we bring to the public. The next run days are school holiday events on Tuesdays the 3rd and 10th of July.

Our Beautiful Grounds — Finally, I reflect back over how far our club has come from the early days, when we would meet in the old railway carriage. Over the years, members past and present have built and landscaped the grounds which delight the public when they visit. I want to thank the members who regularly turn out to keep these grounds in good shape, while enjoying each other's company with the odd tea break. If you haven't had time to yarn with a few members while getting involved with jobs around the grounds, we would love to see you on Saturday or Tuesday mornings. The group is a great crowd and you would be most welcome.

Steve Briggs



Paul's and Ron's traction engines at AMRA. Photos: Steve Briggs

The public enjoyed it, and so did we!

IT was a good day at the office! The weather was perfect for our public run on June 24, we had plenty of locos, willing staff in and around the station, oodles of support from the public and the day's takings weren't bad either! And while the "big boys" were playing trains, so were Garth and Richard with their smaller stuff up on the garden railway.

Four big party bookings ensured we had plenty of activity in the picnic grounds and the queue for rides was maintained right to the end. Feedback from our visitors was nothing but positive, some very complimentary.

Locos in operation were the club's Heidi, Ron's Heidi, Tom's Black 5 (driven by Steve Briggs), Dave Robinson's 'big yellow thing', Sue Smith's purple diesel outline "Sues", Terry Skinner's diesel outline, the Blowflies of Steve Reeves and Paul James and Steve Reeves' "Ocker" – nine in all!

The club steamer provided several members with some "steam time", including Peter Smith and Arron.

As usual, Clive Chapman and Andy Davis had the new BBQ all fired up and Clive reports good feedback on his snag selection!

Here are some pics taken on the day.

Article and photos by Tom Winterbourn



Above: Dave Robinson brings back another full load of passengers.



Left: Tanya enjoyed the day driving the battery loco "Ocker".



Right: Surprise! Allen Ward caught in the camera flash near the tunnel exit.

Yes, welcome rain, but ... ugh!

AFTER one of the fiercest storms to hit Perth for some time and a not-too-impressive weather forecast, we were going to open for business as usual on our scheduled public run day on May 27 – come rail, hail or shine! And rain it did, but not enough to keep away two big party bookings and a surprisingly large number of other visitors.

We needed the rain, but why did it fall on our run day?! Sure, we got caught in the showers a couple of times, but not enough to dampen the spirits of our members and visitors, particularly the younger ones. On the operational side, we had eight locos in use: the three Blowflies of Paul James, Paul Costall and Steve Reeves on the raised track and Ron Collins' Heidi, Dave Robinson's 0-6-0 steamer and his big yellow diesel, Sue Smith's battery loco "Sues" and the club steamer on the GLT.

It wasn't a bad day from the revenue point of view, either. Clive Chapman and Phill Gibbons fired up the BBQ and, with some help, provided a lunch courier service to those on duty around the track. Some of the members and locos are pictured here.

Article and photos by Tom Winterbourn



Dave Robinson is left out in the rain with the station occupied!



Above: Ready for the rain: Steve Reeves leaves the station driving "Blowfly".



Left: With a pose always ready for the camera (!) Keith De Graauw drives Paul Costall's "Firefly" past the steam-up shed.

Membership survey

Andrew Manning's recent note to all members and the discussions that followed regarding the future direction of the club at the May and June general meetings have presented a broad range of views and opinions on this topic.

A membership survey has now been developed by John Turney and Andrew Manning in order to get a better understanding of what club members want and how they view their Society.

Members present at the June general meeting were handed a copy of the survey, and Andrew has subsequently emailed an electronic copy to members.

Should you need to get hold of a paper copy, are having trouble opening or completing the electronic copy or haven't received one, or if you have any questions about the survey, please contact Andrew Manning by email: a.manning@westnet.com.au or by phone on 9446 4825.

This is not just "Ho-hum, another survey..." — it is a genuine initiative by concerned members to try and find out how the club can best serve its members and thus ensure its long-term future.

You will each have your own interests, which may cover several different activities that the club is currently involved in, or you may be interested in just one aspect of the hobby that is perhaps not a regular club activity.

Whatever your level of involvement, you will have an opinion on how well (or not!) the club satisfies your own interests. This is your chance to reinforce the things about the club that you like and to suggest changes in areas where you think improvements could be made.

Already, as a result of these discussions, some new activities are occurring — for example, the boiler day reported on page 1 — and other activities are coming.

So please do take this opportunity to have your say and send in the survey!

Calendar of Forthcoming Events

School Holiday Runs	Tuesday	3 and 10 July	10:00 am — 2:00 pm
General Meeting	Friday	13 July	7:30 pm
Club Run Day	Sunday	15 July	9:00 am — 2:00 pm
Public Run Day	Sunday	29 July	10:00 am — 2:00 pm
General Meeting	Friday	10 August	7:30 pm
Club Run Day	Sunday	12 August	9:00 am — 2:00 pm
Public Run Day	Sunday	26 August	10:00 am — 2:00 pm

Know your Society

President	Steve Briggs	0400 691 864	president@ndmes.org
Vice President	Tom Winterbourn	0415 682 931	vicepresident@ndmes.org
Secretary	Tania Mackellar	0498 098 597	secretary@ndmes.org
Treasurer	David Edmunds	0432 426 891	treasurer@ndmes.org
Committee Members	Charles Coppack	0437 709 703	charles.coppack@swan.wa.gov.au
	Paul James	9457 7175	pkjames47@hotmail.com
	David Naeser	0423 088 703	dnaeser@iinet.net.au
	Dave Robinson	0417 943 678	dave.robinson10@bigpond.com
Boiler Inspectors	Ron Collins	0427 461 279	
	Phill Gibbons	9390 4390	
	Steve Reeves	9354 1395	
	Noel Outram	9525 1234	
Librarian	John Martin	9300 2180	
Birthday Bookings	Paul Costall	9572 1385	
Driver Training	Phill Gibbons	9390 4390	
Safety Compliance Officer	David Naeser	9276 8709	
Newsletter Editor	Jim Clark	0407 988 746	jimclark@hardwareandsoftware.com.au
Website			www.ndmes.net
Society On-site Phone Number		9349 0693	
Society Grounds and Track Site		Vasto Place (off Balcatta Road), Balcatta	
Postal Address		NDMES, PO Box 681, Balcatta 6914, Western Australia	

June vertical boiler day

Continued from page 1

Other vertical boiler exhibits on display included Richard Turner's near-completed project and the works in progress of Stan Armstrong and Lyall Austin. Lyall also bought along a project built by his late father, and recently restored — see article on page 7.

While the day was also scheduled to be a club run day, the weather dictated there was very little activity in the steam-up shed, save for a valiant but unsuccessful attempt by Wayne Dunn to get his 3½" Maisey on to the track.

Some of the garden railway boys also tried to get things moving at the track, but again the weather proved too inclement.

To top off a good ME day, the BBQ was fired up by Andy and the 22 members present fuelled up against the elements. The club is particularly grateful to Sue Armstrong for bringing along two large bowls full of salad items.

The general consensus among members present was that similar functions should be planned, the next one in about six months, with the range of working and under-construction ME projects to be expanded.

Tom Winterbourn



Left: John Martin enjoys a warming cup of tea while examining Richard Turner's vertical boiler (front) and Andrew Manning's Caradoc boiler (rear).



Andy Davis and Paul James discuss Andy's Stuart Turner Twin Victoria horizontal stationary engine. It has twin cylinders with 1 inch bore. The engine with its rope drive flywheel is typical of many mill engines around the turn of the 19th century in the Lancashire textile industry. Andy has been working on it for about 6 months and it is now about 60% complete. He got the idea of mounting it on a girder-like fabrication from Richard Turner, who did similar with his single Victoria engine.

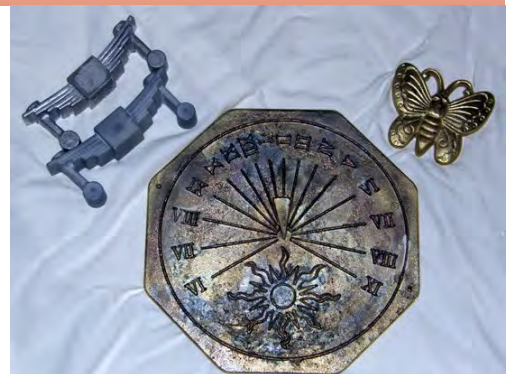
Exploring the dark arts of fire and molten metal...

Ron Collins, Jim Clark and Graham Pailthorpe (SWMEA), along with seven other interested students, recently completed the Foundry Basics course at Midland TAFE. The course comprised six evening sessions which were mostly intensive hands-on practical experience in moulding, using two different types of sand — epoxy hardening sand and the traditional 'green' sand. Each type requires its own techniques.

We were able to pick from our own or a selection of TAFE patterns. Metal (supplied by TAFE) was poured at the end of every session, mostly aluminium and also some bronze, and we could keep our castings.

Metal casting is, of course, one of the oldest technologies dating back thousands of years, but the processes, while relatively simple, require considerable attention to detail and some acquired skill to obtain a good result. The course runs once or twice a year (subject to sufficient student numbers) and is highly recommended.

Jim Clark



Some of the items cast by Jim Clark as test pieces during the course.

Photo: Jim Clark

Notes from the Boiler Group

THE “calibrated knockrometer” is an unusual tool, but one was in use at a recent Boiler Group day when Phill Gibbons and Ron Collins decided to correct a slight runout in the newly fabricated crankshaft of Bill Walker’s ‘Lion’.

Phill gave the crankshaft, which was supported on V blocks, a good wallop with the hammer. Ron then rotated it and measured the runout with his dial gauge, before Phill repeated the punishment in the indicated high spot.



Despite the amazement and indeed consternation of some onlookers, the treatment worked perfectly and runout was reduced to a couple of ‘thous’.

The look on Bill Walker’s face (left) says it all!

Another recent achievement has been Lyall Austin completing the construction of a new vertical boiler for his stationary engine, as noted in the article on the following page. This project was not without its own dramas, which Lyall may or may not wish to recount... But he did take out the distinction of being “Mr. No Leaks” twice in a row with his pressure testing. A good first boiler project!



Left: Lyall Austin working on the final stages of silver soldering his new boiler, assisted as usual by “Mr Preheat” Richard Turner.

Right: One happy fellow! Lyall’s new boiler is on test and has passed (and no leaks...) All photos: Jim Clark



AMRA report

WE again attended the Australian Model Railway Association's exhibition at Claremont Showgrounds in June. Ron and Paul ran their traction engines outside on the Saturday, while I ran my traction engine on the Sunday.

Inside the hall we also had a club display which several members looked after. I believe this generated at least one serious inquiry each day from people who might be interested in joining our club.

Article and photos by Steve Reeves



Left: We featured several stationary engine models.



Above: A general view of the NDME stand.

Left: Some small gauge locos were also on display.

The story of a horizontal mill engine

My father was born in 1917 and after leaving school at the age of 14, worked in timber mills around the Collie area. His father was a steam engine driver with the WAGR so it was no surprise that my father had some connection to steam engines and in those days, timber mills were generally powered by horizontal steam engines, with ample wood supplies to fuel the boilers.

My father also joined the WAGR, eventually becoming a driver on steam engines in Perth, Merredin and eventually back to Collie, so his close connection to steam continued for many years.

Around 1938, with very limited materials and tooling and with no mechanical or fitting experience, he built from scratch a small horizontal engine and vertical boiler, roughly based on the mill engines he had seen during his time at the timber mills.

Years later, as a child growing up in Merredin, I would spend many Sunday mornings with dad in his shed, steaming the boiler and running the engine. I remember the shed being filled with smoke from coal which he no doubt nicked from the railway. The little engine kept us both occupied for many hours.

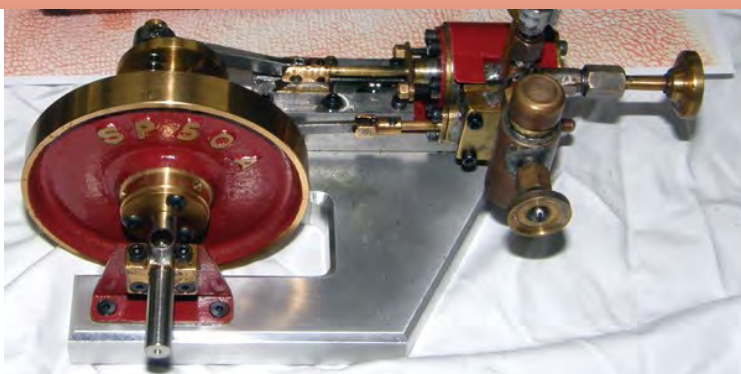
When dad died in 1985 I inherited both the boiler and engine and they have been lying around in my shed sadly neglected, although I did give them some thought when I became a grandfather and I planned to resurrect them so my four grandsons could enjoy them as much as I did as a child.

I missed that target by about ten years and it was in August last year when I dusted off the old wooden box, extracted the boiler and engine and settled down to get them running again. The boiler was beyond repair but after a couple of months and replacing some very worn parts, I got the steam engine running again on compressed air.

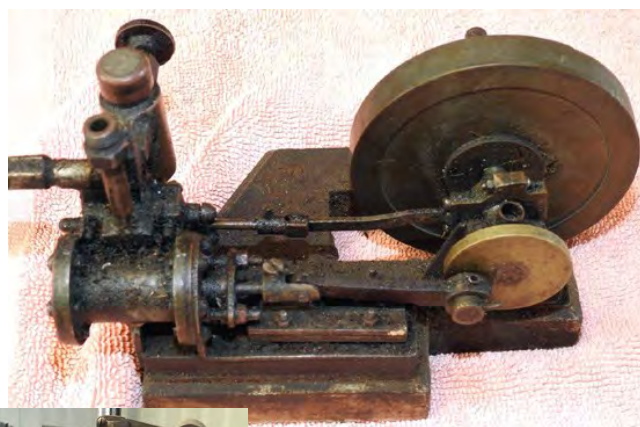
It just seemed incomplete running on air, so I decided to build a boiler and here I am, a member of NDMES and enjoying the time I have at the Wednesday boiler group with Ron Collins and the crew. The new boiler is now substantially complete and I hope to have the little engine in steam again soon, an event that I'm sure will bring back many happy memories.

Just recently, NDMES ran a very well-attended vertical boiler/engineering display as part of the usual club running day and I had the steam engine on static display. Hopefully we will have similar events in the future and I can show the engine under steam.

Lyall Austin



The horizontal mill engine (bore $\frac{3}{4}$ ", stroke 1") built by Lyall Austin's father, now fully restored to working order. Photo: Jim Clark



Above: The engine was in a rather sad state when restoration started!
Photo: Lyall Austin



Left: The original boiler, which was not repairable but is being kept by Lyall as a historical item.

It is interesting to see the techniques and workmanship that were in use nearly 80 years ago — in fact, not so very different from today.

Photo: Lyall Austin



Right: Lyall's interesting and informative display at the recent boiler day.
Photo: Jim Clark

There's more to Stan Armstrong!

Member profile No 6, Stan Armstrong

THERE'S more to Stan Armstrong than being the 'Red Riding Hood' conveyancer of wife Sue's culinary delights to the Tuesday group's morning tea.

The former Registrar to the Public Service Arbitrator worked in an office 40 years and 3 days (!), always dreaming of a life out there where everything runs so smoothly. On August 14, 1987, Stan retired and, in his words, "went wild for a while".

But it was on a visit to Claremont Showgrounds in 2004 that an interest in model engineering was awakened. There was a NDMES display! Model engineering was such a good idea, he thought, so he joined the society not long after and has since so much enjoyed viewing the work of members, some of whom completed their apprenticeships 50 or more years ago.

With the first flush of urgency, he soon had a new lathe in his garage and was suddenly a "Model Engineer", having never before used a lathe!

What happens now? He read quite a few "how to" beginners' books but before any of the work described could be done, he needed to make or buy some tools or gadgets. This syndrome persists to this day.

At the society's Balcatta HQ, fence painting and pulling Bougainvilleas off the tunnel entrance and general "seek and destroy" missions were part of Stan's ME apprenticeship. Tony Jones tried valiantly to teach him the art of drawing plans with the CAD system.

Stan then started building an O.B. Bolton No. 7 Mill Engine, a project which is still underway. "This seems to be a normal progression, some members telling me their models took 10, 20 or 30 years to complete," he said. "At times incomplete models are offered for sale."

Stan's latest project, a 6 inch vertical boiler, is half built, with considerable assistance being provided at the Wednesday Boiler Group by Ron Collins, Paul James, Phill Gibbons, Richard Turner, Steve Reeves — with all the crew encouraging him onwards.

"One of these days you will all be amazed to see a finished model," he said. "Watch this space — but be aware that nowadays my arms have shrunk, my legs have stretched and I am slowing down a bit."

Stan's working career was filled with both exhilarating and scary incidents, now tempered by time and nostalgia. He joined the State Public Service in 1946 as a junior clerk, presenting himself and supporting documents to the Public Trustee, then located on the first floor of the Supreme Court Building. This was an era of dip pens, ink wells and indelible pencils — before biros, electric typewriters, or photocopying became the norm.

It was here that he met Norm, a genius on drafting



Stan Armstrong (left) at the Wednesday Boiler Group, with camera at the ready while Richard Turner, Phill Gibbons and Paul James tackle the tube brazing on his boiler. Photo: Jim Clark

complex transfers of land. "To see him go about sorting out a problem always ended up with him telling me about photography, telescope building and his lathe, with me then leaving with no answer to my problem," he said. "We became firm friends."

"Those side subjects were addictive and soon I was grinding a lens for my own telescope. Photography followed later."

Any engineering aspirations he had at this stage perished quickly. Housing a lathe presented a big problem. No place to put it.

"Anywhere in dad's garage would attract an unbelievably long list of do and don't rules, and I knew mum would not allow it in the kitchen or anywhere in the house!" he said. "Progress on building the supporting structure for the telescope also collapsed."

"I took up the remaining option - photography - becoming engrossed for the next 50 or so years until digital photography wrecked my entire photographic world. Recovery is still slow and painful."

Stan stayed at the Public Trust Office for 19 years, winding up the affairs of the dear departed and also the affairs of those unfortunate souls incapable of caring for themselves.

Weekends, long weekends and holidays were special times, spent tearing around the countryside.

"My grandparents and uncle's farm at York was a marvellous place to go, helping with seeding, harvesting, fox and rabbit shooting, digging wells with explosives and all sorts of other events like shoving my thumb into a grinding wheel or flicking hot welding slag in my eye!" he said.

There were no coastal towns between Yanchep to Dongara and bush tracks led everywhere.

"My goal was to explore every track up the coast and

Stan Armstrong's profile (cont...)

perhaps discover the lost treasure left by long since wrecked sailing ships," he mused. "There it would be: heaps of gold, silver and jewellery glittering in the sun. The closest we ever came was to locate the site of the wreck of the Dutch sailing ship Zuytdorp, just south of Shark Bay."

Holidays with a couple of mates were special, charging off to the North West, Onslow, Yarraloola, Wittenoom, Port Hedland and the marvellous places all around. The bitumen road finished at the now turn-off to Kalbarri.

"We went there year after year and it was different every time, especially the time we made ourselves crook because we didn't drink enough," he said. "Dehydration! We had enough thirst inhibitors on board to drown us."

In 1958, Stan built a trailer and, with a mate, drove around Australia on bone-shattering tracks classified as roads. On the track to Ayers Rock they were stopped by an aboriginal tribe who didn't speak English. He climbed the Rock, too. And at Cloncurry he couldn't help but notice the aeroplane parked up the side street!

And then, of course, there was the Nullarbor track, passing through the stations on the way home from South Australia. He recalled one decrepit old wire netting gate with the sign: "Don't pinch the gate. Ask at the homestead and we'll give you a piece!"

"It took years to stop going on and on about that trip," he said. Stan then moved into the Courts, running the administrative section and glimpsing the at times unfortunate lives some people endure.

"Believe me, those courts had a never-ending queue of scallywag offenders, some being real characters living their lives to the full, regardless of their court prosecutions. Thankfully, really sinister defendants were few and far between."

Mixed up in all of this were the four-year cycle of Parliamentary elections — and avoiding those additional chores was inescapable. At election time, the Governor would issue a writ requiring Stan, as Returning Officer for the District, to call for nominations, conduct the election and declare the election of the successful candidate to Parliament. "These projects took up about six months of my spare time, from start to finish" he said.

Amid all this turmoil, Stan met and married Susan and, not too much later, were blessed with two children.

"Among all this we moved all around Western Australia, from Esperance to Broome and lots of places in between, moving eight times in eight years," he recalled. "I thought it was going to be nine moves, but a cyclone did its best to spread Broome all over the countryside."

After 10 years, they moved back to Perth and Stan took up the appointment of Registrar to the Public Service Arbitrator, the office covering industrial relations as applied to some areas of State government employees. The place was afloat with industrial awards, agreements, classification and promotions appeals, arguments between the workers and the bosses and other matters.

Later, the entire office was abolished and absorbed into the Industrial Commission, where Stan stayed for about a year before transferring to the Electoral Commission.

Now you are up-to-date with Stan's life thus far, but as he says: "Do you really believe it is Susan who makes all those cakes and bickies I take to the club for Tuesday morning teas?"

Profile by Stan Armstrong and Tom Winterbourn

Garden railway post-Convention action



A couple more photos from the post-Convention run day at NDMES.

Left: Garth Caesar holds the interest of a young visitor while shunting his Garratt...

Right: ...on to this very impressive rake of coal wagons.

Photos: Bill Walker



Modifications to an X3 mill-drill

MY X3 mill has suffered a number of modifications to improve its capacity and rigidity. The latest modification has been to replace the DC brush motor and spindle drive train with a 3 phase motor, Poly Vee belt drive and inverter speed control.

I have disliked the very noisy motor since I first purchased the mill. The upgrade was prompted when there was an increase in noise and arcing from the motor (I had already replaced the brushes).

Previously I had upgraded my Myford lathe and my drill press with VSD (variable speed) drives. The drive is so flexible and quiet. Infinite speed variation is obtainable with a turn of the knob and low speed, low torque is usable for power tapping down to M3.

The original motor was rated 0.375kW and is quite small — induction motors are somewhat larger. I was able to source a 0.55kW motor in a small frame size off the shelf locally, the same supplier also supplied the VSD. I set up the VSD to output 0 to 75 Hz giving a top motor speed of 1836 rpm.

There was a good article in ME Workshop magazine describing the design and machining of the Poly Vee pulleys. The aim was to have a 2 step arrangement to give a Hi and Lo range drive selection. The spindle pulleys started out as a 150mm dia. x 40mm thick aluminium blank. The lathe was buried in swarf by the time I had completed turning them to just over finished size, the smaller pulley being only 35mm dia. The splined bore of the pulley was kindly provided by Ron Collins, as was the keyed bore of the smaller motor pulley.

The spindle pulley was designed to be a direct replacement on the quill drive sleeve that accommodated the original drive gear. The sleeve was supported by a single ball race, so I doubled the height of the ball race housing and fitted a second ball race. This I deemed necessary due to the extra load on the sleeve from the drive belt tension. The pulley had to be recessed top and bottom to clear the bearing housing and the retaining circlip at the top.

The pulleys were finished to size on mandrels, including cutting the 4 Vee grooves in each pulley. The grooves were cut with a 40 deg. form tool fed directly in, with lathe in back gear and coolant used.

I spent quite a bit of time developing various options for mounting the motor such that its centre of gravity was as close to the main column as possible. I settled on a slide arrangement which moved back to tension the belt by a cam.

The pulley sizes were calculated using data from the Web to give the same centre distances for the two steps. Then I recalculated when I found I could only source imperial belts. On final assembly it was found



Above: Overall view of the modified and refurbished X3 mill-drill.

Right: Close-up of the new motor mounting, Poly Vee belt drive and the 2-step pulleys.



that the formula I used was only suited to pulleys with small differences in diameter. Luckily, the cam provides adequate tension when **On** for Hi range **Off** for Lo range.

I mounted the VSD unit in the original controls enclosure and was able to also use the existing forward/reverse switch and isolator. The speed control potentiometer had to be replaced. When I installed my first VSD I was confronted with pages of settings I really didn't understand or see any need for. The supplier gave me a contact who had used the same VSD often. He advised me over the phone that I only needed to set 3 parameters, leaving the rest at their default.

A bit of a learning curve to set up the unit (but easier than learning to use a Smartphone!) With a bit more confidence I have been able to adjust a few of the other parameters like ramp-up speed, max and min speeds, remote control, etc.

I am delighted with the resulting performance — smooth and quiet operation, easily adjustable speed and lots of torque when in low range. On very low speeds it is possible to stop the chuck with the hand and an M3 tap will stall the spindle if it gets too tight. Reverse then forward again to complete the job. *Article and photos by Andrew Manning*

Building a $\frac{1}{3}$ scale Southern Cross windmill

(Continued from May-June Steamlines)

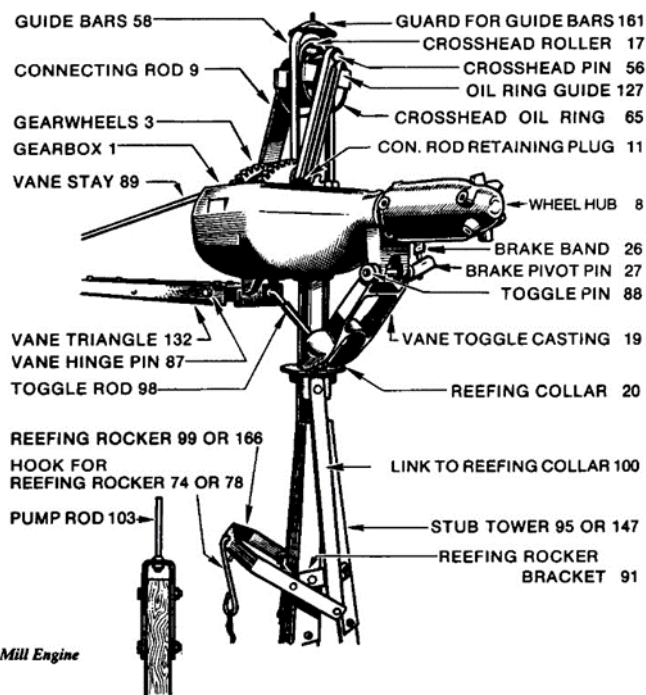
THE tower was the first item I tackled, which I made using 20x20mm steel angle and 5mm round bar. I used a scale ruler to estimate the original dimensions from the catalogue drawing, and worked from those. I used some poetic license interpreting the finer details, but I'm pretty happy with the end result, as the photo below shows.

Next, I tackled the geared mill head – this is surprisingly complicated, with its reduction gear and the slide bars and cross-head that are needed to convert rotary into reciprocating motion — see the outline drawing top right.

With this item I followed the intent but not the detail of the original and I designed things to use various items from my stock draws (otherwise known as my “scrap bins”). In fact, the only parts I purchased for the mill head were the gears (from RS Components) and the bearings. Even the outer cover was a recycled piece of brass boiler cladding that didn't fit my Britannia loco properly.

My version differs from the original primarily in that I decided not to include an oil bath, relying on grease instead, and I used taper roller bearings for the wind wheel shaft instead of bushes. Also, the mill head pivots on bronze bushes inside the top of the tower instead of pivoting on a stub shaft extending above the tower.

The wind wheel and tail were both exercises in creative welding, particularly the wind wheel with its 18 blades. I drew up the blades in CAD, again scaled off the catalogue



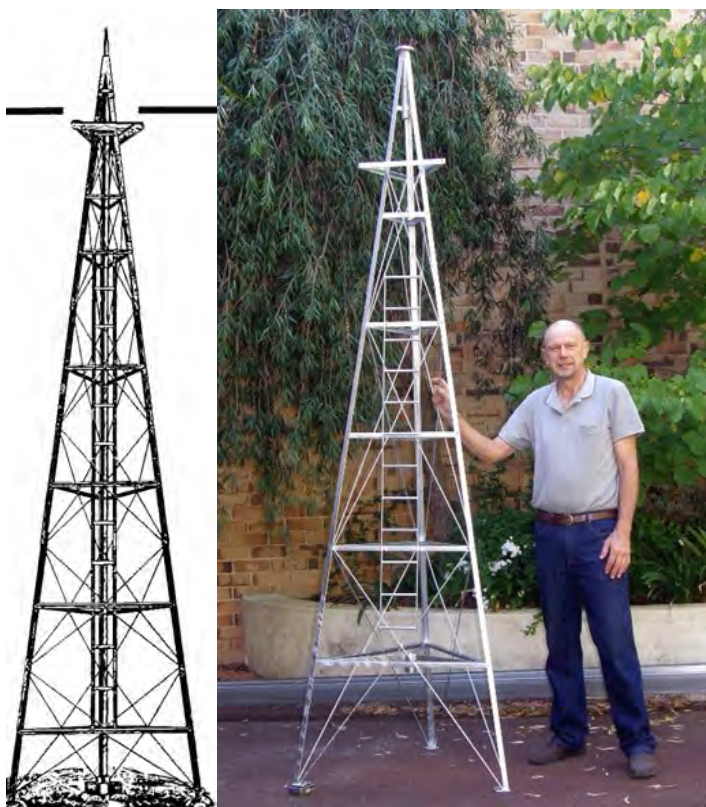
drawing as near as possible, and had them laser cut from black steel sheet. With some help from Ron Collins, I rolled and beat them into the appropriate curved shape, starting by getting one blade to look pretty right, then comparing all the others to that one until I had a reasonably consistent set of blades.

This type of windmill blade is not strictly an aerofoil in the same way that modern wind turbine blades are, but its curved shape is an intermediate step between the ancient flat paddle design of very old windmills and modern aerofoil blades. The idea is to maximise the transfer of force from the wind hitting the leading edge of the blade, which is then increasingly deflected as it passes out through the back of the wheel. Exactly what type of curve should be used, and how critical its effect is, I'm not sure, so I made it to look like the full size as best I could.

Some careful setting out on the welding table allowed me to tack the blades to the hub at 20 degree intervals. Then I spun the wheel on its shaft, adjusting each blade for angle and spacing until the wheel ran reasonably true, before committing to the final welds.

To be continued... **Article and photos by Jim Clark**

(Illustrations from a USA agent's catalogue circa 1950)



Left The catalogue drawing I used. Right: the completed 3m tall tower — approximately $\frac{1}{3}$ of the original 30 foot tower height.



A Model Engineer's outings in the UK

RECENTLY I had the opportunity to attend the National Model Engineering Exhibition in Doncaster UK. It was a really large event with exhibitions from many clubs participating. There were finished locos and other models as well as ones under construction. Outside were half a dozen 6" traction engines fired up. There was a very large area for commercial companies and everything imaginable was for sale.

While I was in London I went to see Cherry Hill's models. The models are in the Institute of Mechanical Engineers building, 1 Birdcage Walk, just down from Big Ben (covered in scaffold at the moment). One of Cherry's models was in the library and the others in a glass case elsewhere in the building, the staff were very helpful and showed me all the models they have.

I have a book with Cherry's models in it and the photos are really good, but not as good as seeing them in the flesh. The models have been described as exquisite and this is true as the detail, finish, etc. is brilliant.

The Mechanical Engineers building is quite old and has oak panelled walls inside and lots of timber in the library, where one of the models is. A bonus for me was a quite large model of a workshop complete with lathes, milling machines, over head cranes etc.

Article and photos by Tom Hardy



Model of an early Burrell-Boydell traction engine featuring a "patented endless railway system" - the rails on planks attached to the wheels.



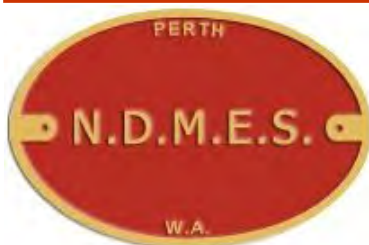
Let and below: Some of the many other models on display.



Left: Model of a contemporary workshop made between 1893 and 1910.



Left: The historic Institute of Mechanical Engineers building in central London.



Northern Districts Model Engineering Society (Perth) Inc.

All correspondence to:-
PO Box 681
Balcatta
Western Australia 6914
www.ndmes.net

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