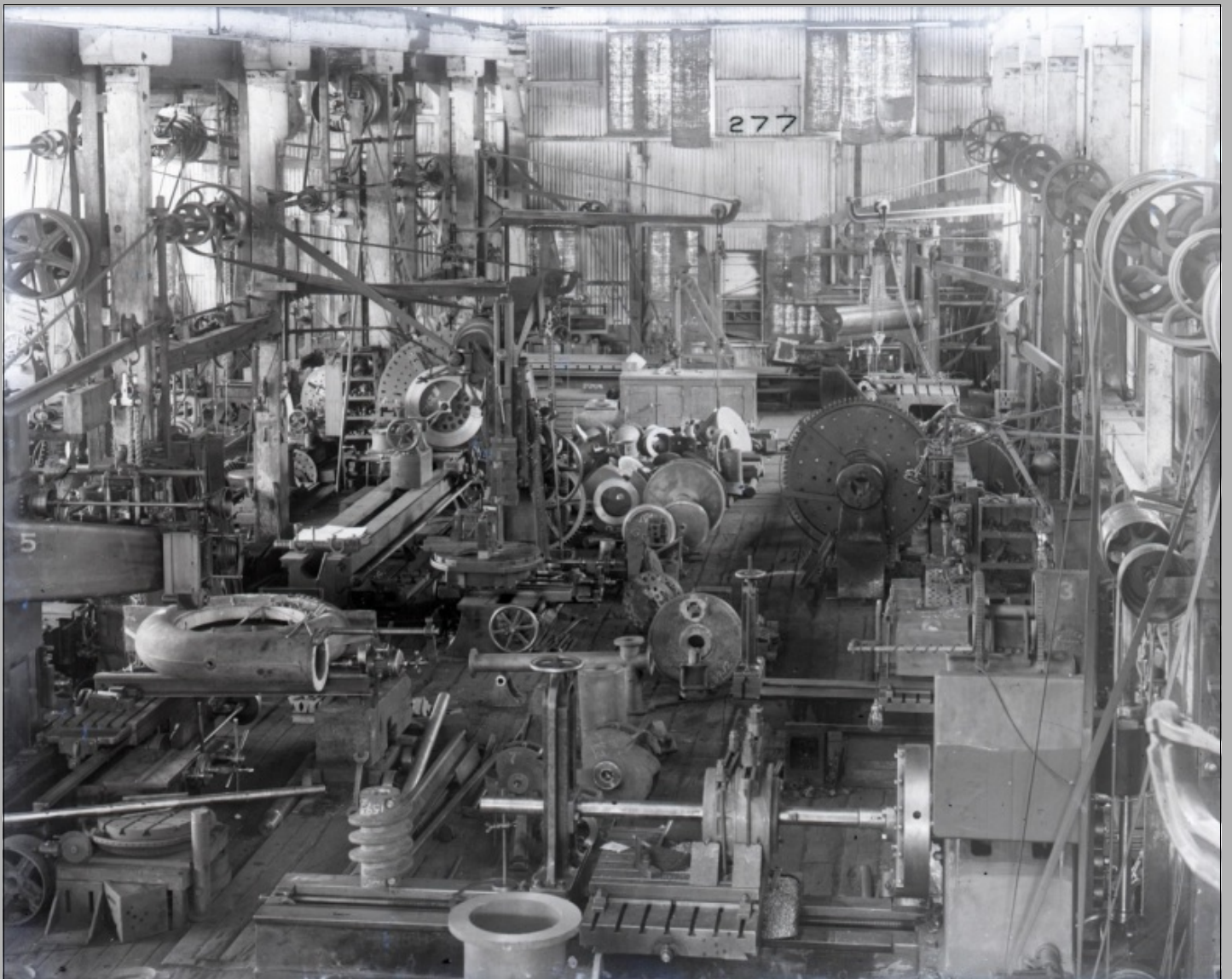


EHA



ENGINEERING HERITAGE AUSTRALIA



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Cover Images:

Front: A view of the Thompsons of Castlemaine Machine Shop in 1911. Note the lineshafts with pulleys & belts along the walls, & the little wall-mounted jib-cranes in the background. The clutter of work-pieces is a set-up for the photo.
Photo: Thompsons Archive.

Back: A view of Newcastle Harbour from the hill near the Cathedral at dusk, looking across the Basin to the lit-up Carrington Pumping Station, with BHP in the background.
Photo: purchased from Newcastle Morning Herald by the Editor in the 1990s.

This is a quarterly magazine covering stories and news items about industrial and engineering heritage in Australia and elsewhere. It is published online as a downloadable PDF document for readers to view on screen or print their own copies. EA members and non-members on the EHA mailing lists will receive emails notifying them of new issues, with a link to the relevant Engineers Australia website page.

CONTENTS

Editorial	3
Steamfest	4
Mount Lyell Abt Rack Railway in Tasmania	6
Thompsons of Castlemaine in Victoria	10
Carrington Pumping Station in Newcastle	15
The Bushfire at Yarloop, WA – a word from the UK	21
Obituary – Jan (Dick) van der Molen	22
Do Manhole Covers tell stories?	24
Connections	27

Calling All Readers

If you enjoy reading this magazine, please also contribute to it! As editor I sometimes write my own stories, but mainly I assemble other people's stories into magazine pages, and I need more contributors to keep the magazine going. There are a few stalwart volunteers who regularly write one or even several stories per issue, but it is unfair to put all the load on their shoulders.

Please think how you could contribute – stand-alone stories, follow-ups to previous stories, stories about industrial or engineering heritage being recorded, re-used, conserved, or (heaven forbid) destroyed, notices of upcoming events, people, book reviews – and so on. I can tidy or trim contributions if necessary, but I need you to find the story, research and verify your facts, find photographs or drawings for illustrations, give links to further information, and preferably relate some human interest angle as well as the technical basis to the story.

When you send images, please send them in original format, eg. as scanned if from books, drawings or film, or as directly from a digital camera, with minimal or no change. I can compress or edit them to suit the magazine, but I cannot restore detail if you have compressed the images for transmission. If there are many images send them in a number of emails. Also, please give me captions and tell me the source of the images, as I always have to acknowledge the source in the magazine.

The Editor

Editorial

There has been a lot of discussion recently in EHA about how we can improve communication with and among Engineering Heritage people around the Divisions and in the wider world. A quarterly magazine can only do so much. It's not much use for passing on immediate news items about people and coming meetings and "events". We do have the web pages on the Engineers Australia website, but those are not amenable to instant communication either. And many of us find the messaging systems used through Engineers Australia increasingly restricted and limited to a few fortnightly formal or official notices sent out to members of EA only within particular divisions. And usually only one EH person per division can send out notices.

However, we do have something incredibly useful, and all ours, that we could be using. It's something we have all had the opportunity to use for about 15 years now, but it seems to have been forgotten, or ignored, by 90% of the people who signed up originally. I am referring to the **Engineering Heritage Australia Yahoo Email Chat Group**. I am told there are around 100 chat group members, but judging by the amount of chat, many of these membership connections must be nearly moribund. (This Magazine has a distribution list of around 2000 !!) As far as I can work out there are only about a dozen occasional users – if that. Not surprisingly I actually know most of them. I regularly send on notices or messages about events, or the magazine, or anything that I think will interest EH people, but I have more or less given up asking for help, or advice, or identifications of places or things, or help finding someone, because I no longer seem to get any response.

I am also a member of the Yahoo groups **Heritage Chat** in Victoria and **NSW Heritage Advisors**. The members of these groups **use** their facility consistently and often. Not as much perhaps as they did in the early days, but still far more often than **EHA Chat**. And if I ask a question or pass info on, I usually get a terrific response. We need to ginger up all those inactive members, or get them to take EHA Chat emails off their Spam list, and also get any EH people or anyone interested in EH who we know who aren't members of **EHA Chat** to join up.

We should be using our own system as the others use theirs – and just think – your notices and ideas and questions will go out all round Australia – and the UK as well probably, as soon as you have written and posted them – no delays and no unwanted editing! We have to get Chat Group members to discover that if they ask questions, they can very well expect a number of helpful suggestions. For instance – not long ago I sent a photo of an unidentified country house in the Hunter Region to **NSW Heritage Advisors Chat**. A few hours later, I had the name, address, and all sorts of info about said house from half a dozen respondents. And now a rather negative example – a few weeks ago I asked **EHA Chat** about the location of a pair of highway bridges on one of our photos. It turned out the bridges were in WA, and very well known in WA, but it took me weeks to discover this. If any WA members looked at their Chat Group emails (if any of them are members), I could have found the answer the very same day!

And another rather serendipitous example which shows how well the **EHA Chat** service can work when people keep an eye on it. This afternoon I passed on a notice from the NSW Heritage Division (new name?) saying that the Rock Bolting Development Site in Cooma was being considered for listing on the NSW State Heritage Register. I included links (URLs) to the EHA Nomination Document and Interpretation Panel for the site. Two hours later there was an email on **EHA Chat** from one of our regular users (not an engineer) saying *Thank you for the pictures, the [NSW Heritage Division] website had no pictures*. How about that? I hope you can all see what I am getting at! SO – if you are already members, get your **EHA Chat** emails off the spam list and start using the service again.

If you aren't members, please email Harry Trueman at harry.trueman@bigpond.com and ask him to join you up. Harry has been the convenor of **EHA Chat** ever since it started, and he would love it if more of you joined up and used the service. You don't have to be a member of Engineers Australia and you don't have to be an engineer – you just have to be interested in Engineering Heritage and want to contribute, or learn. And it's FREE.



Now – after all that serious stuff with no pictures (like the NSW Heritage Division website!), here's a nice one I couldn't fit into my Carrington Pumping Station story. It is a delightful classical lion head over the front door of the Pumping Station. Also note all the decorative classical detailing in the stonework above and around the lion. Engineering works were certainly a matter of great civic pride back in the 1800s.

I took this photo in 1991. I just hope our lion has lasted until today, without defacement by vandalism, graffiti, or vanishment like the wonderful hydraulic crane and coal wagon weathervane you can find on page 18, which sadly disappeared sometime soon after 1991.

The Editor

Steamfest at the National Steam Centre in Scoresby, Vic.

Steam & almost everything else on display at a Steam Museum Festival



A selection of exhibits after the Grand Parade at Steamfest 2016.

Photo Owen Peake.

The Melbourne Steam Traction Engine Club holds a Steamfest at its museum site at Scoresby in Melbourne's east. The club has consistently broadened its focus in recent decades and now offers something for almost everyone interested in movable heritage. Sorry Neil – very little on aeroplanes except for a couple of aero engines.¹

The evolution of ploughing is typical of the range of interests the club caters for at Steamfest. There were demonstrations of horse-drawn ploughing. If you need a definition of 'calm' go and talk to a Clydesdale draught horse. They are charming animals and a pair can do as much ploughing as 100 strong men in a day. The next step in technology was the steam ploughing engines of the late 19th century – an era when having enough 'grunt' was never a problem. Two massive traction engines located at each end of the paddock, dragged a huge plough back and forth between them on steel cables as they slowly traversed across the paddock. Then came the era of the internal combustion engine and the farm tractor became ubiquitous. Steamfest has every kind of tractor available. These demonstrations at Steamfest show centuries of ploughing development all in the same paddock over a few hours.



A pair of Clydesdales with disc harrows at Steamfest.

Photo Owen Peake



The little steam launch getting up steam
Photo Owen Peake.

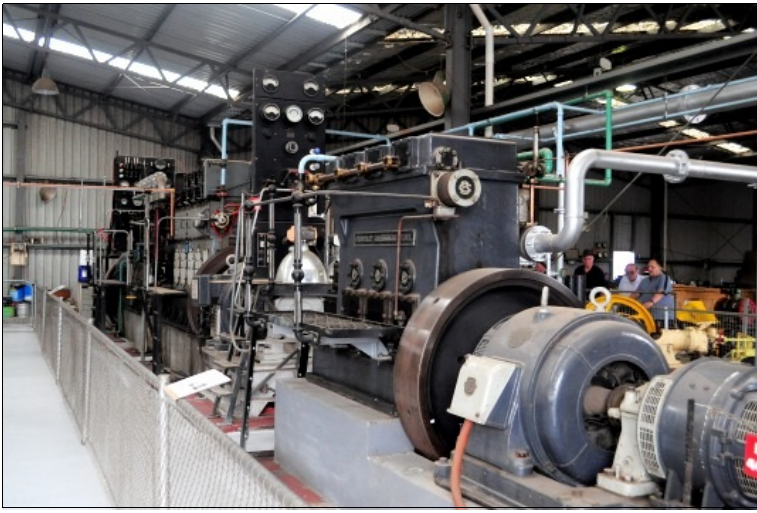
Away from the ploughing demonstrations there were earth-moving displays, a steam launch on a small lake, hundreds of small engines of every type operating all manner of portable equipment and a grand parade of steam traction engines, a massive dragline excavator and everything else imaginable including a military tank.



A line-up of steam traction engines after the Grand Parade.

Photo Owen Peake.

¹ Neil Hogg – the current Chair of Engineering Heritage Australia, a noted aviation enthusiast.



A row of large diesel engines. Figures in the background give scale! Photo O.Peake.

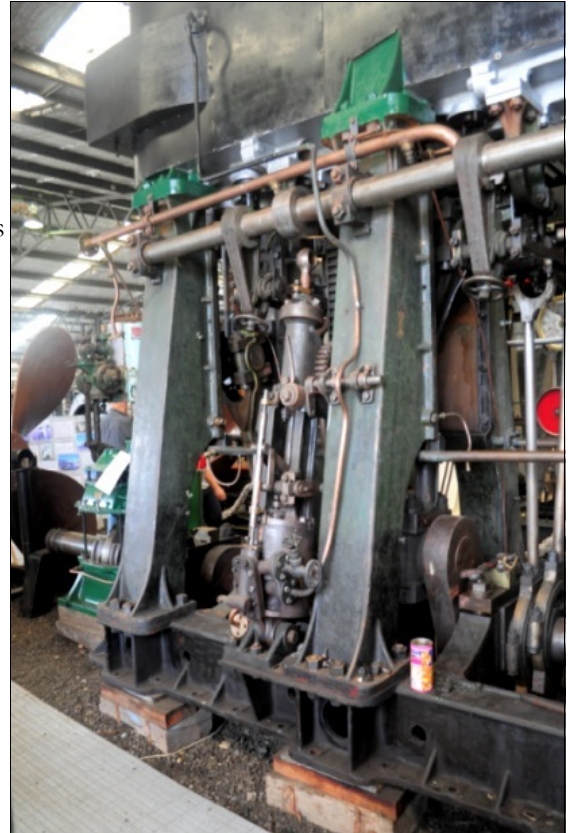
Perhaps the more predictable part of Steamfest is the engine demonstrations inside the museum building. There is a great array of stationary steam engines, many diesel engines up to quite large sizes, steam turbines, machine tools and a complete suite of steam machinery from the tug Lyttelton II. All this machinery is superbly restored and most of it is in runnable condition. The quiet steam engines were run for long periods during the day, the noisy diesels for short periods in rotation, and one of the two huge main steam engines from Lyttelton II turned over slowly on an electric motor all day.



A 1/6th scale steam traction engine with an admirer to scale. Photo Owen Peake

A narrow gauge railway [12 inch gauge (305 mm)] runs around the large site taking people for rides on trolleys hauled by a scale model steam locomotive. This feature ensures a queue at the train stop all day!

On the other hand it would be a good idea to keep well clear of the huge Ransomes & Rapier diesel operated walking dragline. This is a machine that 'walks' on two huge steel feet, like a robot with a nearly-flat battery. It is very slow but takes 1 metre steps and you wouldn't want to get under its feet!



One of the two main triple expansion steam engines of steam tug Lyttelton II. Photo Owen Peake



The Ransomes & Rapier walking dragline – out for a stroll. Photo Owen Peake.

The National Steam Centre has been recognised under EHA's Heritage Recognition Program as a 'collection' and the vast majority of the collection has heritage significance.

The Melbourne Steam Traction Engine Club has many exciting and challenging projects ahead of it. In the yard are two massive hull sections of the Lyttelton II engine and boiler rooms which will be re-erected and all the machinery re-installed in the hull to give the most realistic possible view of the machinery of a large sea-going steam tug. There are two very large steam engines in pieces in the yard – one is a large ammonia compressor and the other the even larger

sugar mill crushing engine from Bundaberg Sugar's Millaquin Mill. We wish the Club well with these projects — their record shows that they will provide us with even greater wonders of the Mechanical Age. If you would like to attend future Steam Centre events go to <http://www.melbournesteam.com.au/>

Owen Peake

EHA documentation for National Steam Centre is at <https://www.engineersaustralia.org.au/portal/heritage/national-steam-centre-1973> Google searches will find lots of info about Tug Lyttelton II and the Ransomes & Rapier Walking Dragline – including how it walks at: <http://cyberneticzoo.com/walking-machines/1939-walking-draglines-english/>

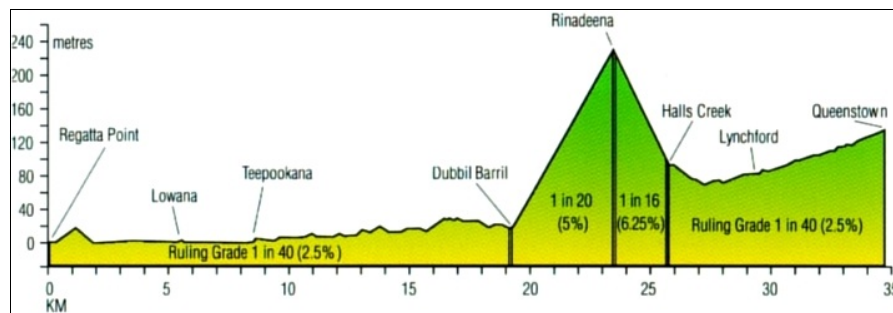
Happy hunting — The Editor.

Mt Lyell Abt Rack Railway in Western Tasmania

Located in the isolated village of Queenstown in Western Tasmania in 1892, the Mt Lyell Mining & Railway Company needed a railway to carry its copper concentrates from the mine to the port of Strahan, more than 30 km away. A sample of the ore had been taken for trial smelting using horse teams and wagons. That exercise showed a much better means of transport was essential.

Right:

Map showing the route of the Abt Railway – Strahan to Queenstown. Normal railway shown with a black line, rack railway sections with an orange and black dotted line. No scale. Source – WCWRailway.



Graph shows altitudes & grades on the Strahan to Queenstown Railway. Source – WCWRailway.

Under the leadership of Mr Frederick A. Cutten, a New Zealand engineer engaged by the Company, four survey teams set out in early 1893, starting at various locations on the Macquarie Harbour. In the process they cut 486 km of foot tracks and 362 km of survey traverses.

They identified three suitable routes for the railway, finally choosing the shorter route following the King and Queen Rivers. There

was however an impassable gorge on the King River. The solution was to divert the railway around the gorge by climbing up Sailor Jack Creek from the King River and crossing the Rinadeena saddle down to Halls Creek near the Queen River.

The Abt Rack Railway System

Normal railways, which rely on adhesion of wheels to rails through weight and metal to metal friction, are limited to grades of 1 in 40 or flatter, but this diversion of the route involved much steeper grades of up to 1 in 16 which could only be climbed by a rack railway. Cutten recommended adoption of the Abt rack and pinion system.

Dr Carl Roman Abt was born in Bünzen, Switzerland in 1850, and studied mechanical engineering at the Swiss Federal Institute of Technology in Zurich. His system used two or three solid rack blades with vertical off-set teeth centrally located between the outer adhesion rails. A toothed cog under the engine engaged with the rack rail; both the main wheels and the cog being driven on the climb. On the descent the rack system can be used as a brake. The first use of the twin-blade, 3ft 6in (1067mm) gauge Abt system in Australia was on the Mt Lyell Railway in 1896, followed by the Mt Morgan railway in Queensland in 1898.



Dr Carl Roman Abt. Source Wikipedia.



Left:

A section of the dual rack on the Tasmanian Abt railway, showing the offset teeth.

Image - Scott Davis on Wikipedia.



Far left:

A section of a double rack and pinion as used on the Tasmanian Abt Railway.

Image - H&J Travel blog.

Railway Construction

The initial contract was for the construction of the section from Teepookana on the navigable portion of the King River to the base of the proposed 1 in 20 Abt incline, a distance of some 7 km. The contractor was a Melbourne firm, Garnsworthy and Smith, and work began in December 1894. This section of the line proved extremely troublesome for the contractor and the workers. The majority of the workers were Victorian imports, ill-equipped and poorly prepared for the harsh environment (cold and wet climate, tortuous terrain and the impenetrable vegetation) and demanding working conditions (low wages, 10-hour days and 6-day working weeks).



The original Quartermile timber trestle bridge on the King River c1896. Note the double rail on the inside of the curve. Source - Tasmanian Archives Office



Men working on the Abt Railway in the 1890s
Source not attributed - Possibly Tasmanian Archives Office

At this stage the rack rail was not installed, waiting for trialling of the first Abt locomotive being assembled at Camp Spur where a small section of the twin-blade centrally-located rack rail was laid. The first Abt locomotive arrived from Dubbs & Co in Glasgow on 27 August 1896, and the Company reported on 26 September 1896 that the trial over the test track was very satisfactory with the running being smooth and steady. With fears about the Abt system allayed, the rack was installed over the two inclines and completed by 19 November, 1896.

The Company became dissatisfied with the slow progress and appointed Edward C Driffield as Railway Engineer to oversee the whole project and hopefully accelerate the works. He hired 400 labourers and established them at a number of bush camps between Dubbil Barril and Lynchford. They cleared timber, excavated cuttings and built timber bridges. Despite the rough terrain, dense vegetation and mostly wet weather, the work finished on schedule. This section of railway required 48 bridges, some of these 120 feet to 140 feet long, mostly built of Huon pine logs. The first 23 km stage from Teepookana to Queenstown was completed in 19 months – an amazing achievement. The first train to steam into Queenstown on 18 July 1896 was hauled by a Hudswell Clarke locomotive, one of the locomotives purchased by the Company to assist the construction. Its arrival was greeted by a large crowd of local residents.



Undated Rose Series postcard of the Abt Railway above the King River Gorge.
Image - State Library of Tasmania



Abt loco with a load of ore, undated but probably 1920s.
Source not attributed - Possibly Tasmanian Archives Office

The Minister for Railways declared the line open, and regular train services commenced on 21 December, 1896. An official opening was held on 18 March 1897, with the official train being hauled from Teepookana to Queenstown by Abt locomotive No.1 carrying a shield with the motto "LABOR OMNIA VINCIT" [*steady work overcame all things*], which was taken by the Company to mean "we find a way or make it". The extension from Teepookana to Regatta Point near Strahan was completed in October 1899. A fair assessment of the terrain is gained from the fact that 19 bridges were needed over this 11 km section including the Iron Bridge across the King River.

Operation of the Abt Railway – Queenstown to Regatta Point



Regatta Point Rail Yards and Railway Station in the 1930s.

Source – Archives Office of Tasmania.

The first train over this section ran on 19 October, 1899, with the official opening on the 1 November 1899. This time the passenger train ran all the way from Queenstown to Regatta Point again carrying the now famous shield with its motto. For many years, the railway was Queenstown's lifeline to the outside world. Trains brought coke, coal and other supplies to Queenstown and delivered copper concentrates to Strahan. The five purpose-built Abt locomotives were fired with coal until the 1950s when oil firing was introduced. Carriages transported passengers in and out. The train also offered an important lifestyle source for the people of Queenstown who often timed their days to the first and last train whistle of the day. A memorable annual outing was the Mt. Lyell Picnic at West Strahan which included the train ride for the Queenstown-based employees and their families.

Closure of the railway after 67 years of service

By the 1960s its locomotives and wagons were wearing out, numerous bridges needed repairs or replacement, and the Company decided the railway would close in 1963, after 67 years of service. The copper concentrates were then carried by road to Melba Flats where they were loaded onto the Emu Bay Railway to Burnie. The State Government upgraded the Queenstown to Strahan Road. Following the railway closure, four of the five locomotives were placed on display at various locations with the other one being scrapped. The rail formation was stripped of its rails and sleepers and over time was invaded by wilderness vegetation, with the structures and timber bridges falling into disrepair.

Rebirth & Restoration – an Act of Parliament in 1999

Over the decades following the closure, pressure grew from a group of dedicated Westcoasters to have the railway restored as a heritage and tourist railway, featuring the rack rail system and its mining history. The hope of reconstructing the Abt railway as a tourist drawcard became reality in 1999 when the Commonwealth Government allocated \$20.45 million to the project. Other funding came from the Tasmanian State Government and the private sector. Sinclair Knight Merz were the project managers. In addition to the tourism-focussed passenger operation between Queenstown and Strahan, the new railway had to provide a freight train service for road vehicle access to Lower Landing and the Teepookana Plateau for the harvesting of the valuable Huon pine timber and Leatherwood honey.

Under the new owner, the Abt Railway Ministerial Corporation, restoration work began in February 2000. The principal siteworks contract went to Hazell Bros Civil Contracting Pty Ltd who had to work within strict environmental guidelines. The design engineers Johnstone McGee & Gandy, working for Hazell Bros, made strenuous efforts to provide a genuine heritage experience. Four of the 39 timber trestle bridges were built in sawn timber, as full replicas of the originals. The Iron Bridge at Teepookana was retained and refurbished. The new Quarter Mile bridge was built beside the old, so that train passengers can see what little remains of the original.

The locomotive restoration contract went to Saunders and Ward Pty Ltd, another Tasmanian-based firm. The locomotives were in poor condition: with chassis cracks, worn cylinders and pinions; neither the brakes nor the pressure safety valves worked. New boilers were designed in the UK. Saunders & Ward completely rebuilt two of the original Abt steam locomotives and refurbished two diesel locomotives, meeting modern safety standards without impacting on their heritage significance.



The new Quartermile Bridge.

Source - Ian Cooper



The West Coast Wilderness Railway, and one of the original Abt locos.
Source - EHTasmania.

The contract for the Railway Operator was awarded to Honeybank Pty Ltd, a firm owned by entrepreneur Roger Smith. In addition to operating the railway, Smith's contract included the manufacture of eight passenger carriages, the building of railway stations at Queenstown, Rinadeena, Dubbil Barril and Lower Landing, and a maintenance depot in Queenstown. The new Queenstown station resembles the old and the Regatta Point station dates from the 1900s. The new carriages have an authentic look and feel.

Full Rail Safety Accreditation, for both passenger and freight operation, was granted to Abt Wilderness Railway in 2002. Following financial difficulties Honeybank Pty Ltd reassigned the Operator leases to West Coast Wilderness Railway (WCWR), a wholly-owned subsidiary of family-owned Tasmanian firm, The Federal Group. The restored Abt Railway was officially opened by the Australian Prime Minister John Howard on 3 April 2003.

The Operator had a 20-year lease agreement with the Abt Railway Ministerial Corporation and paid an annual rental. After operating the railway for over 10 years, WCWR's parent company gave notice in early 2013 that for economic reasons it was no longer able to continue as the Railway Lessee and Operator and closed its operation down on 30 April 2013. Sadly patronage had gradually declined from an initial 60,000 to a current 20,000 travellers per year.



The Drury D1 diesel loco (bought in 1953), on the turntable at Dubbil Barril.
Source - Ian Cooper.



Abt No.3 loco returns to Queenstown in 2001. Source - Ian Cooper.

The Government takes over

After a short break in service, the now Government-operated railway began a return passenger service from Queenstown to Dubbil Barril in January 2014, while bridge and track maintenance work was being undertaken over the remainder of the track from Dubbil Barril to Regatta Point. Operation over the full 34.5 km from Queenstown to Regatta Point began on 15 December 2014.

Awards & Conclusion

The Queenstown to Strahan Abt Railway in western Tasmania is the recipient of three significant awards, all of which confirm its high heritage significance. In 2001 Engineers Australia gave the railway both a Tasmania Division Engineering Excellence award and a National Engineering Excellence Award. In 2005, now known as the West Coast Wilderness Railway, it won the inaugural Engineering Heritage Australia's Colin Crisp Award for a heritage project. And in May this year (2016) the original and the restored railway will be recognised with an Engineering Heritage International Marker.

One of the ways of preventing the loss of our engineering heritage is to turn such assets into viable tourist attractions. The Abt railway reconstruction, now known as the West Coast Wilderness Railway, is an outstanding example.



An original passenger carriage, seen in 1963. Source - Peter Stock.

Bruce Cole and Ian Cooper, Engineering Heritage Tasmania.

REFERENCES:

There are many websites with material on the Tasmanian Abt railway, but the most useful at present is a paper (*Tasmania's Heritage Wilderness Railway*) presented at a conference in Hobart in November 2011. To find it, go to <https://search.informit.com.au/search?action=doSearch> On Simple Search, enter *16th Engineering Heritage Australia Conference Hobart November 2011* and 'Search Q'. The wilderness railway paper is No29. EA members can log in and the paper is free. The EH Nomination documents should be on the EA-EH Recognition Program web pages soon, and these will be free to all.

Thompsons of Castlemaine

A great engineering company from the days when "Australia made stuff"

A Smart Technology company develops

From a modest start milling grain in a Gold Rush town, Thompsons of Castlemaine (known at various times by various names, but until 2005 always including the name Thompson or Thompsons) grew to stand for the best practices in Australian Industry. The company learned early that it had to be very flexible to survive. From grain milling in 1864 they started to produce engineering items in 1875, which were needed right there and then on the gold fields around Castlemaine. As the Gold Rush subsided they started to supply equipment for the railway boom which was then under way in Victoria. Then they realised that they were good at pumps - many industries needed pumps and they made a wide range of types and sizes up to huge pumps for power stations.

As irrigation developed they tapped into that market and specialised in large-volume low-lift pumps for the irrigation industry. When the best of the gold had gone from easily reached alluvial deposits mining went deep underground into the quartz reefs and a whole new set of technologies was required. Compressed air became an important form of motive power underground so Thompsons made compressors in all shapes and sizes.

Much of the machinery they built required a prime mover to drive it. So they built steam engines and boilers. Later, as the steam turbine emerged as a more powerful and very reliable prime mover they built steam turbines. All manner of auxiliary plant emerged from their works, to back up their prime movers, pumps, compressors and other machinery.



Thompsons office building in Castlemaine in circa 1935. The building survived the take-over by Flowserve in 2005 and is still used by Flowserve. From the Thompsons Archives.



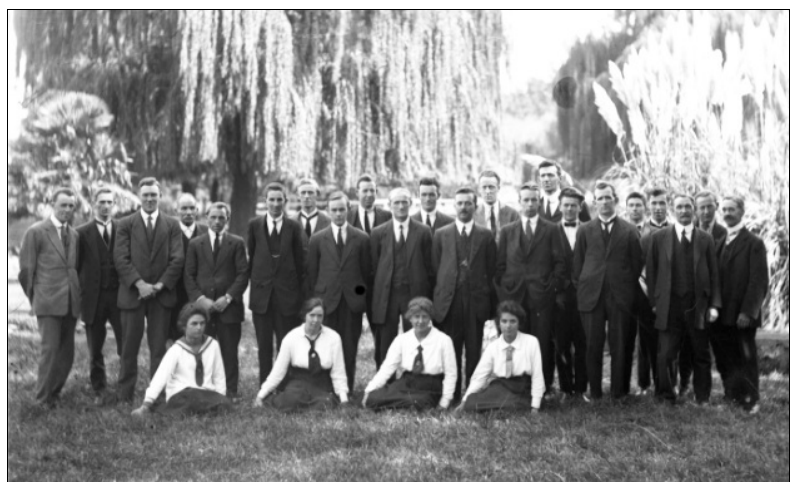
Thompsons Tronoh Dredge at Harrietville on the Ovens River was the largest ever built in Australia. It was dismantled in the 1950s and shipped to Malaya to dredge tin. From an old postcard.

They became experts in condenser plant for steam engines and turbines. From the beginning of the twentieth century until the 1930s, Thompsons specialised in the building of gold (and tin) bucket dredges which were used to gather minerals not easily accessible by more conventional mining methods. The great Tronoh dredge at Harrietville and the Eldorado dredge were built by Thompsons, as were many others, now gone.

Then World War II started and they built whatever the Department of Munitions needed. Amongst other equipment they built field guns and steam machinery for naval ships.

Post World War II they concentrated more on pumps and power station plant. Thompsons merged with Kelly & Lewis, at that time the other major pump manufacturer in Victoria, to consolidate their pump business.

The de-industrialisation of Australia gathered pace in the later decades of the twentieth century. The rumours grew that Australian manufacturers couldn't compete with the Asian factories, and concepts like after-sale service and quality were made to look old-fashioned. Governments gradually stopped supporting Australian Industry. Thompsons (known as Thompson Kelly & Lewis Ltd from 1987) could not fight this trend and their business declined leading to the inevitable take-over by Flowserve in 2005.



A portrait of Thompsons office staff, circa 1920s.

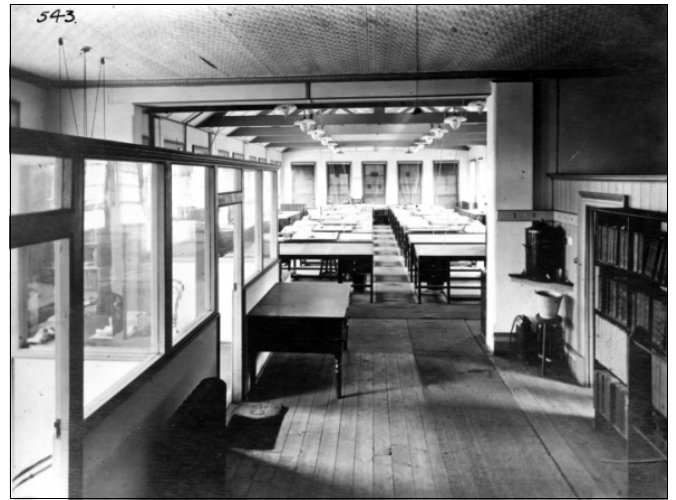
From the Thompsons Archives.

Thompsons of Castlemaine — Design it right and build it to last

Throughout their one hundred and thirty years of manufacturing engineering products Thompsons built up their design and management capabilities. Most equipment was made to a customised design to best meet the customer's needs and they had all the facilities required to design either individual plant items or whole factories or mining plants. Their drawing office had highly skilled engineers, drafters and tracers. Their workshops could produce patterns for castings and quickly produce the required ferrous or non-ferrous castings in-house. Machine shop, forge, welding shop and assembly shops were able to build or repair almost anything mechanical quickly and on the premises. They had test facilities for pumping plant, construction and commissioning crews, and could also do repairs and modifications.

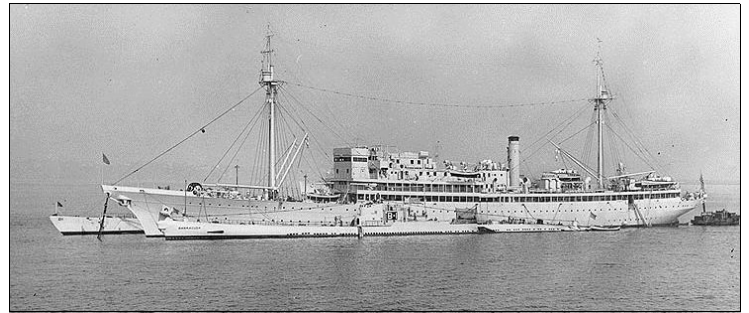


Steam loco "Major" brought in for repairs after a rear-end collision in 1914.
From Thompsons Archives.



Thompsons well lit Drawing Office in c1918. From Thompsons Archives

Thompsons built a reputation for high quality and first class service. Other industries brought their imported pumps to Thompsons to repair. During World War II they carried out repairs on navy ships despite their factory being far from the water. Because of their in-house expertise they often carried out complex repair tasks. Their customers trusted Thompsons and kept coming back with new orders.



USS "Holland" in 1930. She lost her rudder & its post in a storm in 1942. These were rebuilt & reinstalled by Thompsons while "Holland" remained at sea. Ph. US Navy.

Don't forget the community

For Thompsons, operating in a country town nearly 100 km from Melbourne was an advantage they built on. A significant proportion of the Castlemaine community worked for Thompsons or worked in support industries which prospered because Thompsons were the big employer in town. Thompsons put a great deal of effort into Castlemaine. They had influence in much of the social infrastructure of the town by virtue of workers and managers and their families being involved. They sponsored sporting activities, had a brass band, took part in town events and supported schools and other community resources.



Women workers posed on a roof of Thompsons factory sometime during WW2. Photo Thompsons Archive.

Certainly during World War Two (and probably during World War One) Thompsons employed many women after enlistment of men decimated their

workforce. Photographic evidence suggests that there was a great deal of social and community activity during this difficult time. However it is very likely that most of these women lost their jobs as their men-folk returned from the War. This was typical in Australia at that time as society had not then reached the point of accepting women as equals in the workforce despite the fantastic work they did during the War. We do not know how Thompsons management dealt with this issue.



Thompsons Foundry Brass Band in 1953. Ph. Thompsons Archive.

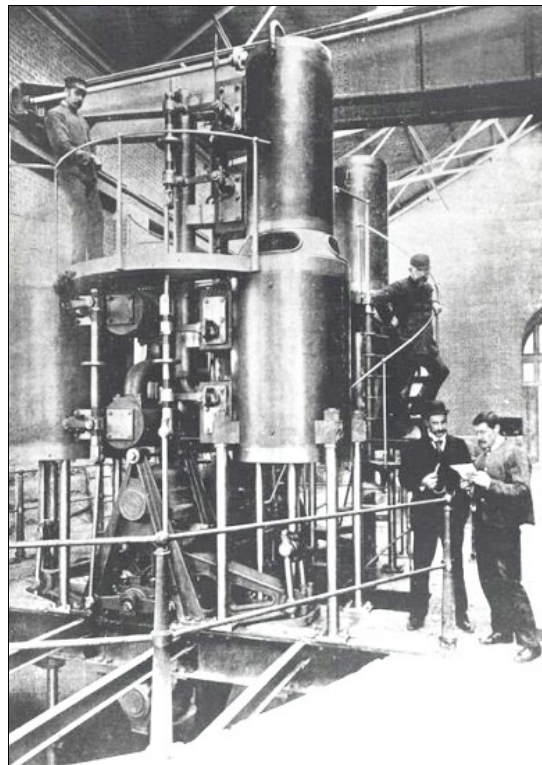
Thompsons History – a company always on the move

There were many twists and turns in the Thompson company story over the 130 years of operation but what follows is a very simplified account. In 1875 brothers, David and James Thompson, migrants from Northern Ireland, commenced an engineering business on the corner of Kennedy and Parker Streets, Castlemaine, the premises at which they had earlier erected a flour mill. The pair began by initially manufacturing and erecting mining equipment for gold mining in the nearby Castlemaine gold fields.

One of the earliest major contracts obtained by Thompsons was for the supply of points and crossings for the Victorian Railways in 1882. Such equipment was still being supplied to the Railways up until the closure of Thompson Kelly & Lewis and continues being made at the same premises today by Vossloh Cogifer Australia. A supply arrangement stretching over 134 years is an achievement by any standard! By 1887 the engineering works had grown to employ 120 men. In 1888 David Thompson died and the business was carried on by James Thompson and David Thompson junior.



Thompsons built railway points & crossings. This set of two roads crossing two roads was made in 1921 and laid out opposite the factory. Photo Thompsons Archive



In c1895, Thompsons built Vertical Worthington non-rotative direct-acting triple-expansion steam engines for the sewage pumping works at Spotswood, Melbourne. One seen in situ c1901 at Spotswood. Image Museum Victoria.

Thompsons' first large undertaking was the pumping plant for sewerage works at Spotswood in 1895, as a part of the huge project to sewer Melbourne. At a time when Victoria was gripped by a major economic recession Thompsons was thriving. The contract included the manufacture and supply of some 500 tons of machinery including four 300 horsepower steam pumping engines, six marine-type internally-fired multi-tubular boilers, surface condensers, Green's economisers, feedwater pumps and a host of other auxiliary equipment. The pumping station was commissioned in 1896. Steam pumping engines by other manufacturers were installed at Spotswood later, followed in 1925 by electrically-driven centrifugal pumps, two of which were supplied again by Thompsons.

Around 1900 Thompsons were pioneers in the system of alluvial mining by hydraulic sluicing, with their gravel pumps being used in Australia, New Zealand, Nigeria, Holland and the Federated Malay States. At that time more than fifty of their gold dredges were working in the Castlemaine district alone. Air compressors and steam and electric winders were made for all the principal mining fields in Australia. By 1908 the manufacture of water tube boilers and high speed, totally enclosed steam engines had commenced in competition with well-established British companies. Many of these engines, coupled to centrifugal pumps, were supplied for irrigation purposes along the Murray River.

In 1913 the manufacture of Dd class Locomotives was commenced for Victorian Railways. During the First World War some 40 Dd class steam

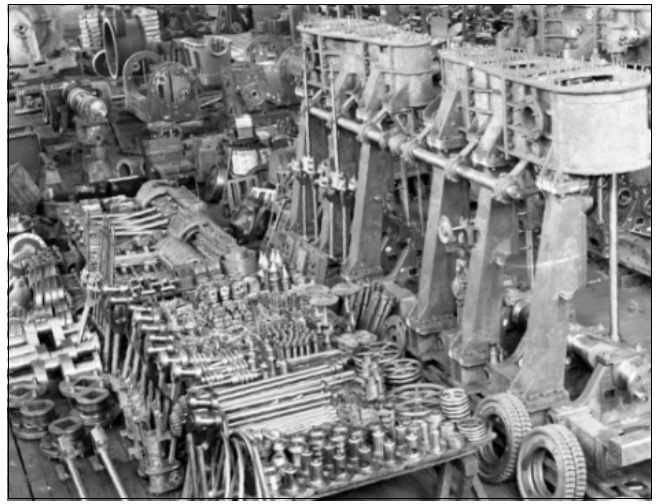
locomotives were built for the Victorian Railways, and a number of marine engines for Commonwealth Standard Cargo Vessels. A further 30 Dd class locomotives were supplied, from 1920, as sets of components for assembly in Victorian Railways workshops in Bendigo, Ballarat and Newport.

In 1916 David Thompson junior was killed in an accident in the works and the management then devolved on Mr E.V. Dam and Mr Rex Thompson.



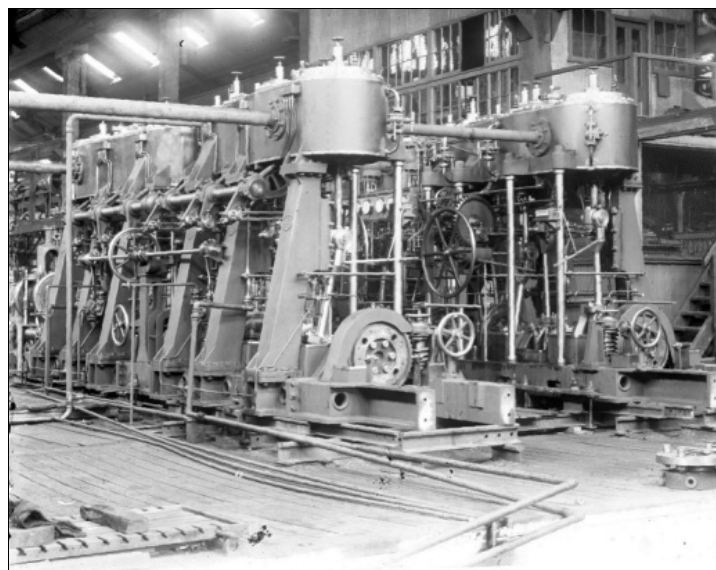
Two of the many Dd steam locomotives built by Thompsons for the Victorian Railways from 1913. These two new locos are in the railway siding at Thompsons, waiting to go. Ph. Thompsons Archives.

By the 1920s the management realised that the ever widening network of transmission lines of the State Electricity Commission would soon almost kill the demand for steam engines. The company became licensees to the Metropolitan-Vickers Electrical Co Ltd, Manchester, for the manufacture of steam turbines and condensing plants. Under this arrangement heavy power plant was manufactured at Castlemaine including eleven 25 MW steam turbines with condensing and feed heating plant. Commonwealth Railways called for tenders in 1923 for 14 narrow gauge NM class steam locomotives. Thompsons won the order ahead of 22 other tenders from Australian and overseas manufacturers. The Commonwealth was so satisfied with the delivery date and quality that an additional 8 engines were purchased for use on the new line being constructed from Oodnadatta to Alice Springs - the Central Australian Railway.



A collection of parts for making triple expansion marine engines in 1917. Photo from Thomsons Archive.

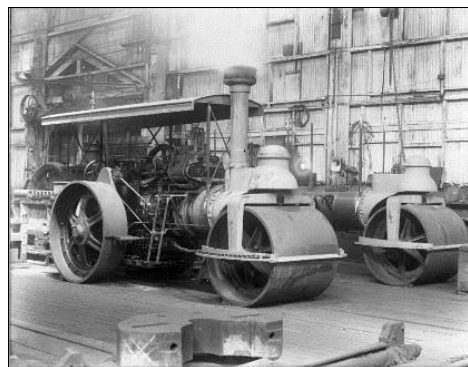
A fire in the pattern store in 1935 resulted in the loss of a huge number of wooden patterns. The damage was said to “reach many thousands of pounds”. The wooden pattern storage building was replaced with a concrete building, divided into sections with steel bulkhead doors and equipped with a fire sprinkler system. In 1939 an Hydraulics Laboratory for the testing of pumps, valves and other associated equipment was completed. This laboratory was expanded over the years and is still in operation.



Four triple expansion marine steam engines, set up for testing in the factory in 1917, as they would be arranged in the ship. Possibly the same engines that we see in parts in the image at the top of the page. From Thomsons Archive.

Production during the Second World War included 25 Pounder Guns and 6 Pounder Tank Attack guns for the Army, marine engines and circulating water pumps for the Navy, crankshafts for engines on corvettes, large forgings, propellers, and other items vital to the War Effort. So great was the demand that the existing plant had to be added to and extended, the major extensions being a new forge annexe and the non-ferrous foundry. Thompsons were also commissioned to provide a new rudder-post for a damaged US Navy ship from a template made by divers, an engineering feat in itself. In 1941 Thompsons build two triple expansion steam reciprocating engines for the corvette HMAS Castlemaine. This ship survived the war and is now preserved at Gem Pier, Williamstown.

After the War, in 1950, to cope with the ever increasing size of power generation plant, a new shop was erected and equipped with the most modern machine tools. Thompsons tendered for, and won, contracts to supply the spiral turbine casings for hydro-electric power stations in the Snowy Mountains Hydro Electric Scheme.



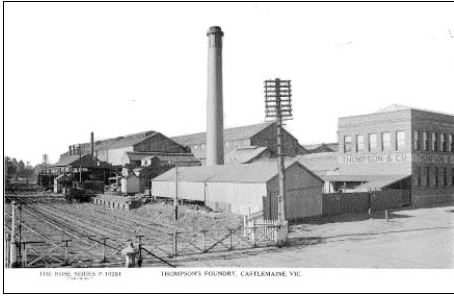
Two road rollers under construction in 1927 – for the Victorian Government. Ph. Thomsons Archives.



Battle worn HMAS "Castlemaine" berthed in South Melbourne in late 1945. Photo - State Library of Victoria Pictures Collection.

In the early 1950s, to provide accommodation for employees, the company built many new homes. During the 1960s and 1970s much capital was spent on upgrading factory facilities and several companies were acquired. In 1971, the effect of the mineral boom in northwest WA created a demand for heavy railway points and crossings, to be incorporated into railways to carry the ore to shipping ports in the Pilbara. Thompsons established a new manufacturing facility at Kewdale, Perth, to carry out this work. After the final shipments of Yallourn 'W' condensing and feed heating plant, power station construction slowed considerably. This ended an era in power station engineering for Thompsons that had spanned 60 years.

Remembering Thompsons



A postcard view of Thompsons in 1920.

Thompsons received an award for engineering excellence in 1993, presented by the Institution of Engineers, Australia - Victoria Division. The Highly Commended Award was won for the development, manufacture, testing and installation of eight large replacement sewage pumps for Melbourne Water's Brooklyn sewage pumping station. In 1998 Thompson Kelly & Lewis obtained a multi-million dollar order for pumps to be supplied to the Laminaria Floating Production and Storage vessel to be operated by Woodside Ltd off the Western Australian coast. In 2005 Flowserve acquired a 75% share in Thompson, Kelly & Lewis Ltd and took over the business. Flowserve continues to operate their Pump Division out of the Castlemaine premises today, assembling and servicing pumps.

How can we remember what made Thompsons such a great engineering manufacturer? Important items of Thompsons prodigious production over the years have survived. As engineers we should encourage the preservation of items such as the Eldorado Dredge and HMAS Castlemaine and many others. A priceless collection of drawings, glass plate negatives, order books and other documentation from the Thompsons Drawing Office has been conserved and is in the process of being placed on public display at the Maldon Vintage Machinery Museum. In 2015 Engineering Heritage Australia recognised this collection and, in a separate recognition, the Eldorado Dredge, with Engineering Heritage National Markers. The greatest recognition must, however, go to the reputation which Thompsons created and the people who built this reputation. Much of the success of Thompsons must be attributable to the technical knowledge of their designers, engineers, the Works Superintendents, and foremen, and to the knowledge and skill of the employees who have identified themselves with the Works, in some cases for three generations. The products of Thompsons were well known as work of the highest quality, and of excellent design.



Thompsons workers with a ship's propeller shaft in a street parade, Castlemaine, WW2.. From Thompsons Archives.

The Bendigo Advertiser summed up the Thompson reputation well on 7th June 1882: *Why has this foundry, situated in such a small town, been so successful? Is a question often asked. I take the reasons as these:—The engineering department of the business is performed most efficiently; the pattern-makers are ingenious; the work-men and foremen are good; the different establishments have an economical equipment of the best machines, and an authority is exercised by the proprietors in having all contracts – it does not matter whether the work is large or small – completed with care and excellence, and therefore the foundry has attained the highest reputation.*

Owen Peake, Chair, Engineering Heritage Victoria.

The author wishes to thank the Maldon Vintage Machinery Museum and the Thompsons Foundry Drawing Office Interest Group for the use of images in this article which come from the Thompsons Glass Plate Collection in the Drawing Office Archives at Maldon, Victoria.

REFERENCE: Thompsons of Castlemaine Engineering Heritage Recognition Nomination. This document contains a wealth of information. See: <https://www.engineersaustralia.org.au/portal/system/files/engineering-heritage-australia/nomination-title/Thompson%20of%20Castlemaine.Nomination.V9.August%202015.pdf>

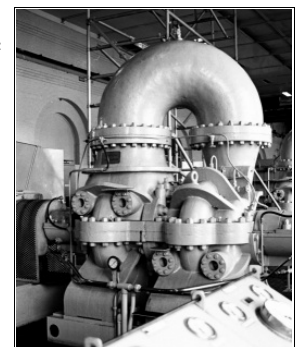
Thompsons were everywhere – a note from the Editor.



One of our first heritage studies together was in the Hunter region in 1990 – Wangi Power Station in Lake Macquarie, built in the late 1940s to early 1950s. Wangi had huge cooling-water pumps for the condensers, made by Thompsons. In late 1990 we were back in Sydney, studying Sydney Water's Ryde Pumping Station, with Thompsons pumps installed in 1921 and those replaced in 1958 with more Thompsons pumps. Those pumps were WOW! I began to realise how ubiquitous Thompsons really was when we travelled down from Sydney to Wangaratta to study the Eldorado Dredge a few years later. It turned out that the whole damn thing had been made by Thompsons!



Images – Wangi (left), Ryde (right), Eldorado (below), all by M. Doring.



Carrington Hydraulic Pumping Station, Newcastle. a different view – from the Editor.



The south, (principal), elevation of the Carrington Hydraulic Pumping Station in 1991, suffering neglect & vandalism.

Photo M. Doring.

When he knew I was to be driving around Northern Italy on my way to Rome, an architect colleague lent me a book of Palladio's drawings and said – this time you should hunt out some of Palladio's villas, you'll never see anything better. So I did, and I haven't. That was thirty years ago. We drove from Venice along the Brenta Canal towards Padua, wondering what we could possibly see from the road.

We nearly missed the first and most beautiful of Palladio's villas – the Villa Foscari, known as la Malcontenta. But there it was, visible to any passer by in its simple garden, reflected in the Brenta waters almost at our feet.

There were several more of his villas along our route, but the one I most wanted to see I missed – the Villa Barbaro at Maser near Asolo. This masterpiece of symmetrical perfection was originally a very grand farming estate. The dwelling house at the centre is flanked by long arcades behind which were stables and byres for horses and farm animals with space for workshops, a granary or winery and maybe a mill and dovecotes behind the tall gables and sundials at each end of the arcades.



Villa Foscari at Malcontenta on the Brenta Canal near Venice. Photo M. Doring, 1986.



The Villa Barbaro by Palladio, at Maser, north-west of Venice.

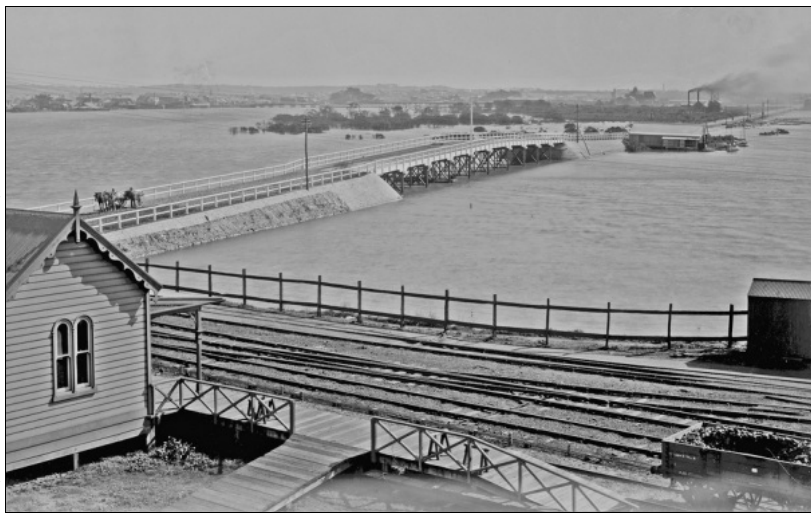
Photo Hans A. Rosbach, July 2007, for Wikipedia.

Five years later my search for Palladio had receded into the back of my mind. There was nothing Palladian about the industrial heritage places I had worked on in Australia. We were finishing up a survey of heritage sites along the Newcastle water front, and I was standing on the Lee Wharf, watching the shipping and looking across at the dead ground beyond the waters edge of The Basin, and there was something quite remarkable – the silhouette of a Palladian Villa, perhaps fallen from the sky into the desolation of a rail yard. What on earth is that? Whoever I asked at the time didn't have the faintest idea what I was talking about. It was something forgotten by history.

Our research into the Honeysuckle Point Railway Workshops had the answer. From the late 1870s the Workshops had some water hydraulic equipment – for instance a wheel press and an hydraulic pump for testing boilers, but we found no evidence that there had been an accumulator or a suitable pump on site, so where did the high pressure water come from?

The answer was from Bullock Island (now Carrington), via a pipeline that crossed the Hunter River over Bullock Island Bridge, from an hydraulic pumping station on the Island.¹ Until the 1860s, Bullock Island was just a stretch of low-lying mud flats on the west side of Newcastle Harbour where the Hunter bent to the north. The spoil from dredging the main channel was dumped there and gradually the Island rose from the mud. Then ships started dumping their ballast along the east edge of the new island, and as that gradually built up, the new strip of land became known as The Dyke.

At the same time, the existing coal loading wharves in the port were becoming overwhelmed with more and more coal and bigger and bigger ships. By 1871 there were 12 collieries at work in the district and *tonnage moved from 1866 to 1871 equals 2,888,845 tons ... and another 1,104,402 tons from private shoots.*²



I have found no photos of the 1870s Bullock Island bridge. This is the new, 1900 Denison St Bridge, photographed from near Mortuary Station. It followed the path of the original bridge, and had a water main on it (and the hydraulic line?). Photo Ralph Snowball 14 August 1900.



Queen's Wharf in 1875, looking north-east from a building in Scott St overlooking the Railway Station platform. The area is crowded with coal wagons and many ships crammed together along the wharf to be loaded by the steam canes. Photo - State Library of Victoria

By the end of 1874, there were 8 steam cranes and 11 shoots along the Queens Wharf, near the present CBD, but the system was becoming increasingly inadequate. *Within the last few years a great change has taken place in the class of vessels frequenting the port of Newcastle. Ships of the largest class have usurped the place of the old colliers. Time is wasted in trimming, and delays occasionally take place from the state of the harbour and the difficulty of putting to sea.*³ The forests of masts in old images of the port bear witness to the congestion. (Most of the steamers of the time also carried sail.)

Mr. E O Moriarty, the Chief Engineer of the NSW Steam Navigation Board found a solution that would not only speed up the turn-around of the colliers, but would get the coal handling out of the City.

He proposed that the Dyke could be readily adapted to the needs of a new coal loading wharf, and so it came about: *As the whole frontage of the Queen's Wharf is now occupied by cranes, shoots, cargo-berths, and steamer-wharfs, the further expansion of appliances to meet the increasing demands of the coal-trade at Newcastle will be made along the Bullock Island Dyke, which has a frontage of a mile and a half on the western side of the harbour. Along the dyke eighteen sections of timber-wharf, each 300 feet apart, have been constructed. On four of these sections are to be erected 15-ton hydraulic cranes, which have been manufactured under contract by Sir William G. Armstrong and Company, and are now on their way from England. The dyke will be connected by a branch line with the Great Northern Railway, and it is expected that the works will be finished and in operation in time for the winter trade of 1877. A plan of Newcastle harbour, showing the position of the cranes and shoots, the branch line to Bullock Island and the site for the hydraulic cranes, is appended.*⁴



Queen's Wharf in 1890, probably viewed from Fort Scratchley. All the steam cranes and coal wagons are gone. This wharf is now given over to general cargo, while the colliers in the Harbour are now waiting for a berth along the Dyke or in the Basin (in the background). Photo - B.W.Champion Collection, Newcastle Region Library.

1 I last saw this in 1990 in one of the bound volumes of NSW Railways Annual Reports, but I have been unable to re-find the reference.

2 *Report of the Commissioner for [NSW] Railways, 1866-1871*

3 *Report of the Commissioner for [NSW] Railways, 1872-1875*

4 *ibid.*



Part of an 1875 Plan of Newcastle Harbour – a colour lithograph published in the Report of the Commissioner for [NSW] Railways, 1875. Copied from a bound volume of reports held in the library of C & MJ Doring.

There are a number of items of note in the part of this 1875 Plan of Newcastle Harbour reproduced here (left). Large sections of Bullock Island have still to emerge from the water, but even so a street grid for the future is already laid out. The “Bullock Island Branch Railway (constructing)” is shown as a dotted line running along Cowper Street and branching out north and south at the dyke – all on ground reclaimed from the river. Along the full length of the Dyke (that was still being built) is printed “MAIN WHARF CONSTRUCTING IN SECTIONS. LENGTH WHEN COMPLETED 8000 FEET.”

The drawing doesn’t show any building for the Hydraulic pumping house, but it was evidently well under way, because tenders had been called for *the erection of the engine house, boiler house, smoke stack and hydraulic towers in the Newcastle Morning Herald of 20/4/1876, closing on 21/5/1876 and a contract for the design and construction of the hydraulic power house was awarded to Mr J.H. Jennings of Sydney in July 1876 and the contracts for the hydraulic pumps etc. and the associated hydraulic loading cranes had been awarded to the Armstrong Hydraulic Machinery Co., at Elswick England.*⁵

The drawing of 1875 shows many long-forgotten things, including the Bullock Island Bridge, which reached from the (former) Mortuary Station on the Newcastle shore to a long spit extending south from Bullock Island. Until the railway across Throsby Creek and along Cowper Street was built, this was the only land access to the island. The promontory of Honeysuckle Point still exists in 1875, and The Basin is just a dotted line on the map with half-a-dozen piles (or mooring posts) around the southern-most end of the proposed dyke construction. The four 15 ton

hydraulic cranes are shown on the Dyke, and the proposed location of later cranes, and the Bullock Island Railway is an insignificant dotted line, running from the Dyke, over Throsby Creek, towards Hamilton Junction, out of the picture to the left. I have shown the location of the Pumping Station with a red dot, on the corner of Cowper & Bourke Streets.

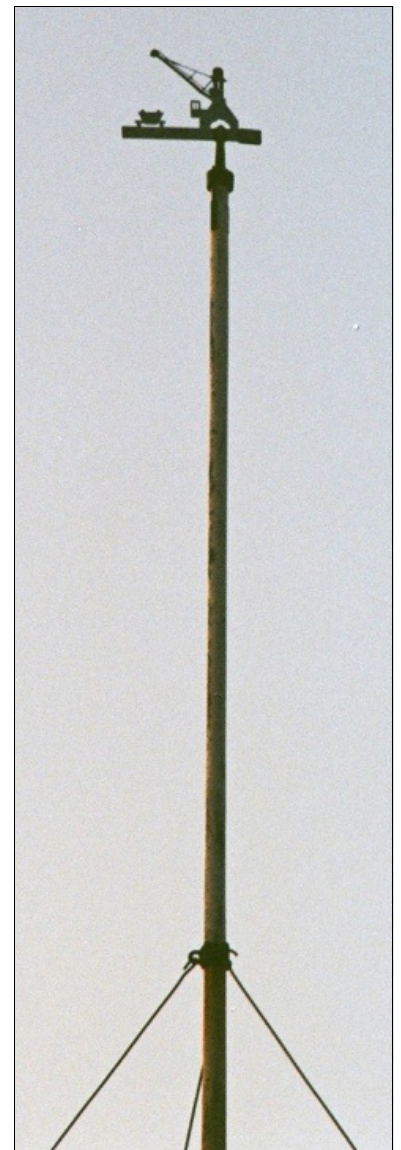
5 Peter Cockbain in *The Engineering Heritage Associated with Coal Shipment from Newcastle 1877 to 1967* - 9th National Conference on Engineering Heritage: Proceedings, Melbourne 1998.

I was interested to know who was the architect of the building, but it appears to remain a mystery. One source names James Barnet, the Colonial Architect of the time – or one of his offsiders, Edmund Spenser.⁶ Another remarks that: *The usual practice, reinforced by departmental jealousies, required the designs to pass through the hands of the Government Architect for his approval.*⁷ But the authors of a recent CMP note that there is no mention of the Hydraulic Pumping Station in the records of the Colonial Architect or other Government records, nor in a biography of Barnet, but goes on to suggest that the building might have been designed in England, and bears some resemblance to hydraulic engine houses at Swansea and Bristol. To me it has only the very slightest resemblance to either. In the finished Carrington building everything is beautifully proportioned and perfectly symmetrical. When one looks at one of Barnet's earliest courthouses – at Molong, and a later one at Bathurst – the influence of Palladio is almost palpable. If Barnet wasn't the architect, he surely had a heavy influence on the actual designer. Maybe the original documents were lost, among many others, in the fire of 1882 which destroyed the Garden Palace (another Palladian tour-de-force of Barnet's). Barnet or not, it is interesting that the architect of the pumping station, 300 years after Palladio, should adopt the industrial style of Palladio's farmsteads for a different industrial use Palladio could never have imagined.



The Hydraulic Pumping Station seen again in 1996, when it was fenced, but still neglected.

Photo M.Doring.



The weathervane, high above the front door, with walking crane and coal wagon, in 1991. I hope it is stored somewhere safe, because by 1996 (left) it had disappeared.

Photo M Doring.

But beyond the architecture, the design looked to the future, including catering for the enormous growth of the coal trade, and the need for more and bigger cranes, and thus more engines and boilers. The Newcastle Morning Herald of 25th November 1876 reports: *Passing on to the works at Bullock Island, we will commence with the Engine House itself, which is situated on the eastern side of the Island, and, when completed, will be a very handsome building, and an ornament to the district. (...) The building will be constructed so as to contain appliances to be available in future for working an additional number of cranes should the increase in the coal trade demand it.* The article briefly describes the building, including, on the east and west sides of the engine room, the two accumulator towers, 56 feet in height, in which, as their name implies, the hydraulic power is accumulated and reserved for use. At this time, only one boiler room and smoke stack, on the west side, were under construction, but concrete footings for a second boiler room on the east side were already in place.

Fifteen years later, in April 1890, the government awarded F. A. King of Singleton, a contract to erect the eastern boiler house and chimney shaft at the hydraulic powerhouse and in June, the tender of Babcock and Wilcox was accepted for the supply of four boilers, each of 136 horsepower, for the new extensions.⁸ They did have to add on a room at the back, because the new tubular boilers, as well as being part of the hydraulic power system, were to supply steam to drive the dynamos supplying electric power for the Dyke lighting. The dynamos were housed in a building at the rear of the powerhouse. (...) Completion of the hydraulic powerhouse was effected with the installation of a third hydraulic pump late in 1891. This unit had a flywheel 13 feet in diameter and had 25% more power than the total of the other two pumps, ensuring sufficient power for the [new] Eastern Basin cranes.⁹

6 John Gibson, *Extant Remains of Hydraulic Power in Newcastle and Sydney, NSW* - Public Lecture Presented to Engineers Australia, 9 July 2009.

7 *Carrington Hydraulic Power House Conservation Plan* – Hunter Design, Newcastle, undated for the NSW Public Works Department.

8 Ted Coulin, *History of Carrington*, unpublished typescript. circa 1994.

9 *ibid.*



A panorama of Carrington, the Dyke and the Basin, said to be taken from the top of the Clyde Hotel, corner of Cowper & Lott Sts in 1906 or 1908 (looking NE-E-SE). Cowper St enters the picture at bottom left, with a loco and coal wagons alongside it. The Hydraulic Pumping Station faces Cowper St, The Dyke with ships alongside and the Harbour beyond, runs across the background. Hundreds of coal wagons wait to be unloaded. The Basin is at right, with ships berthed along its east wharf while the big walking hydraulic cranes load them with coal. Photo from the J & A Brown collection held by UoFN.

I said at the beginning of this story that the Hydraulic Pumping Station looked as though it had fallen from the sky into the desolation of a rail yard, and an empty rail yard at that. How could it have become the desolate and forgotten place it was when I saw it 110 years after it was built? That was partly caused by the enormous changes in the technology of moving coal in the mid 20th Century. Electricity replaced water hydraulics, cranes got bigger and bigger, and eventually even the cranes were replaced by the coal loaders past the north end of The Dyke. But what was the area like in 1877, and in the 1890s and later, when it was a hive of industrial activity?

The Railways Annual Report, 1876 tells: *Important work has been carried out at Bullock Island Junction for the purpose of supplying the hydraulic works on Bullock Island with water (...). A tank of 20,000 gallons capacity and a [Tangye] pumping engine capable of raising 6,000 gallons of water per hour into the tank (...) The water will be drawn from the several swamps existing in the locality.*¹⁰

The water tank appears in an undated photo of Bullock Island Junction at Hamilton (at right). Looking east from the railway overbridge we see the GNR main line heading to Newcastle City and the Bullock Island Railway heading left. The big 20,000 gallon tank is in between the two lines. The shed in front of it was probably the pump house for the Tangye pumping engines which supplied the hydraulic system. The tank at right probably served steam locos on the GNR.



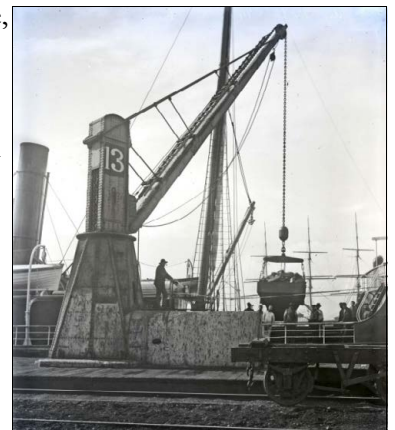
Bullock Island Railway Junction, viewed from the Islington Railway Bridge, looking east. Photo taken by Ralph Snowball, circa 1890s.



Cowper Street Bridge, seen from Wickham. Photo taken by Ralph Snowball in 1904.

Also in the 1866 Annual Report: *The Bullock Island Branch [Railway line] which was commenced in 1875 has been nearly completed.*¹¹ I found no mention of building the Cowper St Bridge but it was probably the last section to be finished.

It started with a single line, but was soon widened to the double line seen here (at left). The Wickham-Bullock mine poppet-head stands out in the middle distance, and a forest of ship's masts are faintly visible along the Dyke in the distance.



Dyke crane No 13 loading coal on a ship. Photo Ralph Snowball 1894.

This story would not be complete without some pictures of the cranes that loaded the coal. The first four cranes shown on the 1875 drawing are rated as 15 ton. No.13, (at right) was probably 25 tons capacity. The walking (or travelling) cranes erected on the east Basin wharf were much bigger, but their travelling was limited to about 15 feet between hydraulic pipe connections.

¹⁰ Supplement to the Report of the Commissioner for (NSW) Railways, 1876, Appendix No.1 from the Engineer for Existing Lines.

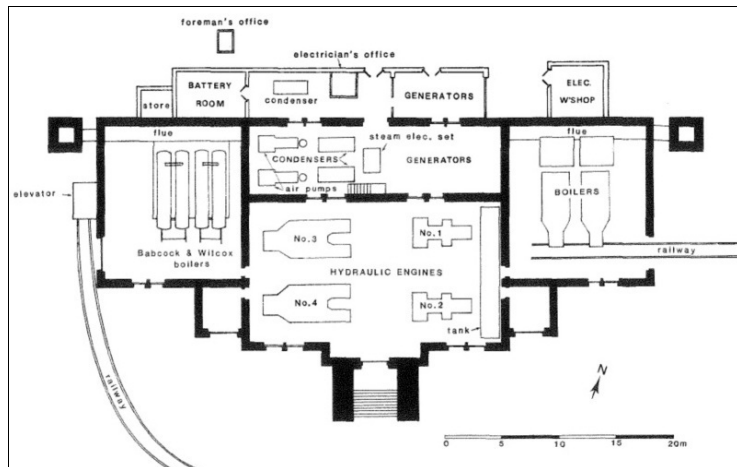
¹¹ Supplement to the Report of the Commissioner for (NSW) Railways, 1876, Appendix No.1 from the Engineer for Existing Lines.

It took a long time to disconnect, move the crane (with an electric motor) and re-connect. Nevertheless, it could even out the loading of coal into the different parts of a ship's hold. Six of these cranes were tested and ready to go by April 1902, but they were not connected to the hydraulic system for another year.¹²

There were many changes over the years – to the wharves, to the cranes, to the Pumping Station machinery. In 1900, a second Armstrong 250 hp compound steam engine (No.4) was ordered to cope with the new cranes, and in 1906, more Babcock and Wilcox boilers were installed. These are clearly shown in a Plan of the Hydraulic Pumping Station, extension 4, 1914, copied from Bairstow Fig.11 (adapted from New South Wales Railways Archives Plan No.15915).¹³



Walking cranes under construction at The Basin east wharf in circa 1901. Photo – Newcastle Library.



Plan of the Hydraulic Pumping Station after the 4th extension in 1914, Adapted from New South Wales Railways Archives Plan No. 15915.

Copied from Bairstow, Fig.11 (see footnote).

The landscape changed over the years too. Eventually the railway running along Cowper Street became more and more annoying, and dangerous, to the many people who were now living in Carrington. By 1911 the railway had been removed, and taken around to the north end of the Dyke. But the Cowper St Bridge remained for public use and in 1912 a tramline across it was opened, servicing the homes and workers in the north of Carrington. A parliamentary Bill of 1912 allowed the removal of the Bullock Island (Denison St) Bridge in 1913.

A town map of 1915 shows these changes, and others. The Hydraulic Pumping Station was still working full bore, and there were still forests of coal sidings outside it, but people could now walk along Cowper St without being hit by a train. On the small section of map shown here (at left), the Pumping Station is visible, and the tram line running across the Cowper St Bridge. Two big footbridges shown over the clusters of rail sidings made a great improvement to safety.



A small section of a 1915 town map of Newcastle. From Newcastle Local History Library.

A recent aerial photo shows all this gone – sidings and footbridges, even most of the wharves appear disused and abandoned. Only the Pumping Station building remains, lonely in its isolation. I imagine it restored to become a major civic attraction, set in gardens, with views still open to the Lee Wharf, as Palladio's La Malcontenta can be seen across the Brenta. But we must never let its fascinating industrial history be forgotten.

Peter Cockbain makes the point: *It should be remembered that although the first [hydraulic] cranes were commissioned in 1877, the last one was decommissioned on 31 July 1967. It is doubtful if we will ever again see an engineering installation which is utilised in its original concept for 90 years.*¹⁴

REFERENCES: For those looking for those technical details that are obviously missing from this account, some of the references in the footnotes can be found on the web, and are well worth the hunt:

Damaris Bairstow (the first & best from 1986): <http://www.jstor.org/stable/29543164>

Peter Cockbain, 1998: <https://search.informit.com.au/fullText;dn=547175241181466;res=IELENG> (free for EA members)

Ted Coulin, circa 1995: <https://coalriver.files.wordpress.com/2014/04/historyofcarrington-tedcoulin.pdf>

For the 2005 CMP by Newcastle Ports & 1995 CP by Hunter Design: Google Search NSW Department of Commerce – Conservation Management Plan for Carrington Hydraulic Pump House. This will also take you to the NSW Environment & Heritage listing.

And for those Hunter Heritage fans, try the Ralph Snowball collection index: <http://libguides.newcastle.edu.au/snowball/flickr10-25>

12 Ted Coulin, *History of Carrington*, unpublished typescript. circa 1994 p.84.

13 Damaris Bairstow, *Hydraulic Power and Coal Loading at Newcastle Harbour*, *New South Wales*, ASHA Journal 4, 1986.

14 Peter Cockbain in *The Engineering Heritage Associated with Coal Shipment from Newcastle 1877 to 1967* – 9th National Conference on Engineering Heritage: Proceedings, Melbourne 1998.

The Bushfire at Yarloop, Western Australia.

Newcomen Society 'Links' Magazine responds to our story in EHA January Magazine.

*From John Porter in the UK,
who visited Yarloop in 2001.*

Does the Society, on its travels, bring disaster in its wake? One might sometimes think so. A pleasant lunch in 2001, under the historic telescopes at Mount Stromlo, near Canberra, was soon followed by the news that the venue had been totally destroyed in a forest fire. The ball tower at Lyttleton, on New Zealand's South Island, was brought down by an earthquake soon after we visited. The workshops and rolling stock of the Zig-Zag railway were devastated by another forest fire in 2013 following a visit by the Society.

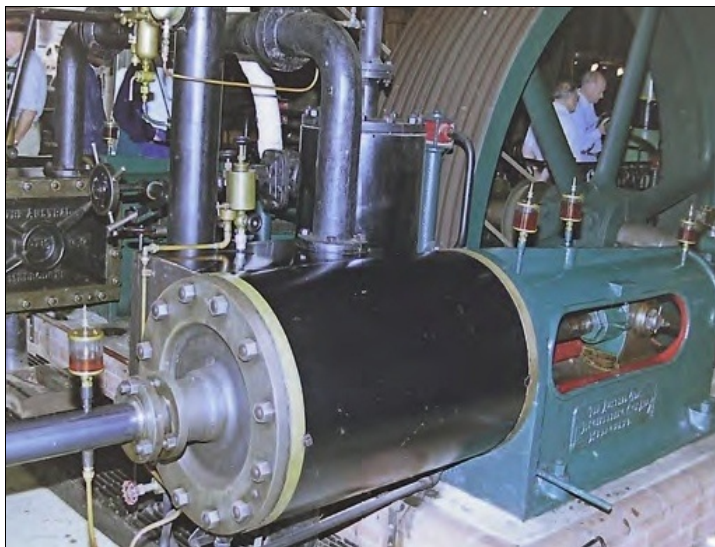


Interior view of the main workshop at Yarloop Railway Workshops Museum in 2001.

Image © John Porter.

Now comes news that the Yarloop workshops in Western Australia, described as “the most intact example of an early privately-owned 20th century railway workshops in Australia”, have been completely destroyed by yet another forest fire. This is particularly poignant and personal as, during our visit in 2001, we met many of the volunteers who had saved, preserved, restored and brought back to life this extensive forestry maintenance site. The workshops began operation in 1901 and finally closed in 1978. They were the central maintenance point where the extensive lumbering operations (think jarrah wood and railway sleepers) connected to the main line. The name, Yarloop, derived from Yard and Loop, is a clue.

Being so remote, their workshop capability was more akin to manufacturing than merely servicing the plant. They had preserved an enormous collection of wooden patterns for the foundry. We saw facilities for major overhaul of locomotives of the standard western Australian gauge of 3 feet, 6 inches. We learned just how much use could be derived from circular and band saw blades as they were re-sharpened, recut, and re-sized until there was insufficient metal left to use. We saw some fearsome petrol-driven, completely unguarded mobile saws, unique to this area, and seeming to fully justify their nickname, “widow-makers”. No one was brave enough to demonstrate one, but we did see a reciprocating steam driven saw in action, making short work of a large log. Its original purpose had been to cut up whales' backbones at the whaling station in Albany. All this was in the original wooden-framed, wooden walled buildings, typical of their day and wonderfully atmospheric as a result of decades of use.



A 350 HP stationary engine, the largest restored steam engine in WA.
Image © 2001 John Porter.

An additional feature, housed in a new, but traditional, wooden building, was a collection of stationary steam engines rescued from elsewhere and re-erected here in steampable condition by Colin Fusey, a man remarkable not only for his considerable energy but for achieving all this with only one arm. Here in the UK we have no idea of the speed and intensity of these fires. Did all the non-ferrous material melt? Surely the cast iron structures must have survived. We await news.

To the families of those who died, and the many hundreds of people who lost everything in their homes, this concern for the artefacts must seem trivial. But it was an excellent museum and, for us, well “worth the detour”. It did bring business to the town, something they will be desperately seeking as rebuilding proceeds.

*This article was first published in
Newcomen Links 237 in March 2016.*

Vale Jan (Dick) van der Molen, 1924 – 2015

PhD, MEngSc, FIEAust, MASCE, CPEng.



Jan (Dick) van der Molen. Ph. - Melb. University

Jan Ludzer (Dick) van der Molen was a very capable, versatile and innovative structural engineer. Born in Amsterdam, he grew up in Eindhoven and studied aeronautical engineering there during the war, while the Netherlands were under German occupation. Eindhoven was liberated by the Allied armies in September 1944, and Dick travelled to England as soon as he could, for military training with the British Army Corps of Royal Engineers. He joined the Dutch Army Corps of Engineers after the war ended, and in 1946 travelled to Indonesia in a reconstruction unit which built more than 1000 bridges in five years. While there a lad working for him kept expressing concern about snakes. Dick replied that there were no snakes in there. But the lad persisted until Dick twigged that the boy needed a new pair of shoes which Dick promptly provided.

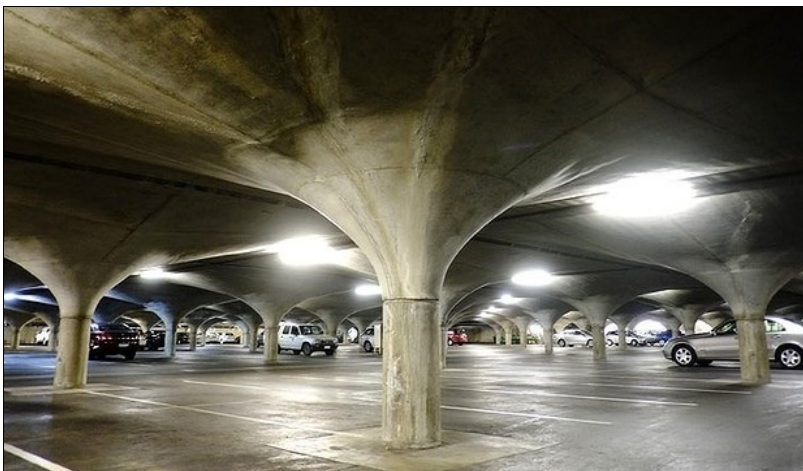
After demobilisation in 1950, he emigrated to Australia, and worked on the Snowy Mountains Scheme for two years. After the Snowy his work took him to Singapore, then Turkey, and back to Australia where he has been in private practice with various consulting firms as a structural engineer, including Chief Civil/Structural Engineer with Bechtel Pacific, and Chief Structural Engineer with Camp Scott & Furphy. In his consulting career he tackled an incredible variety of structures including power stations, aircraft hangars, a grain terminal, chimney stacks, wharves, not to mention the detailed design of two 550 ton erection trusses for the approach spans of the Westgate Bridge.

He is said to have been associated with the design/construction in 1967 of the renowned cable stayed pipe bridge over the Savage River Gorge in Tasmania,¹ and the McIntyre Bridge over the Barwon River at Geelong – a cable stayed pedestrian and pipe bridge which is said to have been one of the first applications of computer-aided bridge design in Australia. Another well known van der Molen engineering design was the Rosebud Soundshell on the Mornington Peninsula, completed in 1969. Its roof is described in the Heritage Victoria database as a free-standing reinforced concrete shell in the form of a hyperbolic paraboloid.² Van der Molen is said to be a local pioneer in the application of computer technology to the design of concrete structures.

Working for Harris, Lang & Partners in 1969-71, van der Molen designed and supervised the construction of the underground car park under the south lawn at the University of Melbourne.³



Slurry Pipeline Suspension Bridge, Savage River, Tasmania.
Photo from Highest Bridges.com website.



Car Park under the South Lawn, Melbourne University. Photo – Melbourne University.

When presented in 1971 with the problem of designing an underground car park for the University of Melbourne, with trees planted in the roof structure, Dick van der Molen realised that the key to the project was finding a satisfactory solution for the tree roots. After a quarter of an hour of sketching on the back of an envelope, he had the answer: saucer-shaped flowerpots on columns, interconnected to form arches. With the geometry of hyperbolic paraboloids, the concrete formwork could be made in four demountable and reusable sections, thereby simplifying construction and saving costs. When Dick presented John Loder, of the [architectural] firm Loder and Bayly, with three options, John is reputed to have excluded the others in his recommendation to the university. Construction was completed by John Holland contractors in 1972 under Dick's supervision, on time and within budget. Furthermore, the structure actually works very

well as a car park and sometimes as a film set. The Concrete Institute of Australia made an award of excellence to Dick and to the project which is heritage-listed for its design, construction and aesthetic appeal.⁴

1 See http://www.highestbridges.com/wiki/index.php?title=Savage_River_Pipeline_Bridge and <https://www.pipeliner.com.au/2016/03/16/the-savage-river-slurry-pipeline/>

2 See <http://vhd.heritagecouncil.vic.gov.au/places/154866/download-report>

3 See <http://vhd.heritagecouncil.vic.gov.au/places/3808/download-report> and http://vhd.heritage.vic.gov.au/search/natrust_result_detail/65785

4 From The Age obituary March 1st 2016 by Keith Adams, a friend of Dick van der Molen.

By the late 1970s, Dick van der Molen was becoming interested in academic pursuits – specifically, the science of making concrete. The (then) Australian Engineering and Building Industries Research Association, in Parkville near Melbourne University, published two of his papers – *Report on Curing of Concrete* in 1979, and *The Durability of Concrete* in 1981. These would have been part of his studies at Melbourne University where, in 1982, he obtained the degree of Master of Engineering Science with a thesis on the curing of concrete.

In private practice work from 1980 to 1989, he was involved in rectifying structural failures and appearing as an expert witness on litigation resulting from them. In 1985 his interests turned to structural timber, but it appears that concrete continued as a parallel preoccupation, because in 1988 he joined the University of Melbourne Department of Civil and Environmental Engineering (now Department of Infrastructure) lecturing in concrete design and technology and in timber structures. No doubt his students benefited from his extensive practical experience. Graham Hutchinson, his colleague at Melbourne University, contributed :

Dick (van der Molen) was employed as a Lecturer in the Department of Civil and Environmental Engineering at The University of Melbourne between 1988 and 1999. Dick gave generously of his time and expertise to students and fellow staff. He was widely respected for his great practical expertise in analysis and design of reinforced concrete structures. His lectures were entertaining and relevant. During his time at the University, personal desk top computers were becoming very popular and Dick took full advantage of this. He used, in a unique way, the commercial program Excel to develop sophisticated analysis and design routines for reinforced concrete structures. Dick was very popular with students who were grateful that a man of his experience would happily and freely pass on what knowledge he could.

From the early 1990s Dick was deeply involved in the structural assessment of, and the possibility of restoring, the Sewer Aqueduct which crosses the Barwon river flood plain at Geelong. This is a major historic reinforced concrete structure designed by celebrated engineer E G Stone and built in 1913-16. It has 14 spans and a total length of 750 metres, but some of the reinforcement is corroded and the concrete spalling, and the cost of restoration would be very high. It was listed on the Victorian Heritage Register in 1991. Dick personally carried out a structural analysis which showed that the structure was still safe and could be repaired. He served on various committees and appeared before an Independent Planning Inquiry in support of the conservation and restoration of the aqueduct. He undertook a study tour in Western Europe on restoration techniques for reinforced concrete heritage structures and reported his findings to Heritage Victoria on his return.



E.G. Stone's Barwon River Sewer Aqueduct at Geelong.
Photo – Heritage Victoria.

After his retirement from Melbourne University (at the age of 75), in 2000 Dick moved to Hobart and joined Engineering Heritage Tasmania. There he single-handedly restarted the EHT oral history program, without any previous experience in the process. He carried out two interviews for the Engineering Heritage Tasmania local programme and a further four interviews for the EHA national program. Dick has published either individually or jointly some 44 papers on various topics. He has attended and contributed papers to two Engineering Heritage Conferences, in Auckland in 2000 (*Early Reinforced Concrete Structures - A Heritage Issue*, about the Barwon Sewer Aqueduct and the Denys Lascelles Wool Store in Geelong) and in Canberra in 2001 (*Roads, Bridges – and Federation*).



Dick van der Molen (left) & Keith Drewitt at the Ross Bridge in Tasmania.
Photo – Bruce Cole.

With his interest in historic bridges, it was not difficult to persuade Dick to research the Ross Bridge in central Tasmania, and prepare an engineering heritage recognition nomination. At the recognition ceremony his talk brought to life the task of constructing a masonry arch bridge with convict labour in 1835. It is the second oldest bridge in Australia. Dick was not satisfied with the initial award of an Historic Engineering Marker and submitted a strong case to EHA for an upgrade. This had never been done before but, after a reassessment, the bridge was awarded a National Engineering Landmark.

During his time in Tasmania, Dick not only passed the age of 80, he also completed his research and thesis on *An Investigation Into Structural Failures*, gaining his PhD from Newcastle University in 2006. He was delighted to be invited by Tasmania Division Committee to become a Fellow of Engineers Australia. Engineering Heritage Tasmania and indeed EHA have been very fortunate to have had Dick van der Molen's services. He willingly turned his talents to new challenges in a very productive way. In 2006 he returned to Melbourne to live in a retirement village, listen to his favourite music and enjoy Friday lunches with some of his University colleagues.

Bruce Cole, Chair, Engineering Heritage Tasmania.

Do Manhole Covers Tell Stories?

Revisiting Morocco and Spain – from Owen Peake

Last year Helen and I spent some time holidaying in Morocco and Spain. Early in the trip, in the back streets (actually alleyways) of the ancient city of Fez in northern Morocco, I realised that something had changed since we were last there 45 years ago. It wasn't that the buildings had changed, or the narrowness of the streets or the appearance of the people or their dress. None of these things had changed a scrap!

What I remembered was that I no longer had to step over the narrow open sewers in the streets. The nasty open drains had gone and all that was left in their place were the manhole covers of a modern sewerage system. It wasn't difficult to find a manhole cover in a patch of sunlight and take a picture.

The power and telephone cables still hung in untidy bunches on the walls but the sewers had gone underground. We all know from the unsavoury histories of Australian cities that a potable water supply and water-borne sewerage need to go hand-in-hand.



Sewer cover in Fez. Photo Owen Peake.

Sure enough, in little niches in the walls of the houses were small doors covering water meters. And then I noticed that the wells at strategic locations around the city were derelict and deserted – the water supply had also gone underground and into every household.



An alleyway in the Fez Medina (the old, walled city) with a manhole cover hidden in the shadows.. Photo O. Peake.

At left: This manhole cover "Ville de Fez" comes from the Sidewalk City blog, August 2010

Living Industrial History & Modern Technology together in Fez



Looking down on the leather dying vats in Fez Medina. White vats at the back are the first part of the tanning process. They contain lime & pigeon droppings to remove hair, fat & impurities from the skins before washing in water then to dying vats in the foreground. The processing takes several days.
Photo - Owen Peake.

There were indicators that Morocco had progressed remarkably in many ways since our last visit. The highways were paved, the railway system had been expanded and the many trains were hauled by modern diesel-electric locomotives. There were mobile phone towers and almost universal coverage (unlike the patchwork coverage in Australia), and most towns had several ATM's. Transmission lines criss-crossed the countryside and there were zone substations on the outskirts of larger towns. The provision of electricity is now taken for granted and we experienced not one outage in the three weeks we were in the country. The water and sewerage revolution had not only come to Fez – we saw the same development everywhere we went.

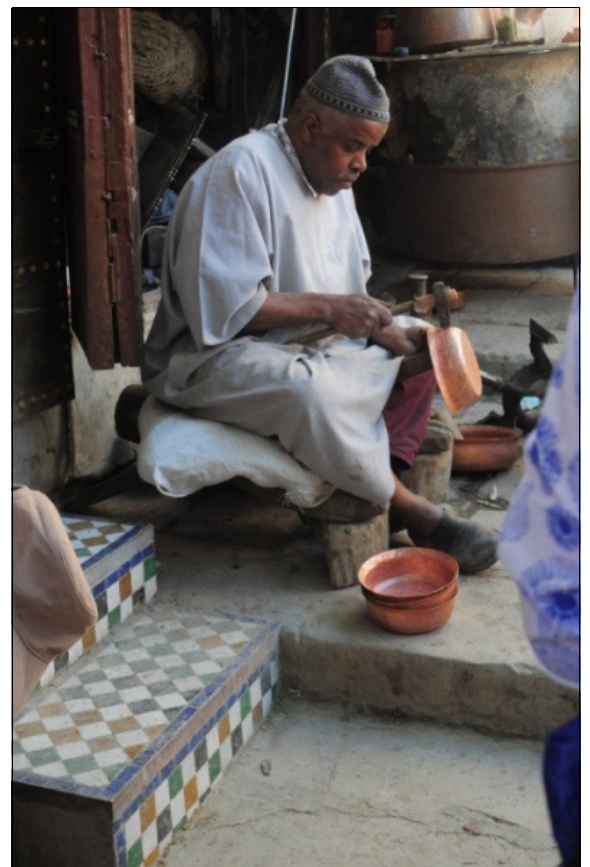
In fact the whole country had a look of a country on the move. The economy might not be booming but it seemed to be bubbling along quite sustainably. The society was also very open. Whilst we were not allowed to enter mosques we were allowed into madrassas [Islamic religious schools] and the richly decorated mausoleums of the royal family. There were many road blocks but we were told that these related to extremist activities in neighbouring Algeria. The police at these road blocks were friendly, communicative and not heavily armed. We saw police almost nowhere else, and very little army activity was evident on the highways, although there were apparently concentrations of troops along the Algerian border, way out in the Sahara.

From a heritage perspective there were few shocks. Perhaps the greatest shock was the lack of camels on the highways. We met camels on the desert fringe but they are part of the tourism infrastructure and no longer part of the national transport infrastructure – European and Japanese trucks had taken their place, much to our disappointment.

Morocco has embraced the UNESCO World Heritage system and has several important sites recognised. Elsewhere we saw newly restored buildings and buildings under restoration. Nothing of heritage value had been 'disappeared' and replaced by high rise apartment blocks. Even the famed leather processing and dying works in the Fez Medina were as we remembered them with men working knee-deep in noxious and foul-smelling chemicals oblivious to possible harm.

Another feature of the Fez Medina which survives is the metal working bazaar. Again it was largely unchanged since 1970 although I did see some stainless steel material and products which certainly were not there in 1970. The bazaar specialises in brass and copper work, sheet-metal work making all manner of objects and decorations. There are the usual pots and pans (both beaten and fabricated) and all manner of artwork. Clearly much of the product is made-to-order and we saw several shopkeepers sketching designs for customers.

Engineering heritage is still not on the agenda but time will change that. The grain mills and civil works on the river at Chefchaouen (see my article in the previous edition of EHA Magazine) were the only serious attempt to conserve engineering heritage that we saw. This is clearly a society working hard to conserve its ancient built heritage but engineering heritage might just have to wait a bit longer.



Craftsman finishing a copper bowl in the Fez metal-working bazaar.
Photo - Owen Peake

Across the Straits of Gibraltar to Madrid

Back in Madrid we had a few days to explore this Melbourne-like city – it is a charming mixture of old and new on a flat plain with about the same population as Melbourne. There are many parks and gardens and fine art galleries and public buildings.

Not surprisingly I also found plenty of manhole covers.

In a garden named Puerta Felipe IV there was a fine cast iron cover owned by the City Council of Madrid and marked ‘Alumbrado Publico’ (Public Street Lighting) surrounded by a well-tended flower bed of pansies. [At Left.]

Nearby in the Parque del Buen Retiro (roughly equivalent to our botanical gardens) there was a magnificent Victorian Era Summer Pavilion beside a small lake. [See below.]



Back out on the streets of Madrid there were manhole covers for all manner of services. I'm not sure why the natural gas pit cover is clearly in English but it is impressive that someone thought it important enough to paint it a nice dark blue.



Telephone Cover at Left.

Spain has a passionate commitment to maintaining traditional architecture in urban and suburban residential landscapes: each city seems to control both style and colour schemes. Below the ground the services are up to the best European standards – hence all those tell-tale manhole covers.

Owen Peake



Natural Gas above



A typical street scene – Plaza del la Puerta del Sol Madrid.



Sewer Cover at Left



Water Cover at Right

All Photographs on this page by Owen Peake.

Connections

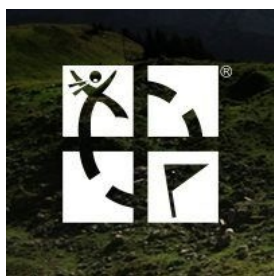
Recognising Sydney's industrial heritage

The City of Sydney commissioned a Heritage Study of Industrial & Warehouse Buildings which was finished in 2014 and is now online. Claudine Loffi, a heritage Planner with CoS wrote (paraphrased): *The listings in the Heritage Study of more than 100 industrial and warehouse buildings across the council area, seek to better acknowledge the value of this under-recognised form of heritage. The study was completed by City Plan Heritage with research by Dr Shirley Fitzgerald and Dr Terry Kass. Alexandria, Rosebery and Surry Hills received the largest number of new listings. From chewing gum manufacturers to World War II shadow factories, stationers, fabric mills, substations and fridge factories, the list of buildings reflect the diversity of City of Sydney's history as a former industrial heartland of Australia.* What can I say? The study is huge, thorough & fascinating, and I wish we had done it. Congratulations CoS. Download it at <http://www.cityofsydney.nsw.gov.au/development/application-guide/heritage-conservation/heritage-studies>

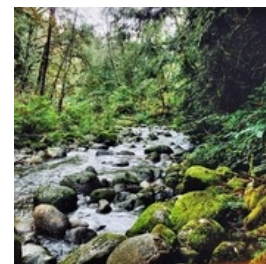


Workmen (and boys) at P.N. Russell & Co., 1874.
Source – State Library of NSW.

Engineering Heritage on Geocache



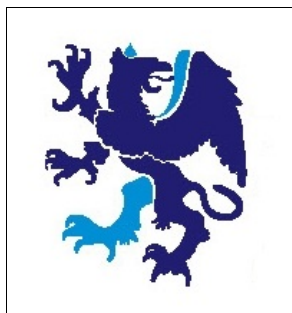
Our EHA Chair drew our attention to GEOCACHING – a sophisticated treasure hunt using GPS and very popular. Find out more about it on <http://geocaching.com.au/> So why should we be interested? Well someone has listed most of our engineering heritage markers around Australia. Edwin / MavEtJu (a Geocache Australia member) has done a pretty comprehensive job, including site descriptions for each Engineering Heritage Landmark within the cache details.



Find the markers on this Google map: <http://geocaching.com.au/my/query/gmap/7459>
And find the list of the EHA Landmarks here: <http://geocaching.com.au/my/query/screen/7459>

Five Thousand Years of Engineering in Five Days!

Newcomen Society Summer Meeting in Dublin



The 2016 Summer Meeting will be held in the wider Dublin area from Monday 11 July to Friday 15 July inclusive. An exciting and informative programme of visits is currently being organised, from the engineering of monuments in Neolithic times through the works of John Rennie in Dublin and Dun Laoghaire (Kingstown), Dublin's Victorian water supply and the development of the Port of Dublin through to leading-edge 21st century technology, together with lots more! Places are limited and booking has already commenced. If you are interested please contact the President, Michael Grace, at: summer_2016@newcomen.com & details will be forwarded to you.

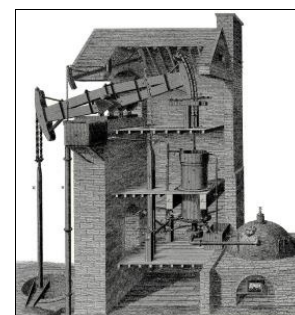
1st International Early Engines Conference

Preliminary Announcement & Call For Papers

The inaugural International Early Engines Conference (**IEEC - 2017**) will be held from 11th to 13th May, 2017. The purpose of the conference is to provide a forum for presentation and discussion of new research into heat engines prior to 1812. The IEEC will be hosted at The Ironworks, Elsecar, South Yorkshire, part of the Elsecar Heritage Centre, home to the preserved 1795 'Great Engine' – the only Newcomen-type atmospheric beam engine in the world to have remained in its original location and recently conserved and reinterpreted thanks to a Heritage Lottery Fund Project steered by Barnsley Museums.

Find out more at: <https://www.earlyengines.org/ieec-2017-conference/>

Like to present a paper? Contact: admin@earlyengines.org before 30th May 2016.



And last but not least – having nothing serious left to contribute – some light entertainment.

A Heath Robinson creation – a nightmare to any engineer! www.youtube.com/embed/wSuH9u0kvhU?rel=0

And a bit of nostalgia for any old Sydneysiders. <http://www.youtube.com/embed/Jy5cZ-IO0Eg?feature=player>

