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## Cover Images:

Front: The Völklingen Ironworks in Germany.  
A UNESCO World Heritage Site.  
Photo: Adrian Visintin.

Back: Poster advertising Ballan's Great Vintage [Machinery] Rally, on 17<sup>th</sup> February 2019. Ballan is close to the Western Freeway, 81 km from Melbourne and 38 km from Ballarat. Just a short Sunday Drive !

This is a free magazine covering stories and news items about industrial and engineering heritage in Australia and elsewhere. It is published online as a down-loadable 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.

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## CONTENTS

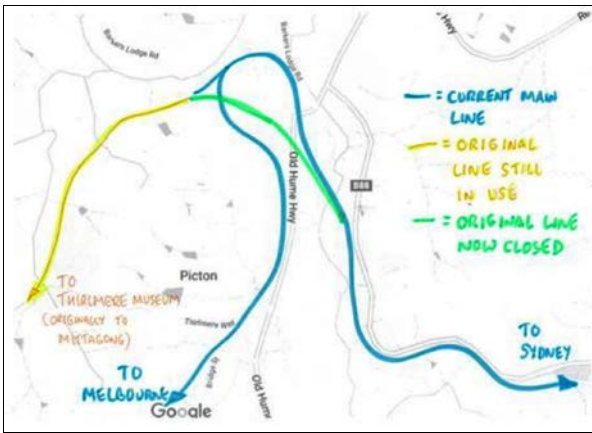
Editorial	3
2020 NZ Australasian Engineering Heritage Conference	4
The Ultimo Tramways Power Station in Sydney	5
Launch of EA Newcastle Div. Oral History Collection	6
Völklingen Ironworks in Saarland, Germany	8
A Foghorn at Sumburgh Heads in the Shetlands	9
More on Manhole Covers	11
Sydney Quarantine Station, North Head	12
Steam Pumping Engine at Lake Boga, Victoria	14
Traegerwellblech	15
Owen & Helen Peake re-visit Iran	21
Book Reviews	24
Novels about Engineers	25
Connections	26
Event Notice – Ballan's Great Vintage Rally, 17 Feb.	28

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# Editorial

I have wondered occasionally whether anyone reads these editorials, but following publication of the September 2018 issue of the magazine, I got proof that at least some readers do. Apropos of Keith Baker's New Zealand railway spiral (p15), I had asked whether the spiral at Picton still existed, and was promptly disabused of the notion that it had ever been a spiral. Bill Phippen gently advised me that the line I thought was a spiral, was not. He explained: . . . *the route is still in use, unchanged since 1919, though it is not a spiral. The line certainly passes through Picton twice at different levels after passing around a more than 180° bend just outside the town, but never crosses itself. It would be better described as a tear drop than a spiral, though the practical intent of the designers is the same, to extend the length over which the inescapable change in elevation is gained or lost.* A few days later, Basil Hancock also sent me an explanation of the Picton phenomenon, along with his nifty little diagram [at left].



Both Phippen and Hancock told me of another (actual) spiral in NSW. Bill's description follows: *There is also a spiral at Cougal on the Uniform Gauge line north of Casino as the 1930-built route to Brisbane climbs into the rugged Border Ranges. Two tunnels and a 'land bridge' are used to form the circular route around a conveniently located hill. The arrangement is simple enough as the route is single-track ...* Hancock sent links to Wikipedia articles about the Cougal Spiral [ [https://en.wikipedia.org/wiki/Cougal\\_Spiral](https://en.wikipedia.org/wiki/Cougal_Spiral) ] and the Bethungra Spiral [ [https://en.wikipedia.org/wiki/Bethungra\\_Spiral](https://en.wikipedia.org/wiki/Bethungra_Spiral) ], and the most interesting (to me), a Wikipedia list of spirals around the world [ [https://en.wikipedia.org/wiki/Spiral\\_\(railway\)#List\\_of\\_spirals](https://en.wikipedia.org/wiki/Spiral_(railway)#List_of_spirals) ].

Another response came from an engineer friend who told me about a spiral she had experienced in the Wild West of Canada. I think she must have meant the Big Hill spiral tunnels (plural!) near Field in British Columbia. There were two good explanatory images on Wikipedia at [https://en.wikipedia.org/wiki/Big\\_Hill#The\\_Spiral\\_Tunnels](https://en.wikipedia.org/wiki/Big_Hill#The_Spiral_Tunnels) – one a 1908 drawing and the other a modern photograph.



The Big Hill Spirals, taken from a Canadian Kodak Company, Toronto, postcard.

At left: Several Canadian Pacific Railway locomotives exiting the Lower Spiral Tunnel. The spirals are about 1100 feet in diameter and trains over 85 cars pass over themselves, as shown here. Photo by David R Spencer, 1986.

That's enough about railway spirals – to do some other catching up, readers may remember Owen Peake's story about engineering in Vietnam in the January 2018 magazine, with a photo of an extraordinary tangle of wires on a power pole, and he wondered: *How the linesmen work out which cable goes where is a deep mystery but it appears that most people get a phone connection and a computer connection somehow.* Mal Rowe wrote to him saying: *I asked the same question of a local engineer a few years back, and his reply makes complete sense of the tangle of cables. He said that no-one tries to trace or repair a connection - they simply run a new cable. !!*

Another subject from September 2018 which earned a response was the Ferguson tractor, in Keith Baker's story *Fergie, the Tractor that Saved a Town*. My UK engineer cousin had a Fergie, but his had a front-end-loader, which he preferred to a scoop. *This did very useful work about the place but it needed a more robust pair of front wheels. It also needed a decent-sized counterweight to be hung from the 3-point linkage. I made one out of concrete which worked well.* That made me wonder how well the Fergie worked with a big load on the back – I don't think Dad had scoop or front-end-loader on his Fergie. I do know about my tractor though, a 4-wheel-drive Fiat built in Romania about 40 years ago. Put a moderately heavy load on the carry-all at the back, and it tended to lift the front wheels. Our son fixed that by bolting a piece of railway rail across the front (a push-bar) with dog-spikes sticking up and spearing heavy lumps of steel as counterweights. It has worked well for a long time, but it just makes me wonder how many tractors have this sort of designed-in structural instability – particularly those top-heavy giants of today. I think they are designed mainly to pull things.



# Engineering in a 2020 World

## The next Australasian Engineering Heritage Conference in Dunedin, New Zealand.

The Engineering New Zealand Otago Heritage chapter is hosting the next Australasian Engineering Heritage Conference in Dunedin between Sunday 22<sup>nd</sup> and Wednesday 25<sup>th</sup> November 2020, preceded by a 3-day pre-conference tour. The conference focus will be on heritage engineering or technology which has endured, undergone development, restoration and re-purposing to claim its place in the future. It's a theme that aligns well with the story of the Otago region of New Zealand.

Situated at the remote southern end of New Zealand, Otago is bordered in the west by the southern Alps and in the east by the Pacific Ocean. Abundant natural resources supported a population of Maori who were joined by small numbers of European sealers and whalers through the early 19th century. Scottish settlers founded the city of Dunedin in the 1840s and in 1861, gold was discovered in Central Otago, fuelling a further influx of migrants, supercharging the region's economy and creating a demand for engineering infrastructure which has not been seen since. Our distance from other manufacturing and industrial centres necessitated both local ingenuity and industrial capacity.

Times change, but some things endure — *Much of our past has a future.*



The 1867 Ross Creek Reservoir & Valve House near Dunedin. Image: Benchill, 23 March 2009, in Wikipedia.

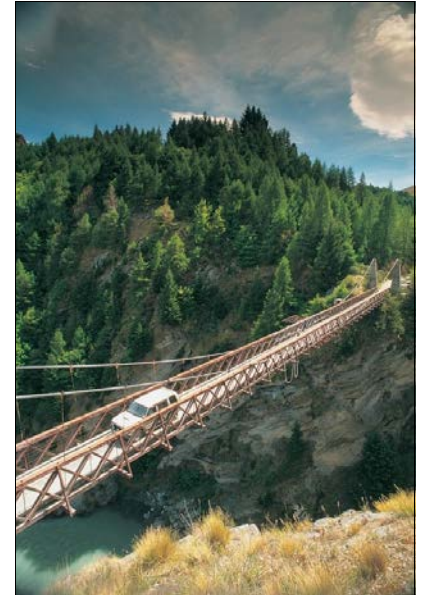


A DeHavilland DH89 "Dominie" from the Museum of the Croydon Aircraft Company at Mandeville. Image: Museum Facebook page.

### The Future of the Past.

This conference theme not only fits our region, it provides a platform for a wide range of papers across the full spectrum of engineering and technological endeavour in what promises to be an engaging and enlightening event.

*This announcement has come from Engineering Heritage New Zealand, who will be the hosts for the conference. Expect more information and a link to a conference website at a later date.* The Editor.



Skippers Canyon Suspension Bridge near Queenstown – 90 metres above the Shotover River. Image: YSander, 2003, in Wikipedia.

Three of New Zealand's largest construction companies were incorporated in Dunedin – two of these well over 100 years ago. The entirely Dunedin-built steamer *Earnslaw* still plies Lake Wakatipu after 106 years of service. A vast network of water races built to provide water for gold now carries the water which irrigates much of the Central Otago farmland, while Dunedin City has just finished the overhaul of a 151-year old water supply dam.

Dunedin's economy is increasingly underpinned by its considerable ICT resource and even this has strong links to the past. A 105-year old Engineering Company has become a world leader in assembly line and meat processing technology.

Once a staging post for exported wool and grain or imported goods, the city's re-purposed warehouse precinct now houses companies creating real-time animations for globally televised sports events such as the Americas Cup or Masters golf, building fine instrumentation for the life sciences, or creating genetics management software for farmers.



The 1872 E-class Fairlie locomotive "Josephine" in the new wing of the Otago Settlers Museum. Image from Expedia.



TSS "Earnslaw", a 1912 twin-screw steamer plying the waters of Lake Wakatipu. Image: Discover Queenstown.



# The Ultimo Tramways Power Station in Sydney, now known as the Powerhouse Museum, or the Museum of Applied Arts & Sciences.

For your information, from the Editor.

The Ultimo Power Station is now almost lost to memory. It was built fronting William Henry St, Ultimo, between Harris Street and the Darling Harbour rail yards, originally to supply 600 volt DC power to the new Sydney electric tram system. Opened in 1899, it was the first major power station to be built anywhere in NSW, and it continued in service until the Sydney tram system was shut down in 1961. At that time, its major buildings were the Boiler House, the Engine Room and Turbine Hall alongside it, the 1926 Switch House extending south beyond the Turbine Hall, and the saw-tooth roofed 1899 Tram Sheds beyond that. Every one of those buildings was in the best industrial architecture style of their time, utilising superb brickwork.

1961 was the year I first came to Sydney. I never noticed the Power Station, although I was in Harris St once, visiting the Technological Museum nearby. I was most unimpressed with that. It appeared to be bulging at the seams, with many exhibits stuffed into a dingy, mouldy basement. I don't think I gave either another thought until the 1980s. In the meantime, all of the Power Station buildings and the Tram Depot remained disused and mouldering away from 1961 until 1978, when someone had the brilliant idea of moving the old Technological Museum's contents down the street to fill those vast halls. Eureka! In August 1979, the NSW Government announced its intention to convert the former Power House and Tram Depot into a new home for the Museum of Applied Arts and Sciences. The complex will contain dynamic displays covering all fields of science, technology and Applied Arts. Quoted from a 1988 NSW PWD book *Ultimo, the Power House, Ultimo the Tram Depot*. (see below).



The back of the Power Station in c.1905, viewed from south-east. The boiler house is on the right, the engine room & Turbine Hall at left. Photo: Powerhouse Museum.



The Powerhouse Museum at Ultimo in 2018. The big white roofs are over the Boilerhouse at top right, 1988 buildings top left, Engine Room below the Turbine Hall, and Tram Shed bottom right. Image from Google Earth

The new museum didn't open until 1988, but the word had got around how great it was going to be. Museum people in the UK were asking about it in 1986! The design of the new museum won the Sulman Medal for architectural merit in 1988, but equally important was the growth and high quality of the collections, now there was room for them to expand. From the day it opened, the Powerhouse Museum was, and remains, one of the most successful museums in Australia, partly because of the importance and attractiveness of its collections and displays, and partly because of the surviving industrial/technological ambience of its historic industrial buildings, but also very largely because of the centrality and convenience of its location.

In 1961 the Power Station location was a dingy industrial area that no-one in their right mind would want to visit unless they had to go to work there. By the time the Museum opened in 1988, its inner city region was rapidly transforming into the premier tourist attraction of Sydney, with Sydney CBD, Darling Harbour, Chinatown, an Entertainment Centre, all close to transport hubs and convenient for country, interstate and overseas visitors and Sydneysiders from all the suburbs – north, south, east and west. Amazingly, it is again on the route of a new, revived tramway. You can hop on a tram at Central Station and be at the Museum in a matter of minutes.

It's hard to imagine why anyone would want to change this situation, but in 2014, someone in power in NSW had what has been described as a thought bubble – the Western Suburbs need more entertainment venues. How about we move the Power House Museum to Parramatta and sell its site in Ultimo for residential towers!! For some reason the idea took hold, and it became State Government policy. It triggered massive opposition – not just in Sydney, but around Australia and even from overseas

– but the NSW Government remained obdurate. In 2017 the *Sydney Morning Herald* put various arguments quite well in: <https://www.smh.com.au/entertainment/whose-idea-was-it-to-move-the-powerhouse-museum-in-the-first-place-20170830-gy74k3.html> Museum staff were reported upset about deficiencies in maintenance caused by the proposed relocation to Parramatta, as in: <https://www.smh.com.au/entertainment/art-and-design/staff-steamed-up-over-idle-damaged-powerhouse-museum-objects-20181030-p50csy.html> Opposition to the move only increases, but the Government is unmoved. The latest news in January 2019 announces an international architectural competition for the design of a cultural precinct in Parramatta, including the relocated Museum. And this only days after an announcement by the Leader of the NSW Opposition that the Powerhouse Museum would not be relocated if the Opposition won the State election in March 2019. We await with interest the resolution of these arguments.

Extracts from the PWD book are in the nomination document for the Ultimo Power House on the EHA Register. Find it at: [https://portal.engineersaustralia.org.au/system/files/engineering-heritage-australia/nomination-title/Ultimo\\_Power\\_House\\_Nomination.pdf](https://portal.engineersaustralia.org.au/system/files/engineering-heritage-australia/nomination-title/Ultimo_Power_House_Nomination.pdf)

And there is plenty more interesting stuff about the proposed move to be found on the Internet.

# Launch of EA Newcastle Division Oral History Collection

## How the Collection evolved, and its publication on the UoN SoundCloud.

By Judy Lindsay

Oral Histories provide a vital thread connecting our past to our present. They are a primary source enabling first hand understanding of why things happened and how they happened. They can be both informative and interesting. From the interviewees' perspective, they are an opportunity to reflect on their career achievements. Engineering has been one of the foundations of Australia's prosperity and a comprehensive Australia-wide oral history library will provide insight into the engineers' role for future historians. Most Engineers Australia (EA) divisions have some oral history recordings but the challenge to date has been to coordinate these and provide accessibility. Newcastle Division of EA believes it has found a solution.

The launch of the Newcastle Division Oral History Collection was held Monday 15 October 2018 at the Newcastle Division office. The collection of over 60 recorded interviews and associated photos and film, summary logs and documents is now stored with the University of Newcastle Living Histories Cultural Collection.

Most importantly, the digitised interviews for the Newcastle Division are accessible to the wider community through a SoundCloud platform. They are grouped in 5 main themes – Academia, Consulting, Manufacturing, Infrastructure and Services, and Earthquake (Newcastle – 1989 event).



Launch of the EA Newcastle Division Oral History Collection on the Uni. of Newcastle SoundCloud, Oct. 2018. L to R: Jessica Waugh (student), Patrick Lindus (student), Merv Lindsay (Chair EHA Newcastle Division committee), Dr Ann Hardy (UON), Judy Lindsay (EA National Coordinator Oral History).

The interviews have been collected over the past 20 years with the first conducted in 1998 with Zihni Buzo. I first met him in 1998 when I travelled to Armidale for an engineers' function. My first impression of him was of a charming, intelligent and very proud engineer. He aroused my interest in his working life. I was currently studying history at university and had an interest in engineering and its social context. Having just offered to help out with the oral history programme, which was then starting in the Newcastle Division of EA, I suggested that Zihni might be a very good subject for the first interview.



Zihni Buzo, circa 2000.

So we arranged to meet and I interviewed him at his home in Dangar Street, Armidale. The interview was loosely structured on a life history approach, but I did find it very hard to concentrate on his engineering life. I listened to the interview not so long ago and I realised how little I knew about engineering matters then. But I think the interview does show the very rich tapestry of his background. He had an outstanding education – he was educated in Turkey, where he won a scholarship. Then he went to Harvard University and fast tracked all those wonderful educational opportunities. Unexpected opportunities came his way, which he just seemed to grasp, and he really made the most of them. He had a very passionate and positive approach to many of life's challenges.

Early in his career, between the two World Wars, he worked on water supply projects in Albania and Greece. He talked a lot about environmental consequences back at a time when many people did not give much thought to the environment. He also talked about his migration to Australia, finding work here, his appointment to the Oaky River Hydro Electric Scheme project in northern NSW. Following its completion, he worked in over 40 different countries for the World Health Organisation. He had an outstanding career as an engineer.



## *Engineers Australia Newcastle Division Oral History Collection*

During Zihni Buzo's interview he alluded to 16 mm film footage that he had taken of the Oaky River Dam project from start to finish. While the interview doesn't discuss very much detail of the engineering matters, I think Zihni thought the footage would tell the story of that construction. Following his death in 2006 all the footage was gathered and with the cooperation of the Armidale Historical Society, we procured the assistance of the National Film and Sound Archives in adding the footage to their archives and providing us with a digitised format copy, including brief notes of its contents.

The Oaky River Dam that Zihni built was constructed in the 1950s. It was finished in 1956 and was opened by the Hon. J.C. Renshaw, MLA, NSW Minister for Local Government and Highways. Zihni was recognised for his contribution to our society with an OAM in 1991. Apart from his significant work as an engineer, he had assisted many migrants from his homeland in Albania to settle in this country. I must stress that he was a very humble man, and he placed the greatest value on his award of an Honorary Fellowship from Engineers Australia. As he said, the recognition of one's peers is the greatest honour.

A professionally produced film resulted from the footage that Zihni took of the dam construction and his life in Armidale. It does have some engineering facets from the interview audio but it is a mix that encapsulates a whole range of things in his life – his family, life in Armidale in the 1950s, methods used in construction work, OH&S issues, the way people dressed and relaxed. The film was premiered at the EHA national conference in Newcastle in 2015. It is a really lovely film that encapsulates Zihni's life and can be viewed on the UoN SoundCloud, together with the 1998 interview.

In the collection, there is another migrant engineer, Charles Resevsky. Born in Latvia 1934, his interview recounts his early years during the occupation by Russia and Germany and the need for the family to leave there in 1941 due to his father's risky position in the Ministry. The family went to Austria and Charles recounts the period after World War 2 during the American occupation. Finally his family migrated to Australia in 1949, living in a migrant camp at Greta, NSW. He attended high school at Maitland and discusses the challenges of learning English. Despite this difficulty, he was dux of the school and won a commonwealth scholarship!

Charles Resevsky undertook an apprenticeship at BHP, then worked at Rylands (steel products manufacturing) and converted his mechanical engineer qualifications to civil engineering. He next worked in Research and Development at Lysaghts (Steel sheet products manufacturers) and undertook a masters degree. During the early 1970s he established his own consulting practice and his interview explains the projects he was involved in. Charles provides an insight into the differences between architecture and engineering and why he chose engineering given the influence of his father who had worked as an architectural draftsman. Typical of that era, his father's qualifications were not recognised in Australia and he worked as a labourer. Clearly Charles derived much satisfaction from his work and defines engineering as a 'creative pursuit'. The 1989 Newcastle earthquake impacted on his business and it is interesting to hear his account of that event. This is very much a migrant success story and his contribution to the profession was significant.

The collection includes interviews with several past EA national presidents, with one being Dr Bruce Sinclair (AO). Bruce was the founder of one of Australia's largest consulting firms and his story illuminates a man of great intelligence, charisma and integrity. The story of the evolution of Sinclair Knight as it was known, is fascinating, touching on significant projects in Australia's development. In his early years as an engineer, Bruce worked on a part of the Snowy Hydro Scheme, a section under the management of the Public Works Department alongside the rest of the construction under the management of Sir William Hudson. When one listens to the interview, there is a sense of the era coming through as well as an inkling of the personalities of key players in that project.

Manufacturing features largely in the collection and it is no surprise when one considers the importance of BHP and associated heavy industries of the past 100 years in Newcastle. With the demise of heavy industry in Newcastle, it is interesting to listen to interviews with people such as the Honourable John Price, former MLA and past engineering manager of Newcastle Dockyard, who recounts the difficulties and challenges that needed to be overcome for the workforce and for the region.

Further interviews are still being undertaken in the Newcastle Division and they will all be added to the SoundCloud platform. This has been an outstanding collaboration with the University archive department. The process has gone hand in hand with the university engaging students to assist with the various tasks required to digitise the recordings, loading them onto the platform while ensuring the release documents and any requirements of the interviewees are addressed. This experience will aid in employability by providing learning of skills. The university is aided in this project with some funding from the Vera Deacon Regional History Fund enabling students to work both in a voluntary capacity and with some paid time.

The address for the UoN SoundCloud is: <https://livinghistories.newcastle.edu.au/nodes/view/69094>

I strongly encourage anyone reading this article to access this site. There is provision for comments to be made on the accompanying blog through the administrator of the site at the university.

*Judy Lindsay- Affil MIEAust,  
EA National Coordinator Oral History.*

# Völklingen Ironworks in Saarland, Germany.

A UNESCO World Heritage Cultural Site

From the Editor.

Recently my partner received an email from a friend, with a set of extraordinary photographs attached – of a disused iron works in Germany, still amazingly intact and, since 1994, a UNESCO World Heritage site. How could that have happened? In Australia such places get demolished as soon as possible – that is even dictated in planning law. In NSW, “rehabilitating” a disused coal mining site means everything must be bulldozed into oblivion, leaving only the bare earth behind. No trace of former structure or history may survive.

The photographer, Adrian Visintin, wrote to our friend:

*Then I went and visited the Völklingen Ironworks in south western Germany which in its time would have been a horrible, dusty and heavily polluted place but now 30 years after being closed down it's a UNESCO heritage site for industrial culture, basically an open air museum and in some places nature is returning bringing flowers and green to the harsh industrial atmosphere.*



Völklingen Ironworks.

Photo: Adrian Visintin



Völklingen Ironworks.

Photo: Adrian Visintin

From Wikipedia: *The Völklingen Ironworks (German: Völklinger Hütte) is located in the German town of Völklingen, Saarland. In 1994, it was declared by UNESCO as a World Heritage site. It is an anchor point of the European Route of Industrial Heritage (ERIH). In 1873, Julius Buch began planning of a steel works near Völklingen on the banks of the Saar River. However, this planned work was not completed. In 1881, Carl Röchling began new construction. Two years later the first smelter began operation.*

I realised, when I looked the place up, that we must have driven close past it many times, in 1986 when the plant closed, and in 1992 when we were cruising round that area again. In Australian terms, it's a short Sunday drive from Frankfurt, Luxembourg, Strasbourg, Dusseldorf. We were searching for industrial heritage, but we never knew it was there.

page for the Ironworks [at <https://whc.unesco.org/en/list/687>], I have extracted a few short passages from the Description, or as we would call it, Statement of Heritage Significance.

“The laws and regulations of the Federal Republic of Germany and the State of Saarland guarantee the consistent protection of Völklingen Ironworks. It has been a cultural monument under the act on the Protection and Care of Monuments since 1987.

“The ironworks, which cover some 6 ha, dominate the city of Völklingen. Although they have recently gone out of production, they are the only intact example, in the whole of western Europe and North America, of an integrated ironworks that was built and equipped in the 19th and 20th centuries and has remained intact.



Völklingen Ironworks.

Photo: Adrian Visintin



Völklingen Ironworks. Photo: Adrian Visintin

“The Outstanding Universal Value of the Völklingen Ironworks lies in its unique completeness and originality. Technological milestones such as the dry gas purification plant, which was the first of its kind on such a large scale, the suspended conveyor system (the largest of its type), and the pioneer sinter plant are all integral parts of a complex 19th and 20th century pig-iron production works concentrated in a small area. The installations are exactly as they were when production ceased in 1986. The overall appearance is that of an ironworks from the 1930s, since no new installations were added after the rebuilding of the coking plant in 1935.”

What an inspiring place – why can't we do something like that with our disused industrial monuments? It's not as if we haven't any space to spare in this country. Sometimes, one or two token buildings are left on a site, but almost always they are thoroughly stripped of any vestiges of their industrial past, as though that was something shameful. We should learn from Germany!

The Editor



# Sumburgh Head Lighthouse & Foghorn in the Shetlands.

From Michael Clarke



Left:  
Sumburgh Head Lighthouse and  
Foghorn – right rear of the photograph  
– with the Visitor Centre and Education  
Centre in the foreground.

Image: Frank Bradford –  
from the Education Centre website.

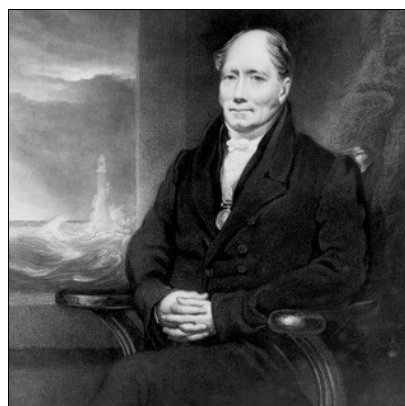
Below:  
Signage at the entrance to Sumburgh  
Head Visitors' Centre.

Image: Juliet Ward.

Another milestone in heritage conservation and recognition was reached on 30<sup>th</sup> September 2016 when the restored Sumburgh Head foghorn on the Shetland mainland received an Engineering Heritage Award from the UK Institution of Mechanical Engineers (IMEchE). The Foghorn is located close by the Sumburgh Head Lighthouse.

In comparison with the 35 metre high Bell Rock lighthouse completed by Robert Stevenson in 1810, 18km off the Scottish coast, Stevenson's 1821 Sumburgh Head lighthouse on the southern tip of Shetland mainland is a modest structure. It is a cylindrical tower 17 metres high with balcony and lantern. Its light has a range of 23 nautical miles (43 km).

*From 1906 to 1987 there was a foghorn which is traversable in azimuth. This replaced a bell which had been presented after the loss of the 'Royal Victoria' in 1864. The foghorn at Sumburgh Head last sounded in 1987 - before the light was automated in 1991. The light is now operated remotely from the Northern Lighthouse Board offices in Edinburgh.<sup>1</sup>*

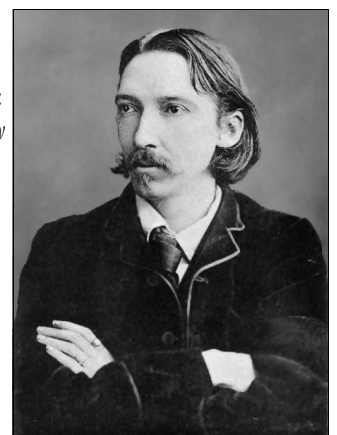


Robert Stevenson — Lighthouse Builder.

The Stevenson family tradition of lighthouse building, began with Robert Stevenson. *Between 1790 and 1940, eight members of the Stevenson family planned, designed and constructed the ninety-seven manned lighthouses that still speckle the Scottish coast, working in conditions and places that would be daunting even for modern engineers.<sup>2</sup>*

Four of those eight Stevensons were the ancestors of Robert Louis Stevenson (RLS), the famous writer. He wrote: *Whenever I smell salt water, I know I am not far from the works of my ancestors. The Bell Rock stands monument for my grandfather, the Skerry V'hor for my Uncle Alan; and when the lights come out at sundown along the shores of Scotland, I am proud to think they burn more brightly for the genius of my father.<sup>3</sup>*

Bella Bathurst wrote: *The Lighthouse Stevensons, as they became known, were also responsible for a slew of inventions in both construction and optics and for an extraordinary series of developments in architecture, design and mechanics. As well as lighthouses, they built harbours, roads, railways, docks and canals in Scotland and beyond. They, as much as anyone, are responsible for their country's appearance today.*



Robert Louis Stevenson —  
grandson of the Lighthouse Builder.

Restoration and repair of the Sumburgh Head Foghorn, Lighthouse and buildings was carried out under the Shetland Amenity Trust between 2012 and 2014. The award was presented by Bill Edgar, past President of IMechE, to John Mackenzie of the Shetland Amenity Trust, and to Brian Johnson who was responsible for the repair and restoration of the foghorn itself during the wider restoration works on the site. Brian worked for many years as an occasional keeper and lighthouse engineer for the Northern Lighthouse Board, he joined the Shetland Amenity Trust in 2007 and although now retired, he still keeps the foghorn operational. . . .<sup>4</sup>

1 [https://en.wikipedia.org/wiki/Sumburgh\\_Head\\_Lighthouse](https://en.wikipedia.org/wiki/Sumburgh_Head_Lighthouse)

2 Bella Bathurst, *The Lighthouse Stevensons*, HarperCollins, (1999).

3 ibid. and [https://en.wikipedia.org/wiki/Portal:Lighthouses/Selected\\_quote](https://en.wikipedia.org/wiki/Portal:Lighthouses/Selected_quote) both attributed to R.L. Stevenson in 1880, without original source.

4 <http://www.imeche.org/news/news-article/past-president-bill-edgar-presents-heritage-award-to-shetland's-sumburgh-head-foghorn>

## Sumburgh Head Lighthouse & Foghorn in the Shetlands.

Although foghorns are now obsolete in modern shipping, they played a very important part in the history of maritime safety. The sound of the Sumburgh Foghorn is powered by low pressure compressed air, generated by compressors driven by the three engines in the Engine Room. The blast is controlled by an air driven clockwork mechanism which operates valves in the correct sequence and at the correct time to spin a siren rotor, housed within the siren chest. At the right time, a cam operates a valve which causes air to lift a diaphragm valve allowing the full flow of air to pass through the siren – rotating at 1200rpm – thus creating the ‘blast’ noise for the seven second period, then closing the diaphragm valve to stop the sound. The sound is amplified by the trumpet on top of the tower and in the case of Sumburgh Head, this can be heard as far away as Fair Isle, some 37 miles away.



The Foghorn, before and after repair & restoration.  
Images from IMechE website.

The foghorn at Sumburgh Head last sounded in 1987, just before the automation of the Lighthouse Tower and the last Keeper left his post in 1991. The light is now operated remotely from the Northern Lighthouse Board offices in Edinburgh. Following extensive repair and restoration, on Thursday 15 January 2015, the final stage of testing was carried out on the Sumburgh foghorn. After previous ‘silent’ tests where air was passed through the horn with no sound, the motor was engaged and the horn sounded out over the sea for the first time in 28 years.<sup>5</sup>



The Sumburgh Head website tells us it is: *A World Class Visitor Attraction in Shetland, . . . an imposing and prominent spur of rock at the*

*southernmost point of mainland Shetland, where the Atlantic meets the North Sea.*

*. . . The Foghorn was built in 1905 and was first operational in 1906. The Northern Lighthouse Board holds the original plans for the structure, signed by D. A. Stevenson. The [foghorn] system is powered by compressed air generated by Alley & MacLellan compressors, driven by three Diesel Kelvin K Series engines in the Engine Room – these replaced the original Crosley engines in 1952. The “character” of the Sumburgh Head Foghorn is one seven second blast every 90 seconds. This was to distinguish it from other fog signals in the area. . . . The engines are set at a speed which allows them to generate the correct amount of air during the silent period to be ready for the next blast. This air is stored in the three receivers in the engine room. The air pressure required is 25psi before the blast, dropping to 15psi during the blast.*

*Originally there were eight air receivers, but three were removed during automation of the station. The two external receivers at the base of the foghorn tower are unusable owing to corrosion and have been blanked out for safety. The system has been amended to operate on the remaining three receivers located in the Engine Room which are in good sound order and have been proof tested. . . . The sound from the foghorn echoed out to sea, sending a real thrill of excitement through those present, as the thunderous noise could be felt as well as heard!<sup>6</sup>*

This story was prompted by my receipt of two images [reproduced above and at right, with acknowledgement] sent to me by Martin Thomas AM. These had been sent to him by his daughter Juliet Ward who had visited Shetland on holiday. They caught my interest, but having only the two photographs to go on, I have derived most of the information in this story from the internet. I acknowledge my debt to IMechE, to the Sumburgh Head Lighthouse Visitor Centre & Nature Reserve and to Bella Bathurst, the author of *The Lighthouse Stevensons*.

Martin Thomas AM was National President of Engineers Australia in 1992 and unveiled the National Engineering Landmark plaques awarded to Pyrmont Bridge in Sydney, and the Great Zig Zag in the NSW Blue Mountains, and the Engineering Heritage Marker plaque awarded to Lithgow Blast Furnace in NSW.

Under ‘Sumburgh Head foghorn’ on the Internet, there are quite a few related links and images including <https://www.sumburghhead.com/foghorn> which includes a video clip of the award ceremony, the noisy compressors generating compressed air, and the horn itself, blasting its warning to shipping.

*Michael Clarke, B.E.  
Engineering Heritage Sydney Division.*



Foghorn at Sumburgh Head – Photo by Juliet Ward.

5 <http://www.imeche.org/news/news-article/past-president-bill-edgar-presents-heritage-award-to-shetland's-sumburgh-head-foghorn>

6 <https://www.sumburghhead.com/sumburgh-head-foghorn-sounds-again>



# More on Manhole Covers

The April 2016 issue of EHA Magazine carried a story of mine on manhole covers in Morocco and Spain.

This might have started something?

Later, I received an email from Wollongong EHA enthusiast Doug Boleyn with an image of a magnificent manhole cover in Budapest, Hungary taken in August 2016.

When I was talking to our Editor about this subject she offered some further images of yet more manhole covers, these ones in Germany.

What astounds me is the amount of first class graphic design which goes into many of these covers.

The graphics and the iron-casters art suggest high levels of civic pride.

These might be common or garden examples of city infrastructure but they tell the story of the hidden services, of which we give so little thought, as we walk the streets of the cities of the world.

*By Owen Peake*

## A few words about these covers from the Editor

**Hamburg** – A castle with three towers on the coat of arms of the

*Free and Hanseatic City of Hamburg*



HAMBURG – Germany

Photo: M Doring.



BRAUNSCHWEIG – Germany

Photo: M Doring.

**Braunschweig** – (or Brunswick) This cover was made by Gebrüder Schreitell, a foundry started in Salzgitter by brothers Wilhelm and Waldemar in 1946. The City coat of arms here is a lion rampant with tail curled over his back, stylized for the City Waterworks.

**Bochum** – This covers a hydrant of the Bochum Waterworks. It was made by Bopp & Reuther, of Mannheim and the company was started by Carl Bopp & Carl Reuther in 1872. The oval shape of the cover is unusual and is possibly related to the company's well known invention of the Oval Wheel Meter Principle (look it up!).



BOCHUM – Germany

Photo: M Doring.

**Wuppertal** – This one was outside the terminus station of the Suspension Monorail, but it may have belonged to something in the street outside. The four triangular shaped cover panels are also unusual. The utilitarian design lacks any decoration, but it had some sort of impressed badges on the far triangles, so small as to be indecipherable.



WUPPERTAL – Germany

Photo: M Doring.

**Budapest** – The main text says Main Channel Works ZRT, Budapest.



There are other numbers and letters and the word Hydrotec around the rim. The number 2011 (just visible in the full size image, at the base of the outer ring) may

be the date of manufacture. The coat of arms dates from 1873, when the cities of Buda and Pest, on either side of the Danube, were joined as one city. The shield is supported by a standing Lion on the left and a winged Griffin on the right, and surmounted by the Hungarian crown (with its crooked cross). The shield contains the single tower of Pest at top, and the three towers of Buda underneath, with a wavy band representing the River Danube in between.

BUDAPEST – Hungary

Photo: Doug Boleyn.



# Sydney Quarantine Station, North Head.

By Keith Baker.

Readers may recall that in the July 2017 issue of the EHA Magazine, I wrote a story about the historic Quarantine Station at Point Nepean, Victoria. I was taken with the way passengers from England were detained and their luggage fumigated more than a century ago. I was aware that a somewhat similar quarantine facility existed in Sydney, and last year I had the opportunity to visit it while staying in the adjoining suburb of Manly.



The wharf area of the former Quarantine Station, with narrow gauge rails from the Luggage Store (now the Visitors Centre) to the Disinfecting Block and Boiler House (now a Restaurant) beyond. Note the Boiler House chimney still survives. Image: Judy Baker.

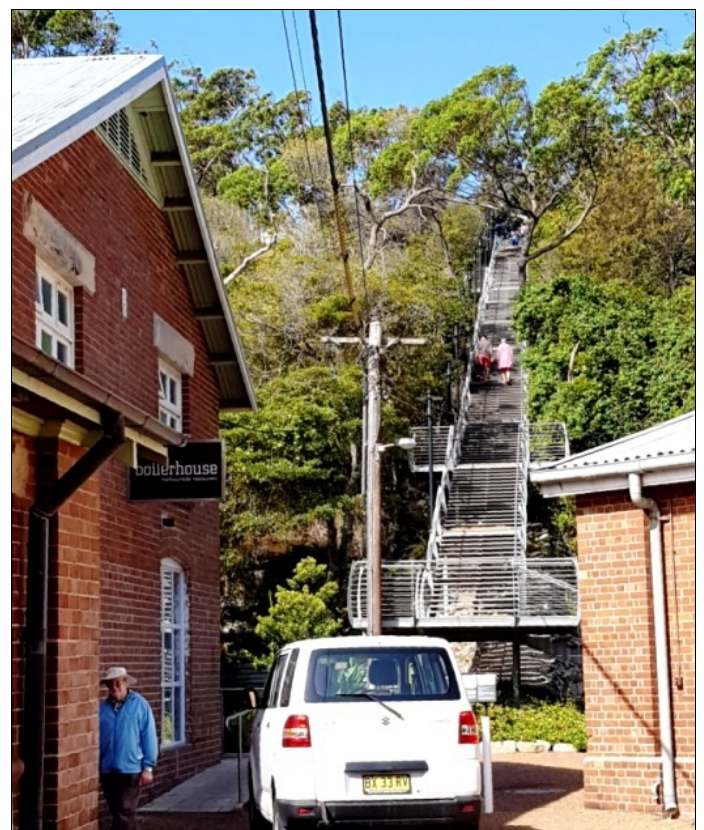
Comparative analysis can be an important aspect in determining the significance of an engineering work. While this was a quick comparison and not a formal analysis, I was struck with both the similarities and the difference of the two sites which had started independently to meet a common need in separate colonies to protect their citizens from epidemics which often developed on long sea voyages.

The first impression was that the accommodation for formerly quarantined residents was much more spread out than at Point Nepean, over a steeply sloping site and a larger timbered area. It is now being commercially used as the Accor Q Station Hotel, whereas the Point Nepean accommodation is open for interpreted inspection.

Minibuses provide transport around the Sydney site. A steep slope between the centre of the former accommodation and the former disinfection area on a small flat area by the waterside is traversed by a long stairway. This stair is a recent replacement for the funicular which would have hauled luggage, after decontamination, up to the residents' place of temporarily enforced abode. Nothing of the funicular remained but a photo display of this earlier mode of transport.

There was much more similarity between the two sites in the facilities on the flat area by the wharf. Consisting of a luggage store (now museum and café), luggage fumigation area, shower blocks and boiler house (now a restaurant), they were in a more compact configuration to suit the site. The similarity here was to be expected since both sites came under Commonwealth control in 1907 and the Sydney fumigation equipment dated from after that period, presumably based on the design and experience gained in Victoria. In this regard, similar narrow gauge trolleys were used for handling luggage, but they cleverly allowed shunting of loaded trolleys side by side while awaiting their turn to enter the fumigation chambers, by making use of cross rails.

Right: The Funicular Stairway starting past the Boiler House. Image: Judy Baker.





## Sydney Quarantine Station, North Head.



Autoclaves in the Disinfestation Block, in use from 1917 to 1974. Note the movable rails allowing longitudinal and transverse movement of multiple luggage trolleys through either autoclave from where they were parked. Image: Judy Baker.

The twin autoclave chambers were similar to the rectangular one of the two existing in Victoria, but they didn't allow the visitor as close an inspection and walk through, or any better information about their operation.



The Brick Shower Block with an elevated Tank Room. Image: Judy Baker.

The configuration of showering facilities allowed a more compact footprint than the bath houses of some decades earlier in Victoria, while maintaining the principle of a dirty entry and clean exit on respective sides of the shower cubicles.

Partitions were corrugated iron rather than brick, and the building was open to allow visitors to walk through rather than imagine the arrangement from outside. Interpretation of this area was clear, allowing a superior visitor experience of this aspect of the quarantine process.

An interesting feature that had been preserved was the graffiti carved into the sandstone wall by seamen and passengers with time on their hands.

See image below, by Judy Baker.



Interior of the 1913 Shower Block, with an interpretive panel indicating disinfection of passengers with hot water and carbolic acid. Image: Judy Baker.



On the whole I was pleased to see the extent of historical preservation on a site that has become a commercial hotel within the Sydney Harbour National Park, with sufficient interpretation and public access to allow visitors as well as hotel residents to gain a good appreciation of the history of the place.



# Steam Pumping Engine at Lake Boga, Victoria.

By Owen Peake.



Lake Boga glistens in the afternoon sun. Quiet now, the roar of large aero engines is long gone from the days when this was a main maintenance and repair base for flying boats of the RAAF and Allied air forces and navies. The steam pumping engine of this story is just behind the camera position. Image: O.Peake.

On the way back from the October 2017 EHA Conference in Mildura we passed through the little town of Lake Boga, about 15 km south of Swan Hill in northern Victoria. Lake Boga is most famous for its World War II Flying Boat Maintenance Base. My father trained here on Catalina Flying Boats before going to Darwin and ‘The Islands’.

The Lake Boga Flying Boat Museum is just along the lake-shore from another roadside feature at the edge of town – a large steam pumping engine formerly used in local irrigation works. The engine was manufactured by Thompsons of Castlemaine in 1903 and installed at Long Lake, just west of Lake Boga, in the same year.

The pumping engine was transferred to the Cannie Ridge pumping station in 1926. There it provided irrigation water to somewhat higher ground. The name Cannie Ridge seems to have disappeared from maps however Cannie remains, 37 km south west of Lake Boga. Cannie lies near the watershed of the Avoca River to the east and Lake Lalbert and Lalbert Creek to the west, so the old name of Cannie Ridge still seems appropriate. Mind you the country in the area is very flat so watersheds are hard to pick. The steam pumping plant was operated at Cannie Ridge until 1952 when it was replaced by diesel pumping plant.

In 1955, the Victorian State Rivers and Water Supply Commission donated the steam pumping engine to Lake Boga, and, with the support of local citizens and its makers, Thompsons of Castlemaine, it was re-erected on its present lakeside site, to serve as an historic marker of the earlier days of irrigation in the area.

The engine is of quite conventional layout with no particular engineering features. It is a compound engine (live steam from the boiler goes to a high pressure cylinder then to a low pressure cylinder and finally to a condenser). This arrangement obtains the

best efficiency from the steam. The engine was controlled by the excellent Corliss valve gear which gave more precise valve movements than other valve gear designs and hence higher engine efficiency.

Two parallel sets of crank, con rod, piston rod, steam cylinders (all blue) and pump (green) are mounted with one set each side of the flywheel, in what is generally termed a “cross compound” configuration. The boiler was wood-fired and produced steam at 150 pounds per square inch (1000 kPa). This engine had an output of 75 horsepower (56 kW) at 52 revolutions per minute and could deliver 14 megalitres of water per day. The flywheel is 15 feet (4.6 metres) in diameter and the whole engine is 36 feet (11 metres) long.

The engine is generally called the Cannie Ridge pumping engine after the pumping station where it spent a large part of its working life. It is listed on the Victorian Heritage Database as classified by the National Trust (Victoria) and it is also on the local council Heritage Overlay Schedule as an item of local significance, but there is no descriptive material included with the listings, with the exception of a single image in the National Trust database.



The Cannie Ridge Pumping engine in its shed on the shores of Lake Boga, which can be glimpsed in the background. Image: O. Peake.

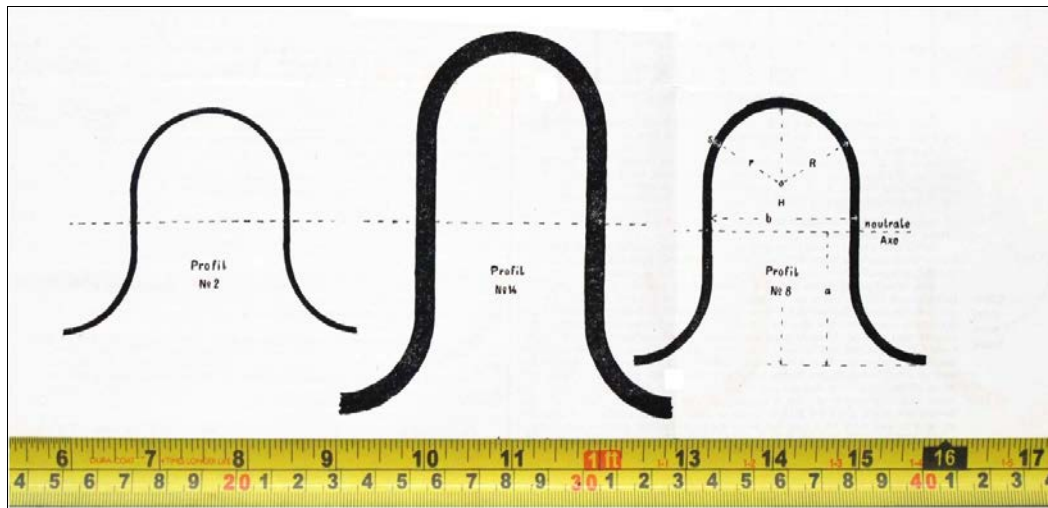


Image (left): Detail of the Cannie Ridge Engine showing the two pumps. Image: O. Peake.



Traegerwellblech, though little recognised, was a common building material in eastern Australia in the late nineteenth century. It is also remarkable in that it reached the colonies very soon after its invention in Germany but remained unknown in Britain and the USA, which were the sources for most building innovations in the colonies.

A heavy form of corrugated iron suitable for bearing loads seems to have been developed in Belgium by the 1870s, and used for bridge construction, but it was not strong enough to be cost-efficient because the corrugations were not deep enough.<sup>1</sup> The idea was then improved upon by Hein Lehmann & Co of Berlin. It seems that this partnership was established by 1875, but our first information about it is in 1878, when a tradesman, Max Hein, and an engineer, Anton Lehmann, were operating a factory for corrugated iron sheets in Berlin-Reinikendorf.<sup>2</sup>



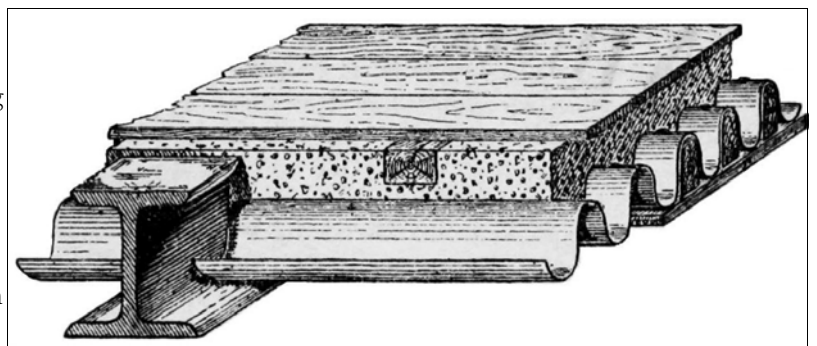
Traegerwellblech corrugation profiles: Hein, Lehmann & Co, Bau-Insalt für Eisen Constructionen ...Trägerwellblech [6 page tabloid size brochure, with numerous illustrations] (Hein, Lehmann & Co, Berlin no date [after 1878]), p 1: Miles Lewis collection.

The partners invented a machine for corrugating iron plate while cold, and henceforward the material was known by the German name 'Traegerwellblech',<sup>3</sup> the literal translation of which is 'the weight carrying deeply corrugated plate' or 'bearing corrugated iron'.<sup>4</sup> Whereas the section of conventional corrugated iron approaches the form of a sine curve, in Traegerwellblech the tops and bases of the corrugations are semicircular, and they are linked by vertical webs, though this is readily apparent only in the deeper forms. In some cases, but not all, the plates were also exceptionally thick.

In 1875 the Kaiserhof Hotel in Berlin was burnt, and the arched brick flooring performed badly in the fire. The *Zeitschrift für Bauwesen*, the journal of architecture and civil engineering issued by the Minister of Public Works, said:

The opportunity thus afforded for exhibiting Traegerwellblech in the dual character as a fireproof medium and as a bearing construction for the massive walls, seems to point to the probability of the usefulness of this material to purposes in the architectural [field], and its application can be highly recommended.

Traegerwellblech was extensively used in the rebuilding of the hotel, which was completed by 1877, for landings, staircases, partition walls &c.<sup>5</sup> It was thenceforward used generally in Germany, especially for the fire curtains of theatres, and the Dutch government ordered gatekeepers' cottages made of it for their colonies. The fire curtains became universal in German theatres and one Seipp, of Berlin, specialised in their construction.



Traegerwellblech used in flooring: Hein, Lehmann & Co, Bau-Insalt für Eisen Constructionen ...Trägerwellblech (Hein, Lehmann & Co, Berlin no date [after 1878]), p 2: [See a description on the next page.] From the Miles Lewis collection.

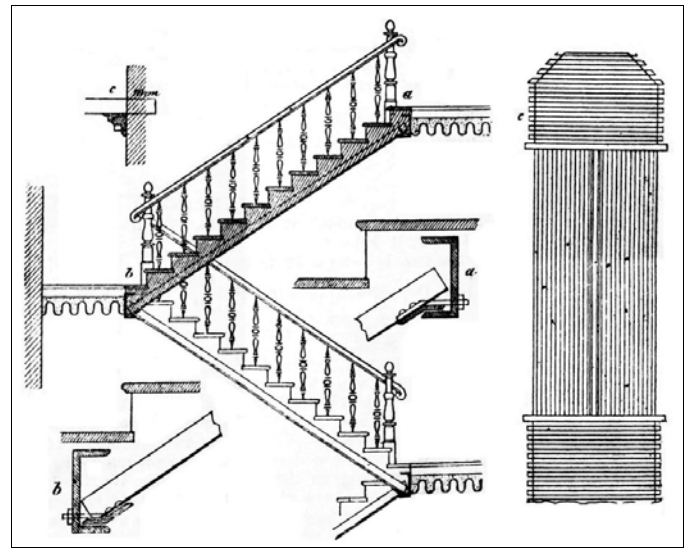
1 Peter Behrendt, *Modern Fireproof and Watertight Building Materials: Traegerwellblech and Asphalt*, Royal Society of Victoria, *Transactions and Proceedings*, vol xx (Royal Society, Melbourne 1884), p 80.  
2 Hein Lehmann site <https://www.heinlehmann.de/en/unternehmen/history> accessed 27 April 2016.  
3 Peter Behrendt, *Modern Fireproof and Watertight Building Materials* (Melbourne 1883: originally read to the Royal Society of Victoria, 10 May 1883), pp 1-2.  
4 *Australasian Builder & Contractor's News*, 6 July 1887, p 133; 27 August 1887, p 251.  
5 Behrendt, *Fireproof and Watertight Building Materials*, pp 1-2, quoting the *Zeitschrift für Bauwesen*, 1877, p 160.



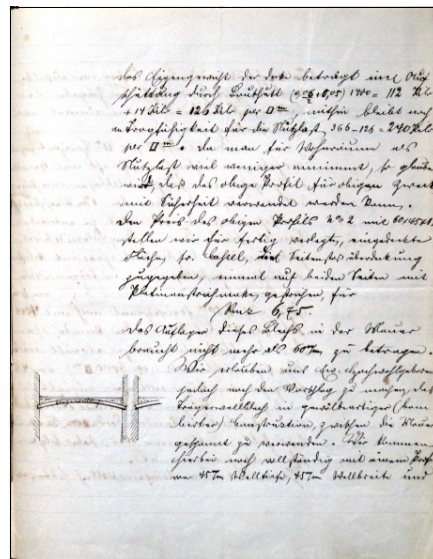
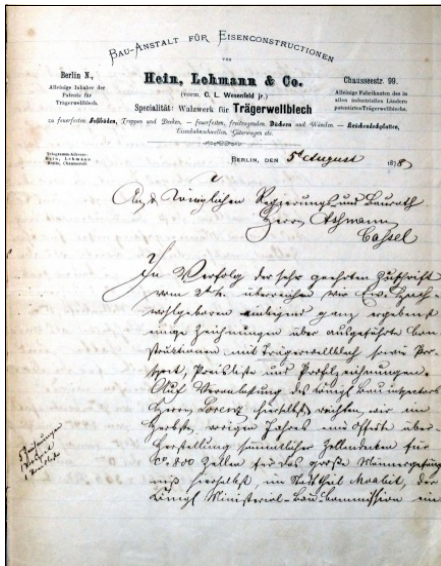
# Traegerwellblech

There seems to have been a change in the company's direction in about 1878, as indicated by a surviving file of correspondence and trade literature derived from Hein Lehmann & Co and the linked company of Jacob Hilgers.<sup>6</sup>

One of the designs now published shows flooring consisting of corrugated sheets resting on the lower flanges of iron joists, and carrying a layer of concrete sufficiently deep to just bury the tops of the joists. A timber floor is built into and over the concrete, and some unspecified sheeting covers the underside of the structure. This differs very little from earlier British fireproofing systems such as Cheyne's and Cooper's, both of which derive in turn from Fox and Barrett's system. A staircase supported on Traegerwellblech is also illustrated.

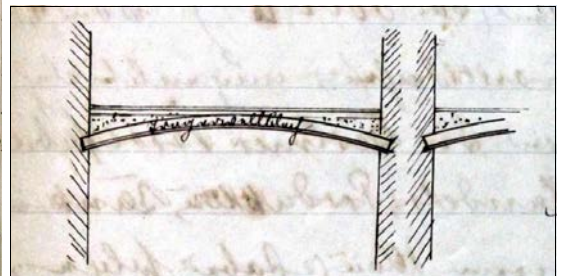


Staircase supported on traegerwellblech: Hein, Lehmann & Co, Bau-Insalt für Eisen Constructionen ...Trägerwellblech (Hein, Lehmann & Co, Berlin no date [after 1878]), p 3: Miles Lewis collection [reformatted].

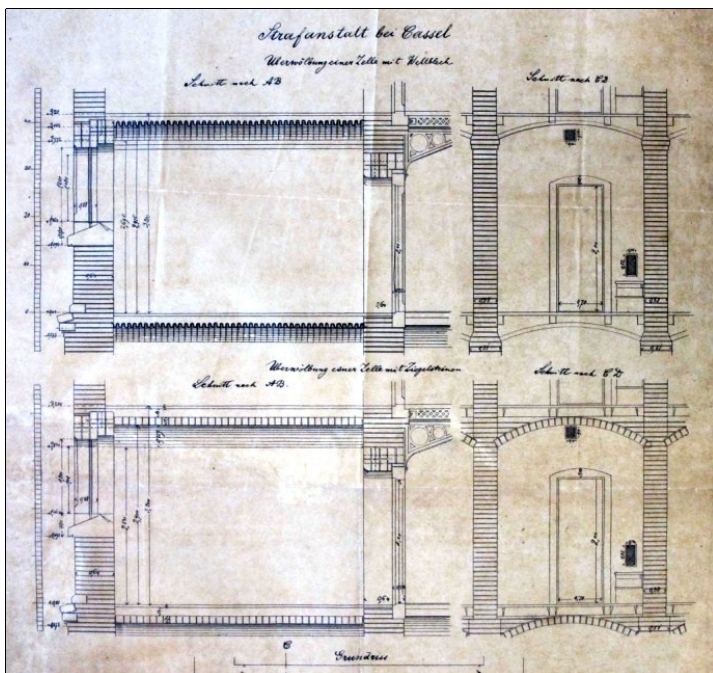


Pages 1 (left) & 2 (right) of a 7 page letter from Hein Lehmann & Co to an unknown recipient at Cassel, 5 Aug. 1878. Miles Lewis collection.

During 1878 Hein Lehmann were making proposals for the construction of a penitentiary at Cassel, Germany, and in one of their letters is a marginal sketch showing a concrete floor resting on sheets of arched corrugated iron.



Detail of the marginal sketch on page 2 of the Hein Lehmann letter at left. Miles Lewis collection.



This appears to be the point at which the canonical arched Traegerwellblech system was invented – if ‘invented’ is the word for a combination of previously known elements (which had indeed been similarly combined elsewhere). What is novel is only the use of the heavy gauge deep profile iron in this way, rather than ordinary corrugated sheets, and it must be conceded that this produces a remarkably strong and durable flooring system.

This idea was then developed in drawings for the penitentiary, in which arched roofs of this type cover the individual cells. But Hein Lehmann did not obtain the commission, and their design for the penitentiary did not proceed. Whether the flooring system was much used in Germany and other European countries is not clear, but it is clear that it was quickly and widely adopted in the eastern colonies of Australia.

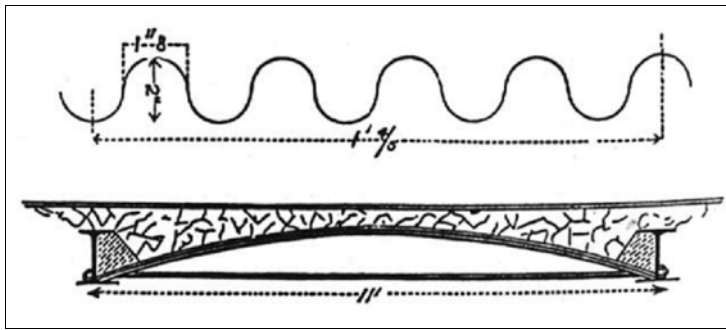
Left: Traegerwellblech vaulted cell, above, and brick vaulted cell, below for 'Strafanstadt bei Cassel', Überwölbung Zelle mit Wellblech [penitentiary establishment near Cassel, upper vaulted cells with corrugated iron].

Detail of undated drawing: Miles Lewis collection.

<sup>6</sup> Miles Lewis collection. The file is a government one, apparently from the office of the 'Royal Building Master', and compiled in connection with the proposed penitentiary at Cassel.



## Traegerwellblech



Traegerwellblech section and test arch:  
Australian Engineering and Building News, 1 April 1881, p 184.

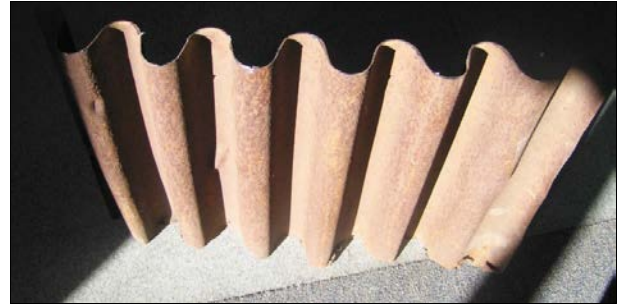
The tests were conducted by Schmedes, Erbsloh & Co, who were perhaps the local agents at this stage, at the Market Buildings [presumably the Western Market] and they displayed an 'arched corrugated plate' of 19 gauge [0.35 mm] iron spanning 3.3 metres in an arch rising 330 mm, restrained by two tie rods. This sustained a load of about 1150 kg per square metre without permanent deformation.<sup>9</sup>



The first building in Australia known to have used Traegerwellblech, completed 1885; 'Bank and Business Premises corner Swanston and Collins Streets Melbourne erected by the Freehold Investment & Banking Company of Australia Limited – David Wormal, Architect', by Clarence Woodhouse, 1887, State Library of Victoria H9327.

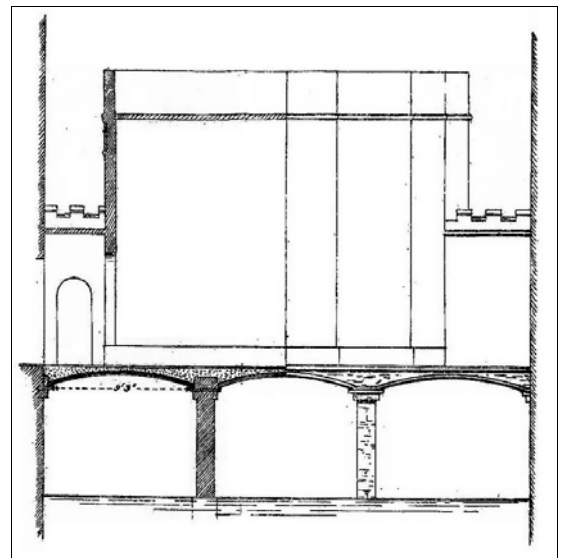
The first structure we know to have been built using Traegerwellblech was a 'fire proof bridge and re-erection of Exhibition Trophy at Virginia Tobacco Factory', in Bourke Street west, for which tenders were called by Terry & Oakden in August 1883.<sup>11</sup> We know of it because a drawing of this rather bizarre structure was published by the engineer Peter Behrendt.<sup>12</sup> In the middle of the bridge is the trophy in question, a castle-like structure which had formed part of the firm's exhibit at the 1880 Exhibition.<sup>13</sup>

Traegerwellblech was first tested in Melbourne in 1881, using arched sheets of 4, 2.5 and 2 inch (102, 63 and 51 mm) corrugations,<sup>7</sup> and this may have been the same occasion as that when it was reported to have been subjected to 'severe tests' before being adopted for the ceilings of the Freehold Investment and Banking Company.<sup>8</sup>



Specimen of Traegerwellblech iron:  
Miles Lewis building materials collection Melbourne University.

The project in question was probably the five storey block of shops and warehouses built for the Freehold Investment Banking Co of Australia at the east corner of Swanston and Collins Street, as designed by David Wormal in 1883, though it was not in fact built at this time.<sup>10</sup>



Fireproof bridge for the Virginia Tobacco Co. Bourke Street west, Melbourne, captioned as 'Fireproof Bridge with Showroom. – Virg. Tobac Fabr. By Mr. Oakden, Architect': Peter Behrendt, 'Modern Fireproof & Watertight Building Materials - Traegerwellblech & Asphalt', Royal Society of Victoria, Transactions and Proceedings vol xx (1884), plate 2 fig 5.

7 *Argus*, 3 February 1881, p 5.

8 Charles Mayes, *The Australian Builders' Price-Book* (Melbourne 1886), p 16.

9 *Australian Engineering and Building News*, 1 April 1881, p 184.

10 It was described in the *Argus* (Melbourne), 1 January 1884, p 134. The tender had been let and the shops were advertised, *Argus*, 22 April 1884 p1 It seems that the building must have been completely finished early in 1885, A coloured lithograph is held in the State Library, and a view was published in TWH Leavitt & WD Lilburn [eds], *The Jubilee History of Victoria and Melbourne* (2 vols, Duffus Bros, Melbourne 1888), 1, pl3, foll.p16

11 *Argus* (Melbourne), 27 August 1883, p 3.

12 Peter Behrendt, 'Modern Fireproof and Watertight Building Materials', Royal Society of Victoria, *Transactions and Proceedings*, vol xx (1884), plate 2, fig 5.

13 *Age* (Melbourne), 1 October 1880, p 4.



## Traegerwellblech

In 1883 Hein Lehmann & Co, the Berlin makers, registered the Traegerwellblech brand in Australia,<sup>14</sup> and the iron was now available in Melbourne from Palmer, Scott & Co, as agents for Hein Lehmann. The engineer Mephan Ferguson had monopoly rights for construction using it.<sup>15</sup> In the same year the engineer Peter Behrendt delivered a paper to the Royal Society of Victoria on *Modern Fireproof and Watertight Building Materials*, devoted mainly to Traegerwellblech.<sup>16</sup> He illustrates mainly structures and details of German origin. But his floor system is different, with the whole secondary structure raised above the wrought iron joist and the concrete omitted. He also shows a staircase supported on arched Traegerwellblech, unlike the ordinary flat sheets used for the German version, and a dome clad in Traegerwellblech in which the sheets seem to have converging corrugations, adapted to the dome shape.

By 1886 Traegerwellblech had been used in upwards of five thousand buildings in the world,<sup>17</sup> and it was now being sold in Sydney by Trapp and Elles, of Margaret Street, who displayed some sheets at the Scientific and Mechanical Exhibition of that year. In 1888 Hein, Lehmann & Co showed 'Corrugated-iron, of various kinds', doubtless including Traegerwellblech, at the Centennial Exhibition in Melbourne.<sup>18</sup> It was used most characteristically in the form of arching between girders, and for fireproof staircases, for which the plates were laid on the angle, the risers built on top in brickwork, and timber or other treads placed on them.<sup>19</sup> Commonly it was levelled up with coke breeze concrete, carrying some sort of paved surface. In 1890, when Traegerwellblech was specified for use in the Commercial Bank of Australia headquarters in Collins Street, Melbourne, the fill above was a mixture of coke breeze with little else - actually seven parts of breeze to one of cement and one of sand.<sup>20</sup> It was also specified in 1890 with concrete over, for William Pitt's Rialto Building.<sup>21</sup>

By now Traegerwellblech had been used in the flooring of what is now the Verdon wing of the State Library of Victoria, where it can be seen from underneath; and also for other fireproof floors in the City of Melbourne Bank, the Alexandra Theatre, and several 'large buildings' in Collins Street. It had also been used in the Bank of Australia in Adelaide and the Royal Opera House at Brisbane, but not apparently in Sydney as yet.<sup>22</sup> In 1887 the new Fruit Markets in Sydney were built with floors of curved Traegerwellblech with concrete on top, and a layer of Trinidad asphalt.<sup>23</sup> However Trapp & Elles's advertisement in Mayes's price book of that year added to the list the new Fruit Markets in Sydney (later the Corn Exchange).<sup>24</sup>



Verdon wing of the State Library of Victoria, 1886,  
Traegerwellblech flooring seen from underneath:  
Photo: Miles Lewis.



Princess Theatre, Spring St, Melb., by William Pitt 1886-7.  
Section through shops: State Library of Vic. WD THE 15.23 [detail].

In 1887 Traegerwellblech was used for the Melbourne Storage Company building in Lonsdale Street, Melbourne, as previously discussed.<sup>25</sup> The Princess Theatre was also built in Melbourne in 1887 using Traegerwellblech, and this is the only reported case in which the name is actually visible as a brand on the iron.<sup>26</sup> Also in 1887 Palmer, Scott & Co successfully resisted a move by the Melbourne Chamber of Manufactures to have an import duty imposed upon Traegerwellblech. The customs authorities regarded it as no more than a type of corrugated iron, a category of material which was not dutiable.<sup>27</sup>

14 Australian series no A11933, control number 576, and A11731, control no 1054, as advised by Terry Sawyer, 2004.

15 Behrendt, *Fireproof and Watertight Building Materials*, pp 3-4. It appears Palmer Scott are agents for the whole of Australia: *Australasian Builder and Contractor's News*, 27 August 1887 p 25.

16 Royal Society of Victoria, *Transactions and Proceedings*, vol xx (1884), pp 75-83.

17 Charles Mayes, *The Australian Builders' Price-Book* (5th ed, Melbourne 1886) advertisements p xxix. See also p 16 of the text.

18 Centennial International Exhibition, Melbourne 1888-1889, *Official Record* (Melbourne 1890), pp 423, 736.

19 Behrendt, *Fireproof and Watertight Building Materials*, pp 2-3.

20 GW Blackburn, *The Commercial Bank of Australasia Limited New Premises, &c* [bill of quantities] (Melbourne 1890), p 6.

21 Victorian Heritage Register no H 0041.

22 *Australasian Ironmonger*, 1, 7 (1 October 1886), p 164.

23 *Australasian Builder and Contractor's News*, 4 June 1867, p 68.

24 Mayes, *Australian Builders' Price-Book* (1886), p xxix.

25 *Australasian Builder and Contractor's News*, 26 November 1887, p 464.

26 Information from Robyn Riddett, 1993.

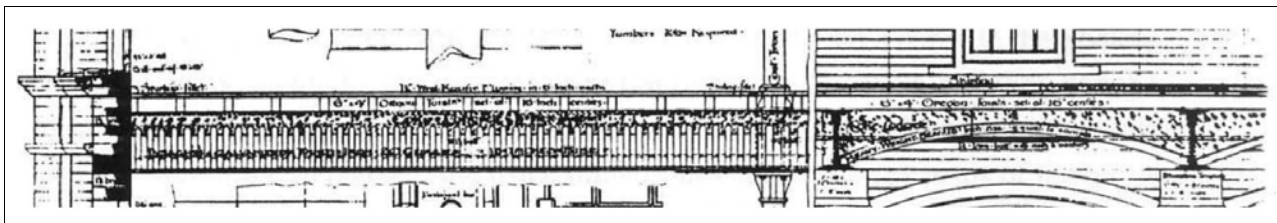
27 *Australasian Builder and Contractor's News*, 27 August 1887, p 252.

## Traegerwellblech

The Sydney agents, Trapp & Elles, seem to have become Trapp & Co, and then in 1889 took in C W Stirling to become Trapp, Stirling & Co.<sup>28</sup> By 1893 however the sole agents for New South Wales were C W Stirling & Co.<sup>29</sup> Although it is not so well documented as in Melbourne, Traegerwellblech was used extensively in Sydney, and to some extent in the other capital cities. While it is not identified by name, the steep profile of the vaulted flooring in the former Fruit Markets admits of no other interpretation. But Traegerwellblech was also made in more normal profiles and it is impossible to tell from a photograph whether it was Traegerwellblech iron which was used for vaulted ceilings in the wards of Sydney Hospital, presumably dating from the 1890s.<sup>30</sup> In about 1889 John Kirkpatrick had proposed the use of Traegerwellblech and concrete in his competition entry for the Australian Club in Sydney, and it appears that he used it in the CML Building, Pitt Street and Martin Place, in 1892.<sup>31</sup> This is not entirely clear, as Irving's survey does not seem to show the corrugated iron as being any deeper than the norm.<sup>32</sup>

Traegerwellblech construction shared the disadvantage of the British Dennett and Wilkinson systems, that the undersides of the metal girders were exposed to fire, and within a decade or so the system seems to have been entirely superseded. It is not mentioned in Nangle's *Building Practice* of 1900, Jeffries's *Building Estimator* of 1907, Mayes's *Price Book* of 1908, or Haddon's *Australian Architecture* of 1908,<sup>33</sup> but it was still being advertised in that year by George H Palmer of Melbourne, as the sole agent for Australia.<sup>34</sup> In Britain a very similar system, but with added fire protection, was being marketed by Potter & Co after the turn of the century.<sup>35</sup>

The best surviving specimen of Traegerwellblech Construction is the Queen's Warehouse, West Melbourne, built in 1889-92 to the design of A J Macdonald of the Public Works Department. The first floor is supported by two rows of cast iron columns, creating three transverse bays. These are spanned by rivetted wrought iron girders. Between the girders spans corrugated iron segmental vaulting of the distinctive deep profile characteristic of Traegerwellblech iron and on top of the iron is coke breeze concrete.



The Queen's Warehouse, Blyth Street, West Melbourne 1892, by A J Macdonald of the Public Works Department, part section: from a fiche supplied by Australian Construction Services.

On the drawings themselves the corrugated iron is in different parts labelled 'Lysaght's Galvanized Tinned Iron 20 Guage [sic]'; 'Heavy Weight ... equal to sample'; and 'Traegerwellblech'.<sup>36</sup> It is not as yet clear whether there are different types of iron in different parts, or whether Traegerwellblech iron or its equivalent was manufactured - under licence or otherwise - by Lysaghts, whose depot was very close to the Queen's Warehouse. At this date the former seems possible, for in another building of 1889 much of the flooring was coke breeze concrete on arches of '24 gauge "Orb" or other approved iron', but in a portion over a laneway the construction was 'Similar concrete arches but with No.5 Traegerwellblech'.<sup>37</sup> While this clearly indicates an hierarchy of iron types at this date, it was not long before Traegerwellblech disappeared as a brand and Lysaghts manufactured something similar. In 1902 Lysaght's *Metal Trades Referee* listed 'weight-bearing' Lysaght Orb iron of 4 inch [102 mm] pitch and 2½ inch [38 mm] depth,<sup>38</sup> and in 1912 there was weight-bearing iron of 3 11/16 inch [94 mm] depth and 2⅝ inch [67 mm] depth.<sup>39</sup>

28 *Australasian Builder and Contractor's News*, 10 August 1889, p126.

29 *Australasian Builder and Contractor's News*, 14 October 1893, p146.

30 EJ Brady, *Australia Unlimited* (Melbourne, no date [c.1915]), p816.

31 Incorrect reference [*Australasian Builder and Contractor's News*, 15 June 1889, p550].

32 Emery Balint, Trevor Howells & Victoria Smyth, *Warehouses & Woolstores of Victorian Sydney* (Melb. 1982), p 106. See also Emery Balint, *Record of Commercial Buildings Constructed in the Victorian Era in N.S.W.* (School of Building, UNSW, Sydney, 1987), p 156.

33 James Nangle, *Australian Building Practice. Pt 1* (Melbourne 1900); Walter Jeffries, *The Australian Building Estimator* (1907); CE Mayes, *The Australian Builders & Contractors' Price Book* (7th ed, Sydney 1908); R J Haddon, *Australian Architecture* (Melbourne 1908).

34 *Cazaly's Contract Reporter*, XXIV, 25 (23 June 1908), p87.

35 Potter & Co's 'A' type floor was made with steel joists, segmental corrugated iron vaults, & concrete. However the lower flange of the joist was encased in sections of fireclay, and below it, at least in the available illustration, was a complete plaster ceiling on expanded metal lathing. PR Strong, 'Fire Resisting Construction' in GAT Middleton [ed], *Modern Buildings* (6 vols, London, no date [c1905]), IV, p173.

36 Copies of the drawings kindly supplied by Terry Sawyer of Australian Construction Services, 28 April 1992.

37 Hyndman & Bates, 'Specification, &c, Warehouse & Offices/Flinders St W/EL Yencken Esq/Flinders St E.' (Melbourne 1889), pp 29-30.

38 *The Metal Trades' Referee* (2nd ed, Melb. ?1902 [1897]), pp 8, 9.

39 *The Metal Trades' Referee* (Melb. 1912 [1897]), p 9.



## Traegerwellblech



Australian Museum, College Street, Sydney, Traegerwellblech ceiling in the Vernon wing: Photo: Peter Phillips.

It is likely that some Traegerwellblech survives in Her Majesty's Theatre, Melbourne, though this has not been reported. The only fully authenticated specimens appear to be the Hibernian Hall in Swanston Street Melbourne, now the Storey Hall of RMIT; the Princess Theatre; and the Queen's Warehouse in West Melbourne.

However, the balconies of the Rialto building, in Collins Street Melbourne, are supported on what appears to be Traegerwellblech corrugated iron, carrying coke breeze concrete, although Traegerwellblech is not named in the architect's drawing.

The former Railways Administration building in Spencer Street, Melbourne, has Traegerwellblech vaulted flooring, and Flinders Street Station has similar flooring, which is presumably Traegerwellblech as well.<sup>42</sup>



New Zealand Loan & Mercantile Agency Wool Store, off Tennyson St, Kensington, Melbourne, extension by Oakden & Ballantyne, 1910, floor of linking bridge from below. Photo: Miles Lewis.



Melbourne General Post Office, Bourke & Elizabeth Sts, 1885-90 top floor extension. This view shows the floor structure, with Traegerwellblech flooring cut out. Photo: Miles Lewis.



Detail of the top floor of the Melbourne GPO building, with a surviving red, rusty section of a Traegerwellblech arch, with one end resting on a Dorman Long joist and the remains of the concrete infill & floor sheeting above it. Photo: Miles Lewis

Measurements taken of iron at Spencer Street by Public Transport Corporation engineers show it to have a depth of  $2\frac{7}{8}$  inches [73 mm] and a pitch of 4 inches [102 mm], with a profile rather closer to a zig-zag with rounded corners than to a sine curve. The Melbourne house 'Redcourt', of 1898, has corrugated iron (not specifically reported as Traegerwellblech) spanning horizontally to carry bathrom floors of tiles on mortar.<sup>43</sup>

Later Melbourne examples include a building at 188-192 Little Collins Street, where the construction is exposed in the ground floor bookshop, and last of all is the 1910 extension of the New Zealand Loan and Mercantile Agency Wool Store, off Tennyson St, Kensington, by Oakden & Ballantyne.

40 Photo provided by Peter Phillips, October 2013.

41 Inspected during renovation, 2003.

42 Information from Mr Alan Pobjoy of the Victorian Public Transport Corporation, who has shown me the principal drawings. These clearly show a vaulted flooring system, which according to Pobjoy was regularly referred to as Traegerwellblech by Mr Dudley Cook, since retired. Robyn Riddett has advised me that there are [other] drawings for the Railways Administration Building labelled Traegerwellblech no.16 BWG profile 36.

43 Reported by John Mathews, 2007.

# Owen & Helen Peake re-visit Iran in calmer times.

By Owen Peake

Owen & Helen Peake spent a month in Iran recently – their fourth visit since 1970 but their first since the Revolution in 1979 which brought the Ayatollahs to power in an Islamic Republic. They love the country, and present-day Iran is calm and prosperous – the dramas of a developing revolution which they experienced in late 1978 have long since passed. Owen didn't find engineering heritage as such this time, but he did think we would enjoy learning more about a country few of us are familiar with. He has written us so much about engineering heritage previously, that this time, he is entitled to a little latitude! The Editor.

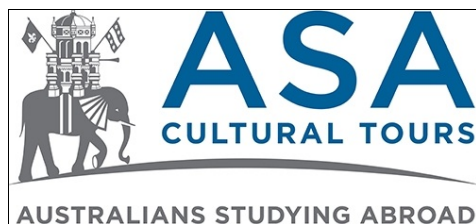
Iran comes to most people's minds with a string of prejudices which have to be tackled before a real story can be told. The Americans call Iran names like "The Axis of Evil", "The Evil Empire" and "The Home of Terrorism" or any one of a dozen other phrases. I perhaps, see Iran from the opposite end of the spectrum – a country of peace-loving people with a solid government (albeit a theocracy), enjoying a good standard of living despite 40 years of US-led sanctions, and working diligently to thrive despite the odds. The country produces 5% of the world's oil (ranking 5th after the USA, Russia, Saudi Arabia and Iraq) and 4.5% of the world's natural gas (ranking third after the USA and Russia).

Their country, of which the Iranians are immensely proud, has a spectacular rugged desert terrain of great, but stark, beauty. In the north, and scattered elsewhere, are great snow mountains which provide the country with much of its water supply. The total population of Iran is 82 million (2018). There are six cities with populations over one million people – Tehran, a cosmopolitan city larger than Sydney with a population of 8.8 million, in the north of the country, followed by Isfahan, Shiraz, Mashad, Karaj and Tabriz. The rest of the population is spread around in thousands of villages, towns and smaller cities from the Afghan border in the east, to the Turkish border in the west, and from the Caspian Sea in the north, to the Persian Gulf in the south.



IranKarteOelGas from Wikipedia.

## So now let's talk about our journey.



The ASA logo, from the ASA website.

We did a counterclockwise circuit from Tehran, covering about 4,000 km over 20 days. The main cities we visited outside Tehran were Hamadan, Kermanshah, Ahwas, Shiraz, Kerman, Isfahan then back to Tehran. We travelled in a 50 seater Scania tour bus but there were only 14 paying passengers so there was plenty of room. The tour was arranged by *Australians Studying Abroad* (ASA), a Melbourne-based company which combines tourist objectives with fairly intense educational lectures, by a large team of guides. In this tour there were three guides: Ali, the local Iranian guide who organized everything and knows the whole of Iran from decades of guiding experience; Chris Wood, the ASA owner who is literally a walking encyclopedia; and Davide from nearby Georgia who is an 'apprentice' on the ASA team at present.

The ancient sites (pre-Islamic) are clustered primarily in the west of the country whilst the most important Islamic period architecture is in Shiraz and Isfahan with some sites in the desert towns of Kerman and Yazd.

Iran is a country in which Australians feel comfortable and Australia seems to be the same for Iranians. Many Iranians emigrate to Australia and there are significant similarities in climates and the physical characteristics of the two countries.

The Iranians are very welcoming by nature and it is an extremely easy country to navigate. Iran has a very long history of occupation going right back to the earliest moves by hunter-gatherers to develop villages, then towns and cities for better mutual protection. Hundreds of groups have invaded the country over at least 8000 years. Most have been repelled and the borders have remained fairly stable. Iran has long been a centre of knowledge, especially within mathematics and geometry, and with written language development coming from the area.

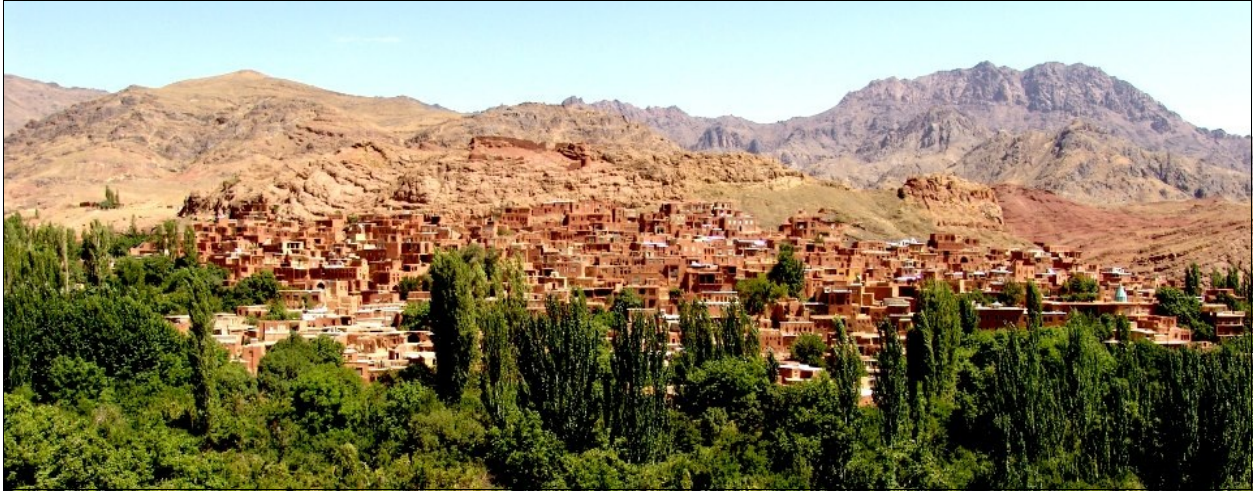


Chris Wood, from the ASA website.



## Owen & Helen Peake re-visit Iran

In the modern world Iran has had to endure and cope with sanctions imposed by the United States, the UN and the European Union. However the up-side of sanctions is that Iran now makes almost everything Iranians need locally. Pretty much every village and town has at least one factory turning out some product that the country needs which might be hard to obtain with sanctions in place. Iran's super-self-sufficiency is impressive.



The Red Village of Abyaneh, by JNM in Wikipedia.

One of the features of our trip was a visit to the ancient village of Abyaneh in the mountains about half way between Isfahan and Qom. The village is in a steep valley and the vernacular architecture of red mud brick houses with wooden balconies and highly decorated doors in narrow alleyways is charming.



Street lighting and power reticulation in Abyaneh. Photo: Owen Peake.

### Village Utility Services

What struck me about this village, and other towns and villages we visited, was the extraordinary quality of the utility services provided. In recent years the Iranian government has made the provision of piped natural gas to even the smallest villages a priority. Abyaneh was no exception with every house having a gas meter on the front wall. Iran electrified the whole

country many decades ago and it is difficult to go anywhere in the country without seeing power lines on the horizon or along the roadside. Abyaneh was also sewered, had reticulated water supply and phone and internet services. A lot of Iranians choose to have satellite dishes to receive world television although these are apparently illegal.



Abyaneh streetscape. Ph: Owen Peake.



Abyaneh Services  
Photos: Owen Peake

L to R: electricity reticulation; electricity meter; valve cover in street; gas meter.

While we were there we observed a substantial storm water system upgrade with quite large new pipes being installed and connected in many streets. This level of detail in utility services in a small village with a population of perhaps 1000 people in a remote valley seems extraordinary to me, but it is a good measure of social progress in Iran.



*Islamic Architecture.*

One of the reasons Helen and I are so besotted with Iran is the Islamic architecture. The Iranians seem to have refined the art ahead of others – their style is more decorative than that found further south (in Saudi Arabia for instance) and more refined than that in Central Asia to the north.

The epitome of Islamic architecture can, in our opinion, be found in the several public buildings which surround the great Maidan Square in the centre of Isfahan. There is a large and magnificent mosque at the southern end of the square (now called the Masjed-e Imam rather than its old name of the Shah Mosque, as the Shah has gone and the Imams now rule the country). A smaller mosque on the eastern side of the square takes the prize from our perspective. It is called Sheikh Lottfallah Mosque.



The Masjed-e Imam Mosque (formerly the Shah Mosque), viewed from the Maidan Square. Photo: O. Peake.



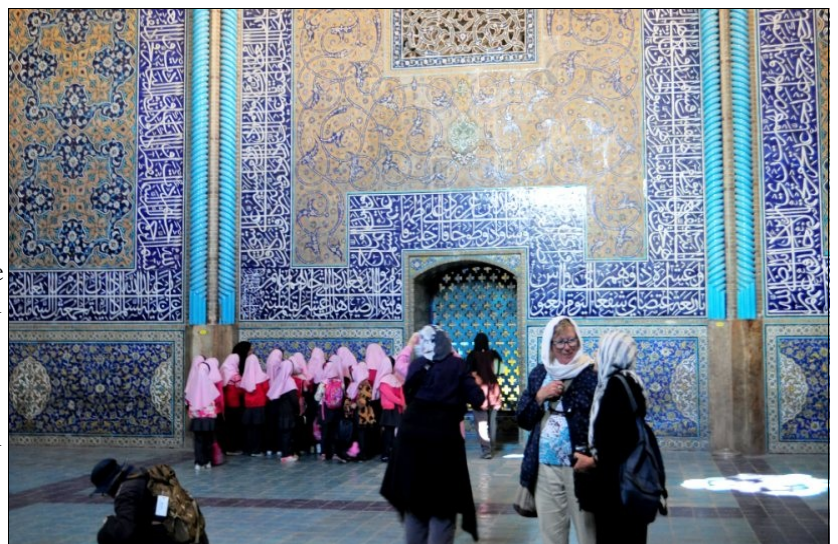
The Lottfallah Mosque, viewed from the Maidan Square. Photo: Owen Peake.

This mosque is one of the masterpieces of Iranian architecture, built during the Safavid Dynasty. Construction of the mosque started in 1603 and was finished in 1619. It was built by the chief architect Shaykh Bahai during the reign of Shah Abbas 1. On expert advice, Reza Shah Pahlavi had the mosque rebuilt and repaired in the 1920s.

The purpose of this mosque was for it to be private to the royal court, unlike the Shah Mosque which was meant for the public. For this reason, the mosque does not have a minaret and is smaller. Indeed, few Westerners at the time of the Safavids even paid any attention to this mosque, and they

certainly did not have access to it. It was not until centuries later, when the doors were opened to the public, that ordinary people could admire the effort that Shah Abbas had put into making this a sacred place for the ladies of his harem. The tile-work is exquisite and far superior to that covering the Shah Mosque.

To avoid having to walk across the Square to the mosque, Shah Abbas had his architects build a tunnel under the Maidan from the Ali Qapu Palace to the mosque. On approaching the entrance of the mosque, one would have to walk through a passage that winds round and round, until one finally reached the mosque entrance. Along this passage there were guards, and the purpose of this design was to shield the women of the harem from prying eyes.



A school group & the Australian tourists visit Lottfallah Mosque. Photo: Owen Peake.

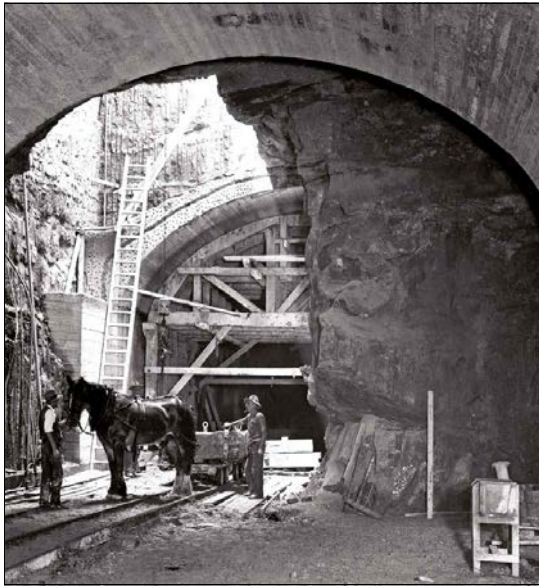


## Two Brief Book Reviews

### *By Muscle of Man & Horse – Building the Railway under Sydney 1916 – 1932*

By Bill Phippen, of the Australian Railway Historical Society

Reviewed by the Editor



The September 2018 issue of EHA Magazine had a note about the publication of Bill Phippen's City Railway book – a copy of the publisher's blurb. I had received a copy of the book shortly before that, but I hadn't had time to read it. In fact, it took a very long time to read it (or look at it!) – 528 pages contain more than 900 photographs, mostly at 2 per page and a few drawings. Much of the text is in the usually large and detailed captions to the photographs. This is a very large picture book (weighing 2.7kg). It is a detailed pictorial record of part of the construction of the Sydney underground railway, from 1916 to 1932. The underground, or City Railway as it was named, was intended to be a two-way loop around Sydney CBD, from Central Station to Circular Quay and back again, but in 1932 the work was halted before the loop was closed. The station at Circular Quay that would have completed the circuit, didn't get built until 1956.

The book started with the discovery of a number of albums of photographs, taken by a photographer hired to regularly record all the construction work happening at the various City Railway sites around the route. Some of those sites were cut and cover, such as Museum and St

James stations, some were tunnelling between stations, some involved underpinning the buildings above them, and there were bridges and a huge embankment as well. The photographer did his rounds, year after year, the film was developed, the prints made and placed in the albums, put away carefully, and some of the albums virtually forgotten for the next 60 or 70 years. The author was invited to examine one volume that turned up, got interested, and in the belief that the albums deserved to be widely recognised, embarked on the wholesale scanning and digitising of all the photographs.

Maybe a book was the best way to make these photos publically available, but it is so large and unwieldy that the market is probably mostly to libraries and construction history specialists. It's not something to hold on one's lap, or take to bed. I had it resting on a board across the arms of a chair. Not at all convenient. Nevertheless I found it fascinating – not to read, but to look at the pictures. I worked my way through it, bit by bit, in spare moments over a period of several months, in a strong light and armed with a magnifying glass. The images, or some of them, were in some manner hypnotic – examining each detail, locating each image in my mind. I remember saying: I can't stop looking at them!

I recommend this book to anyone who has an interest in seeing the way things were built, in how holes were dug, and how earth was moved, way back in the 1920s and 1930s, before the days of tower cranes, tunnel boring machines, Ready Mixed concrete, and similar stuff that we take for granted today.

The book is published by the Australian Railway Historical Society NSW. It can be purchased for \$88.00 at the ARHS bookshop or online via: <https://arhsnsw.com.au/product/by-muscle-of-man-and-horse-6/>

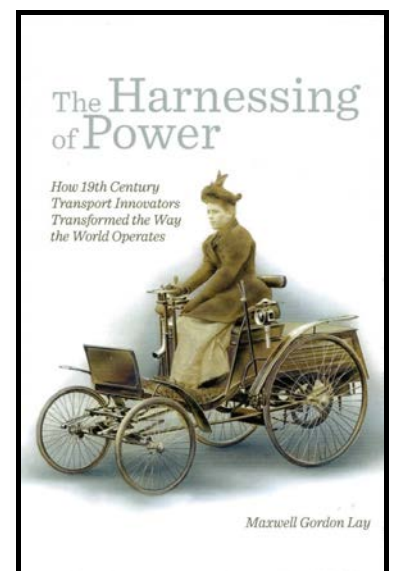
### *The Harnessing of Power* by Professor Max Lay

Reviewed by Keith Baker, November 2018.

Professor Max Lay's book *The Harnessing of Power* was recently published in hard cover by Cambridge Scholars Publishing. Subtitled *How 19th Century Innovators Transformed the Way the World Operates*, it is an updated version of the book I reviewed in the October 2016 EHA Magazine in the form of an ebook on Kindle, then titled *With Power & Purpose*. While the text is basically unchanged, it is even more heavily reference and end noted, and now benefits from an index which was not possible in the ebook format without page numbers.

At the time I said that I found it to be a fascinating journey through 19th century innovation, engineering, economics, politics and personalities, while discussing a wide range of interconnected factors that influenced the progress of transport technology and the industrial revolution. Now published in a handsome 370 page hardcover with over 100 illustrations, it should be attractive to an even wider international audience.

To order, go to: <https://www.cambridgescholars.com/search?Q=The+Harnessing+of+power>



# Engineers featured in recent Australian fiction.

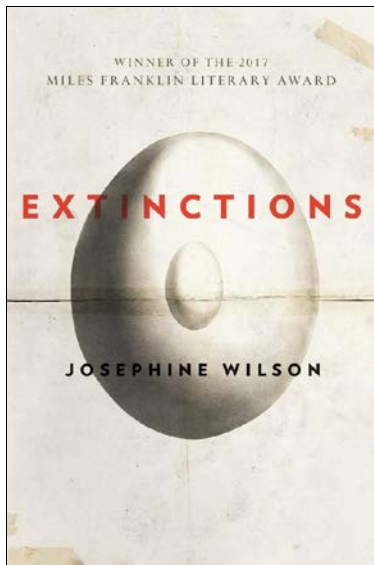
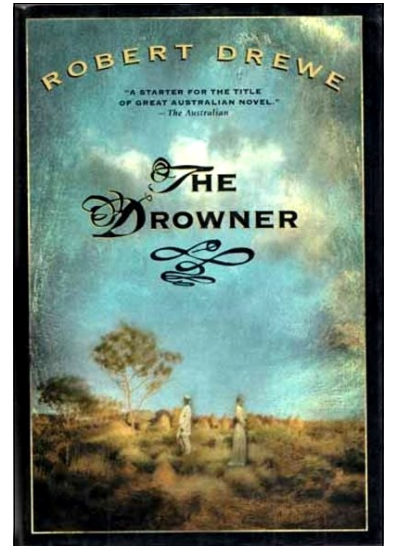
From David Beauchamp

There are few works of Australian fiction where the main character is an engineer. Three fairly recent ones that come to mind are Robert Drewe's **The Drowner**, 1996, Josephine Wilson's **Extinctions**, 2016, and Gregory Day's **A Sand Archive**, 2018.

The engineer in **The Drowner**, William Day, comes from a long line of Wiltshire drowners. Drowners were men who had for centuries channelled water onto farming land to enable crops to grow, but with changes to farming practices their skills were no longer needed. Day instead of following the family tradition trains as a civil engineer, doing his articles with the resident engineer for the Wiltshire and Somerset Railway.

As the railway building boom came to an end in England, Day decides to migrate to the colony of Western Australia. He is employed by C.Y. O'Connor to supervise the construction of the pipeline from Mundaring to Kalgoolie for the Goldfields Water Scheme. Life on the goldfields is vividly portrayed, the typhoid epidemic, prostitution and the opening of the Water Scheme. Running through the book is the intense love story between Day and the actress Angelica Lloyd.

**The Drowner** was published as a Wyatt Book for St Martins Press in 1996, and at that time the RRP was \$23.95 for a hard back copy. It won the Vance Palmer Prize for Fiction and was subsequently published by Penguin.



Professor Frederick Lothian in **Extinctions** is a retired engineer, a world expert on concrete and a connoisseur of modernist design. After his wife's death he isolates himself in a retirement village surrounded by the debris of his life including his collection of worn modernist furniture, which he intends to bequeath to his estranged daughter. In the retirement village Lothian tries to avoid contact with other residents. His next-door neighbour breaches his defences and he starts to confront his own shortcomings and tries to make amends.

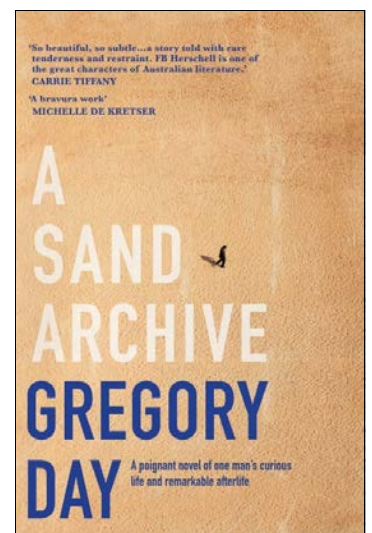
Scattered throughout the text are photos of an elegant Maillart bridge, a Marcel Breuer chair, Frank Lloyd Wright's Tokyo Hotel, various extinct creatures, Saarinen's TWA terminal and other objects mentioned in the book.

**Extinctions** was the winner of the 2017 Miles Franklin Literary Award. It was published by the University of Western Australia press in 2016 and has been reprinted twice in 2017 – RRP \$29.99

In **A Sand Archive** a young writer finds a slim volume titled *The Great Ocean Road: Dune Stabilisation and other Engineering Difficulties* written by F.B. Herschell, a Victorian Country Roads Board (CRB) engineer. The writer meets Herschell at the bookshop where he works, and after Herschell's death decides to explore and write about his life.

Herschell goes to France to study dune stabilization because of the problem of sand encroachment over the Great Ocean Road, especially at Eastern View (between Airey's Inlet and Lorne). In France, during the Paris student riots of 1968, he has a brief love affair. This affects the rest of his life. After his return from France he submits his report, written in French, to his unsympathetic boss. This does not help his advancement in the CRB. Herschell is an interesting but solitary character, not understood by most of his workmates.

I would recommend **A Sand Archive** to anyone who has some knowledge of the Great Ocean Road and is looking for an interesting novel with an engineering background. **A Sand Archive** was published by Picador in 2018 with a RRP of \$29.99.



The last two books should be readily available at any good bookshop. **The Drowner** might be via a library request or a second hand bookshop.



# Connections

## NSW Railways Culture and Heritage



Searching on <http://www.sydneytrains.info/about/heritage/> I came up with a greatly improved website with pages headlined **Culture and Heritage**. Digging into that a bit, you can find a wealth of information about the heritage of the NSW Train System. It doesn't include rolling stock, or not that I found, but there is plenty about that in other places.

The **Conservation** section describes a number of recent projects and gives a link to their **Rail Conservation Guides** – a set of 9 separate guides in PDF format, potentially of great value.

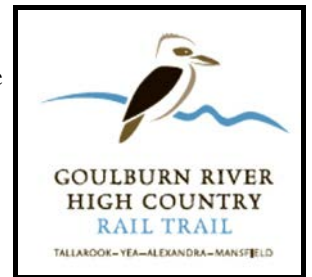
**History of the NSW railways** gives a brief overview and provides a link to Robert McKillop's **Thematic History of the NSW Railways**. This is available in PDF, but unfortunately only in about 16 separate slices. Why not provide it as a single document? Other links are to the *NSW State Records*, and the **Australian Railway Historical Society (ARHS)**.

The Railways Heritage Register is mentioned somewhere, and I searched for this expecting to find a copy of the **NSW Railways Section 170 Register**. No luck. But I did find it via Google as a PDF on another Transport for NSW website. Try: <https://www.transport.nsw.gov.au/projects/community-engagement/sydney-trains-community/heritage-and-conservation-register>

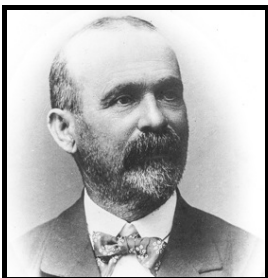
Under **Documentaries** there are two comprehensive reports published in PDF format. **Running on time** is a history of timekeeping and the railways in NSW – fascinating stuff which I have never seen elsewhere, simply laid out and well illustrated. The **End of the Line** report, all about the Electric Train Staff System and Safe Working is equally fascinating, simply explained and well illustrated.

## Goulburn River High Country Rail Trail

We had our first encounter with a Rail Trail 32 years ago, when stopping to look over the edge of an old stone bridge between Bath and Bristol. Expecting to see water running, there was a strip of asphalt with cyclists on it. It was very new then, and now counts cyclists in the millions each year. But finding anything of its history – what went before, how the change to cycleway was organised, how it was built, defeated me. Now there are dozens of old and disused railways converted to cycleways in the UK. Wikipedia's list of rail trails is world-wide. It shows 115 in Australia, mostly trivial in length. With almost all of them, the easily available information is all about the route, the scenery, where you can stay, or what you can eat – all the touristy stuff.



The only exception I found is listed as The Great Victorian Rail Trail (the locals prefer the name on the above logo). The Committee of Management of this rail trail has published **The Project Story** online as a PDF. It covers a brief history of the original railway, from 1883 until it closed in 1978. It started at Tallarook, where it branched off the main Melbourne-Sydney line, and travelled 143 km to Mansfield, in the heart of North-East Victoria. After the railway was closed, it lay trackless, idle and deteriorating for the next 20+ years, until the three Shires the line passed through got together and set up a Project Management Committee to get the rail trail going. The Project Story covers the organisation, concept design, planning, funding, engineering design and construction - and people. There are lots of photos, and maps. I found it, quite by chance, at: <https://www.greatvictorianrailtrail.com.au/wp-content/uploads/sites/47/2017/04/rail-trail-project-story.pdf>



## Carlo Catani: Visionary, Creator, Genius

David Beauchamp drew my attention to *A special exhibition exploring the life and significant achievements of Victoria's foremost Italian-born civil engineer, and a key figure in the development of the State of Victoria from 1876-1918*. The exhibition started in November 2018, but it continues until 23<sup>rd</sup> March 2019, at **Museo Italiano**, 199 Faraday St, Carlton, in Melbourne. See:

<https://www.coasit.com.au/events/events-archive/264-carlo-catani-exhibition>

Carlo Catani was born and educated in Florence, Italy. He arrived in Melbourne in 1876. *What's On – City of Melbourne* tells us: Catani was widely recognised for his visionary schemes of public works, and he dedicated over 41 years of his life to public service. He held the prestigious position of Victorian Public Works Department Chief Engineer from 1892 to 1917. During this time he created many of Victoria's most significant landscapes, waterways, bridges, piers, roads, levees, weirs, lakes and parklands. He managed the reclamation of swamplands and the establishment of new settlements which are still thriving today.

If you can't visit the exhibition, find out more about Carlo Catani at:

<http://monumentaaustralia.org.au/themes/people/government---colonial/display/32285-carlo-catani>

and of course, his ADB entry at: <http://adb.anu.edu.au/biography/catani-carlo-giorgio-domenico-enrico-5532>

# Connections

## Big Stuff 2019 – in Katowice, Poland this year.

From the Big Stuff website:



From 11-13 September, 2019, lovers of big industrial machinery will gather at Katowice in Poland for the sixth Big Stuff conference. With the theme "Preserving large industrial objects in a changing environment", the conference will address the future of large scale industrial heritage in the face of a rapidly changing environment, where social relations, architectural and urban design, landscape environments, mobility infrastructures, spatial functions are all being transformed, and where climate change adds another unknown to the preservation of historic buildings and machinery.

For more information, to register for attendance, or if you are interested in presenting at the 2019 conference, contact Alison Wain at [alison.wain58@gmail.com](mailto:alison.wain58@gmail.com) Updates and conference information will be available at: <https://bigstuff.omeka.net/exhibits/show/conferences/bigstuff-2019>

The conference will start with a tour of local industrial heritage, followed by a day of papers showcasing projects and raising new ideas for the preservation of heritage machinery. The final day will be spent working on plans for transitioning a local colliery from a working commercial operation to a heritage site. This follows the tradition of holding practical workshop sessions at Big Stuff conferences and will provide the Colliery team with ideas from an international audience, and conference delegates with the opportunity to experience idea generation and project planning for a real site at a world class level. Big Stuff particularly welcomes students and emerging heritage practitioners, as well as people working with heritage machinery in a private or volunteer capacity who are looking for ideas to take back to their own sites and projects.

For those who would like to explore more of the industrial heritage of the region before and after the conference, there is a Steam Gala on the 7-8 September. We also hope to offer an optional tour to Petřilá, the oldest colliery in the coal basin of the Jiu Valley in nearby Romania.

The conference presentations will be in English, and papers will be made available in both English and Polish. After the conference, papers will be publicly available on the Big Stuff website at <http://bigstuff.omeka.net/>

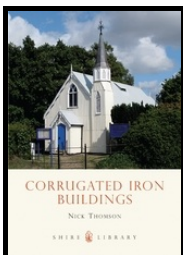
## History of Corrugated Iron

Perhaps this item might be considered as a corollary to Miles Lewis's story about Traegerwellblech in this issue of the magazine. A reference to it turned up in a chat group email, and this led on to a couple of other references. This particular article is an extract from the full text published in *World Archaeology* Issue 28 of 2008. Find it at:

<https://www.world-archaeology.com/features/history-of-corrugated-iron/>

The introduction (quite substantial for an extract) is:

*Archaeology is the study of material culture. However, some materials are perhaps more cultured than others. Thus, corrugated iron is nothing more than an ugly, tawdry substitute for proper building materials; think corrugated iron, think British air-raid shelters and old men's post-war garden sheds, right? In fact, this much maligned material has a surprising and far reaching heritage. David Miles, chief archaeological advisor to English Heritage, draws on a definitive new book by Adam Mornement and Simon Holloway to consider its unusual history. [David] Miles' journey begins in an elite palace in Ghana and finishes with a prize-winning architect. Who knew corrugated iron could get so cultured?*



The same issue of *World Archaeology* includes a review of a Shire Book on *Corrugated Iron Buildings*. Again, this is an extract from the full review, but probably worth a look. The review extract is at:

<https://www.world-archaeology.com/books/book-review-corrugated-iron-buildings/>

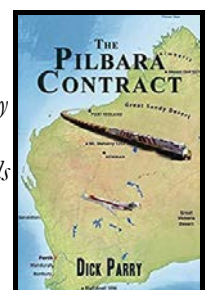
The book can be found at: <https://www.bloomsbury.com/uk/corrugated-iron-buildings-9780747807834/>

As for the book *Corrugated iron: Building on the Frontier*, by Adam Mornement & Simon Holloway – there is a review at: <https://www.journals.uchicago.edu/doi/abs/10.1086/649041?journalCode=wp>

## The Pilbara Contract

Just room for one more brief item – another book, a novel, about an engineer but this time by an Australian engineer, living in the UK. The author wrote to me: *I have read with great interest the Pilbara article by Bob Morrison. in EHA Vol 2 No9 Sept 2018. I believe some of your readers might be interested in my 2017 novel The Pilbara Contract published by Austin Macauley, . . . My motivation in writing this [book] was the regrettable dearth of novels with an engineering background.*

Go to: <https://www.austinmacauley.com/book/pilbara-contract> to read a synopsis, check the price, and, if you wish, order.





Ballan District Vintage Machinery & vehicle Club Inc.



# Ballan's Great Vintage Rally

Sunday 17<sup>th</sup> February 2019

Featuring This Year:

- \* *Our Fabulous Ronaldson Tippett Museum with R&T engines in ACTION! ... (Bring and display your own R&T engines too!)*
- \* *Ford Vehicles of all descriptions! Aussie cars, trucks, utes etc.*
- \* **Vintage Tractor Pull**
- \* **Big Stationary Engines**
- \* **Vintage & Classic Cars, Trucks & Motorbikes**
- \* **Sheep Shearing**
- \* **BSA & British Motorcycles**
- \* **Model Aircraft flying displays**
- \* **Working Demonstrations**
- \* **Vintage stationary Engines**
- \* **Fabulous Handcrafts**
- \* **Variety & Old Time Wares**
- \* **Tools, Axes, Chainsaws etc.**
- \* **Model Trains**
- \* **Model Powered Boats**
- \* **Delicious hot & cold food & drinks at affordable prices**

Old Ballan  
Racecourse  
Racecourse Rd,  
Ballan Vic.

9:00am -  
4:00pm

**ENTRY:**  
Adults \$10  
Family \$20  
Children U14  
Free



MOORABOOL  
Wind Farm

**Exhibitors:** Free entry for each exhibitor plus one helper or passenger. All others must pay entry fee unless pre-arranged. Tractor drivers and engine operators must have Insurance card/docs., & Driver's Licence. Junior operators under 17 must comply with NHMA requirements. Camping permitted. Set up Saturday OK.

**Enquiries:** Jason Palmer 0409 557 541, Ian Erwin 5368 1293, Ray Meadows 5368 1177