Machinery Preservation Club Of W.A. (Inc)

Midland Railway Workshops

A Short History by Bob Wallis (Revised June 2003)

This short account of the WAGR Workshops at Midland depicts an era in Western Australia's vibrant history where a vision was given to a forward thinking civil engineer and a passionate premier of this state. While both men became legends of our early development one went on to greatness and became Lord John Forrest and the other, Charles Yelverton O'Connor, sadly ridiculed, to suicide - our great loss.

To live in Western Australia during the formative years of gold discovery must have been awe inspiring with discoveries made, so to speak, daily. Our Premier and cabinet I'm sure would have been lobbied daily, and possibly nightly, by entrepreneurial shareholders and City Officials all badgering for Government expenditure in their locality, if not region. All baying for funds, a port here, a railway there, visions of grandeur and necessity everywhere!

Out of this finally emerges the necessity of a railway workshop to replace the existing one that could not cope with current rail infrastructure, let alone any future expansion. In addition, this story does not look at the "Fortunes of the Workshops", or its achievements; nor its failures, but it does purposely have a cursory glance at its beginnings and then focus on some of the service industries like the Powerhouse, the Boiler Room and the Pattern Shop. There are many other service industries that supplied the main functions of the workshops, locomotives and wagons, but they are all other stories.

In all articles and books written on Midland that I have read, important histories have been recorded on locomotive achievements, rolling stock requirements, repair facilities and so on - this is different.

John Coulsen Pearson, WAGR Fitter number 46:

Born in Victoria in 1866, moved to WA in 1896, joined the WAGR at Fremantle Workshops, transferred to Midland in 1904, retired, shortly after died in Western Australia on 11/11/1934 at the age of 68. He is the person I dedicate this short history to. Why? Because he was not only a fitter, but also a photographer who recorded some of our early history, workshops and otherwise. It is unfortunate that most of his glass negatives have been broken and are lost to us, however the ones that remain intact depicted his trade, and therefore his interest.

"The O'Connor Vision"

Sir John Forrest, Premier, and the people of this State were very fortunate in employing Charles Yelverton O'Connor, an Irish Engineer, as Western Australia's Engineer in Chief for the Public Works Department.

O'Connor arrived in WA in June 1891 from New Zealand and soon took up the offered position. One of his first duties was to visit all operations under his guidance. We all know the achievements and the sad demise of WA's greatest engineering asset. On the 10th March 1902 he rode from his residence in Fremantle, past the harbour and ended his life on the lonely beach front South of Fremantle near Robb Jetty.

What other achievements this great man could have made to Western Australia can only be dreamed of. His demise was our great loss; a lonely, remarkable man who we remember often when we think of current proposed engineering difficulties, "What would O'Connor have done?" However O'Connor also had Forrest to 'push the barrow'; O'Connor had the vision, Forrest made it work.

After inspecting the railway network and its assets in July 1891 he recommended to the Parliamentary Assembly that to ensure a better and expanding rail system new locomotive workshops, repair and maintenance shops were required. This was to replace the existing inadequate, badly placed, severely restricted and out-moded shops at

Fremantle built in 1886, five years after the Fremantle to Guildford railway was inaugurated as the first metropolitan railway in Western Australia. The Fremantle Workshops site was only 3.5 acres, too small for a vastly expanding and very isolated railway network 1.

O'Connor was met with stubborn opposition within the Assembly; however they too soon realised that the existing shops were very poorly equipped for a massively expanding rail system.

Gold was discovered in the Yilgarn (near Bullfinch) in 1890, and subsequently fields at Nannine, Coolgardie and Kalgoorlie. Western Australia was at the brink of a new era in both goldmining, agriculture and population. Gold! became the catalyst for the new railway workshops.

The Government purchased 105 ha of land at Midland and in 1892 appointed Allison D. Smith, a well trained and respected Mechanical Engineer from the Victorian Railways as a consultant to report on the needs of the Western Australian Railways.

He designed a workshop with 15,800 2m of floor space at a cost of $100,000. The Assembly rejected his ideal, possibly due to the large amount of capital required at a time when it seemed as though massive expenditure was blooming throughout the Goldfields and its Ports.

Money for infrastructure was needed everywhere. Railways for freight and expediency, water to sustain life, ports to accept people and machinery, municipal buildings to house rapidly rising populations. Gold was responsible, agriculture was on the rise and Fremantle, the premier Port had a very large political voice that outcried the city fathers of Albany, Esperance and Geraldton.

In 1893 O'Connor again raised the matter and the Assembly discussed it in November 1894. After a heated debate over the costs, they eventually moved an amended motion: "The railway workshops should be removed to a more advantageous site". This quelled the affair for a period, but O'Connor did not soften. He was the General Manager of the railways and he knew the rail system was failing because of its rapid expansion and because the relatively small Workshops at Fremantle could not cope.

1895 saw a change: O'Connor had won over Premier Forrest but the people of Fremantle were still bitterly opposed to the move. The main reason was the loss of jobs and a further loss to Fremantle commerce, thus possibly shifting some more of this activity to Perth or even Midland.

Politicians were not challenged on the job loss, but the economic suicide the State was considering, taking into account the huge expansion costs going on with the development of the Murchison, Eastern and North Eastern Goldfields, "can this State afford even more capital works programs than it has now!" "Will the Gold last?".

In September 1895 the Director of Public Works introduced a motion that "The Railway Workshops should be removed from Fremantle to a site near Midland Junction". The motion was passed, but again forgotten and not implemented. The debates continued, new committees met, arguments raged, amendments amended, promises made, more lobby groups asked for audiences and so on.

A new Workshops plan was produced by Campbell, McDonald and Quirk. It comprised of 29,2602m of floor area, almost double Smith's. O'Connor, "the man of vision and foresight", found the new plan "far from modern" for example, no provision for lighting by electricity.

O'Connor applied for and left for England in January 1897. (The railway from Perth to Kalgoorlie was opened for traffic on 1/1/1897) The government authorised him to consult a leading English experts in workshop design and construction. O'Connor sought the advice of Mr J.A.F Aspinall CME to Lancashire and Yorkshire Railways; Aspinall had earlier designed the important workshop centre at Hardwick UK.

O'Connor's earlier request to resign as acting General Manager of the Railway Department was granted in December 1896. John Davies, a former WA Government (railway) Traffic Manager was appointed in his place. This now allowed O'Connor more time to concentrate on his other duties, like the Fremantle Port and the Goldfields Pipeline and other purposeful projects.

Harold Dowson was appointed manager of the Railway Electrical Engineering Department in 1897.

Prior to O'Connor's departure for England, funds had been provided for the construction of the workshops on the Midland site. When preparing the Loan Schedule the Premier asked O'Connor to estimate the capital outlay for the next three years. O'Connor estimated it at $2m including $160,000 towards the construction of the workshops.

When O'Connor returned to the colony in September 1897 he found a complete change of railway policy, the entire $2m had been spent on trifling short term advantages for the Traffic Branch of the Railways, and nothing what-so-ever on the workshops; the progress went backwards and the need became more pressing.

More years passed and Fremantle still vocally opposed the move. At this time the workshops employed 450 men and Fremantle benefited. They realised that a great financial loss to the area would occur if the move went ahead. More committees, more plans, two more designs, greater floor space, higher costs, more funding issues and political interference continued to hamper the progress.

In June 1900 T.F.Rotheram was appointed to the position of Chief Mechanical Engineer of the Railway Department. His plan for the workshops was accepted by the Government, the seventh submitted since O'Connor's first; it was very similar to Aspinall's.

The WAG Annual Report in 1900 said "That unless new shops are provided we shall shortly be in a position of being compelled to purchase a further supply of new stock to replace that thrown out of traffic, which we have not sufficient accommodation or appliances to repair". The Annual Report continued to support the move and reported the difficulties at every opportunity.

By 1901 the railway's rolling stock, despite overtime, began to deteriorate at a great pace. Repairs and maintenance to all assets fell badly into arrears. Contractors were brought in to little avail, and available locomotives for train services diminished. The Railways started to flounder; however the new locomotives ordered by Rotheram (1902 C class 12, F class 15, 1903 E Class 30) began to arrive in July 1902 (2) and saved the Railways and Government from severe embarrassment.

In September 1901 Rotheram was asked to scale down his requirements and submit a revised plan, this was ready for the Assembly in December 1901. The report recommended a total outlay of $626,940 to cover the cost of the buildings, machinery and permanent way at Midland Junction.

By this time, ten years after O'Connor first put his plan, the Government began to realise the expanse of the railway; it had grown in length from 188 miles (1891) to 1,355 miles (1901) and it was becoming impossible for Fremantle, a workshops designed for a metropolitan operation, to carry out the requirements of a further expanding railway into harsh and demanding countryside in an isolated State. The people of Fremantle were beginning to lose their argument.

The 1902 WAG Annual Report still relates the difficulties, like bad water (high salinity) from Fremantle rusting out boilers, faulty drainage, accumulated arrears of repairs (being rushed), inefficiency of appliances and accommodation, and rising costs. It was decided after very careful consideration that a night shift in the boilermakers and blacksmiths shop should commence, which would lift production and lower the percentage of rollingstock in maintenance.

By late 1902, and after O'Connor's tragic death at Robb Jetty in March, another change occurred, the building of Midland Railway Workshops actually commenced.

Specifications and all information for ordering the machinery and plant to equip the new workshops were sent to the Public Works Department by April 1902 and the order left the State on the 26th May 1902. Existing machinery at Fremantle and Albany was earmarked to supplement the new machines. This not only cut costs but the operators did not require the necessary training in all the machinery sited at Midland.

The main workshops brick buildings were made from local clay dug from the banks of the Helena River, and in the vicinity of the Powerhouse tunnel and adjacent areas. The bricks were laid by German labourers specially imported and engaged for the job (3) due to the shortage of skilled labour in WA. Today (2003) 100 years later we see very little degradation of the bricks or mortar apart from the bricks in the "Boiler Shop" near where the Babcock and Wilcox boilers were.

In 1903 the work was sufficiently progressed and the Power-house operationally completed for the first 399 men to be transferred on the 4th January 1904. The remaining 600 or so men were transferred to Midland on 4th January 1905. In 1904 the Midland Workshops became generally known as the most extensive and best appointed railway workshops in Australia.

O'Connor's successor, James Thompson, reported the new shops completed at a cost of $948,000, 14 years after O'Connor had first recommended them to John Forrest.

Fremantle closed its doors on 5th January 1905. The old Great Southern Railway Workshops at Albany closed in April 1905 and the staff moved to Midland. The last shop to move was the Tarpaulin Manufacturing and Repair Shop, it transferred to Midland on the 17th May 1905.

The move saw major changes, the 1905 WAG Annual Report said it all when it reported that it was not unusual for the Fremantle yards to have 300 to 400 wagons waiting repair, Midland is so far averaging 150.

The Powerhouse, completed at the end of 1904, housed eight steam engines coal fired by Babcock and Wilcox and two “Lancashire" boilers. They supplied steam to the Powerhouse which in turn supplied electricity to the workshop complex. The water supply came from a 225mm bore that was 300 metres deep, this water also was used for the manufacture of the bricks for the original buildings.(3) The Government at one stage considered a pipe line from Mundaring Weir to supply the boilers totally with quality water, at a cost which must have been considerable. The massive feat needed for such a small volume must have prohibited that pipe project as the bore was persisted with until a better supply was obtained, however some time later Midland did use Mundaring water.

The supply of pressurised steam to various locations within the three main blocks was sent via a service tunnel. The main tunnel commenced at the river, near the bore, passes through the Powerhouse and stops just short of the main gate. Smaller service tunnels then connected each block. The Powerhouse has a direct link via a staircase to the tunnel. When the workshops modernised, these steam tunnels were converted to supply compressed air which again came from the Powerhouse building (3). Other service cables, water, etc also gained access to the “Blocks” via the tunnel.

1904 saw a new three cylinder blowing machine added to the existing one from the Fremantle workshops. The internal photograph of the Railway Workshops at the Midland Powerhouse depicts two blowing engines, one of these is still located within the Powerhouse and is in good mechanical condition, the other has gone. The Blowing Engine, a very noisy machine, supplied a large volume of low pressure air to the blacksmith hearths; because the system was old it was criticised often for supplying “Wet Air” to the smiths.(3)

(The government also purchased Babcock & Wilcox boilers for the Goldfields Pipeline projects and installed them at various pumping stations along the pipeline to Kalgoorlie. The Mundaring Weir Museum still has these boilers intact and on display)

The Powerhouse and Coppershop (Boiler House) building is of heritage significance and adds ascetic value to the 1904 group of buildings. To step into the Powerhouse is to step back in time. Even though the original steam engines connected to generating sets are long since gone, the 1930 compressors are imposing and majestic in appearance when considering the overall appeal of the room. The wooden staircase leading to the mezzanine balcony, which once contained the massive switchboards that overlooked the entire house, are in perfect condition and is both inviting and attractive.

Even though only one original machine remains, the high volume, low pressure three cylinder Blowing Engine, does not retract itself from the significance of the other machines. A casual glance to the ceiling will become a stare, as the “Herring Bone” tongue and groove timber ceiling clings to the roof structure as if in awe. Return to the floor and ask where do these traps, gullies and tunnels go? Peer longer and note the lattice worked cast steel gratings under foot that cover pipework to and from cooling towers and hot wells to the engines. Imagine the noise generated by these giants working to keep up necessary air supplies to the “Machines of Midland”. Return to 1943, the four cylinder Crossley standing by ready for action in the corner, waiting for the electricity supply from East Perth to fail, then the electric compressors come to a stand-still and the duty engineer rushing to turn the air cock valve holding back an available air supply to feed the Crossley flywheel to ignition speed, then Ignition! Compression! and an instant air supply to the Workshops Munitions Shop to constantly do its bit for the War Effort!

While all this is being taken in, nooks and crannies emerge to confuse the view and impress on the visitor to return once again to see if Oliver Twist and Mr Bumble really were in the shadowy distant corner of the Powerhouse.

The Powerhouse is a credit to its masters over the years who helped it remain in the 20th century with just a hint of the 21st.

A short time after commencing operations the boilershop took advantage of loading out cinders in the same wagons that brought the coal supplies. The coal was shovelled on to an elevator which took the supplies to the gravity feed bins above the boilers. Under the floor, another system then raked the cinders and ash from the boilers via an elevator to an overhead bin. Once the coal was unloaded the rail wagon was then filled with the dusty ash, taken to the banks of the river, emptied and returned to the Collie coalmines for more supplies.

The WAG Railways takeover of the Perth Electric Tramways on July 1, 1913 saw them gain control of all the significant power stations in the Perth area. They then planned the closure of the expensive and now outdated Midland Workshops coal fired station. On the 16th October 1913 an agreement with the Perth City Council was formalised whereby the Government undertook the building of a Powerhouse at East Perth. The First World War slowed progress, and the Midland Workshops Powerhouse continued to supply the workshops (and part of the town) with electricity and air until after the war. Some munitions manufacturing was done at the Workshops during the WW1 years.

During the 1920's the workshops were connected to the mains from East Perth (operational 1916) and most of the belt driven machinery was replaced by electric motors, this was referred to as the "Modernisation Scheme". However in photographs reputedly taken in 1938 depicting sections of the “Machine Shop”, clear evidence can be seen that some machines were still being powered by line shafts and belts.

The replacement and expansion of a lot of the obsolete machinery, saving on maintenance, was slowed to a temporary stop brought about by the inflated prices and materials after the first World War. (Part of the old belt driven machinery still exists in block 2, it was used as an example of belt driven machinery for the apprentices’ appreciation). By the end of the 1920’s the workshops were self sufficient in most respects. A visit to the Pattern Shop shows the extent of the self sufficiency where even patterns of a variety of nuts and other basic items are stored. The Blacksmith Shop has machinery for the manufacture of dog spikes, rivets and striking mounds of other basic items. Casual perusal of the 1923 Annual Report, or any other during this period, depicts not only a still expanding railway but also has the responsibilities of isolated branch lines, Tramways and Electricity Supplies.

The Pattern Shop is another inspiring 1904 building which had to produce new patterns as design changes were implemented or parts failed. New wagon fleets meant new patterns for castings, new and diverse locomotives again meant new patterns, and so on. The Pattern Shop shifted obsolete and little used patterns to out-buildings as time progressed. I understand that during 1930 most of the patterns in the old West Midland (ex Fremantle) storeroom were destroyed, and again in 1991 more room was needed so more patterns had to go. Even so at least 250,000 patterns are stored in this building today. A search has uncovered some dated 1902. A wander through the racks and rows and floors of patterns reveal an age of isolation, necessity, range, and sometimes wondering of all things, why did they need a pattern for a hexagonal nut, something that was in plentiful supply, basically anywhere?

The Water tower, now part of the Pattern shop gives an awesome sense of strength with its central columns bearing loads like Goliath. The brickwork, the arches doubled into two floors gives a feeling of the weight the building carried when it held the double tanks high to give a reasonable head pressure to the boilers supply. The connection of the mains supply, and the scrapping of the boilers meant the tower was obsolete. Shortage of storage and being in close proximity of the Pattern shop gave rise to its use, after the leaky tanks were removed, for pattern storage.

During 1930 the Boiler Room was slowly converted to become the Coppersmith's shop, with the transfer of fifteen men. This building was extremely hot, conditions were appalling, especially during the summer months with the heat from the boilers, the oil fired furnaces for annealing copper, smoke tubes and a number of coppersmiths coke fires and a white metal bench where this metal was poured, made it barely tolerable for the men; now add the heat of the day.

Prior to the partial shift to the Coppersmiths shop, the men and facilities were housed in an annexe adjoining the Fitting Shop (Block 3) on the South side. Slow phasing out of the eight "Babcock and Wilcox" boilers which supplied steam for numerous applications meant the coppersmiths had to work alongside the still commissioned boilers in cramped conditions until December 1930 when the new boiler room and coal bins were commenced at the East end of the Blacksmiths Shop. By the end of 1931 all the Coppersmith staff were located in the Boileroom, now called the Coppershop.

The Depression years saw budgets, workforce and capital spending slashed extensively, the rail network ceased to expand and concentrated on minimal necessary services to its clients and its network. The rail connection promises given to farming communities by government, but not yet connected to the network, were immediately withdrawn, and were never installed. Men who were out of work with families to support were lucky in getting work with the government expanding the water catchment areas in places not connected to scheme water, by utilising rock partitions on large rocky outcrops to drain the rainfall towards dams for railways and community purposes. Merredin Rock is a fine example of this type of structure and there are many others that are still operational today.

During the following years the white metal bench and coke fires were relocated to the annexe, built about 1936 and extended after World War II, at the rear of the Coppershop. This allowed room for positioning of overhead belt driven machinery along the east wall. The machinery included a 2 metre sheetmetal guillotine, tube saw and emery wheel, planishing hammer, punch and shears, tube swaging machine and a sheetmetal circular cutter; none of these machines survived to 1994. A number of hand and foot operated machines common to the sheetmetal trade were also installed (4); these did survive.

The Boiler Room, or Coppershop was stripped of its boilers to make way for the less costly direct supply of electricity from East Perth and to house an increasing trade in copper and tin. Ever so small hints of massive boilers, overhead feeders, sweat, grime, flues and refractory bricks still exist to give a second time visitor a feeling of being, a feeling that today's buildings cannot give.

The war years saw the Workshops change direction and all trades directed their efforts into munitions, spare parts, massive ships propellers, ships boilers, steering gear, winches and numerous other needs of the Allied Forces.

The expanding agricultural areas and railway network stemmed by the depression and the war never really recommenced. The depression, and later the second world war, saved our agricultural area from expanding into very marginal country, in hindsight a possible economic disaster area. At the same time the second world war gave us all new technology and an expanded view of life. Our isolation was now diminishing and overseas countries viewed us differently.

The Crossley engine that was brought in from the Eastern Goldfields, most likely from the Lake View and Star Goldmine at Kalgoorlie during the war years (some say no, but cannot suggest an alternative). The express purpose was for the supply of compressed air to the "Midland Workshops Munitions Shop" 24 hours per day, seven days per week, if needed. As the engine supplied its own power to generate air it gave the workshops, and essential services, a back-up supply in case there was an electricity failure. After the second World War the engine settled back to being primarily a back-up supply. During 1968, cylinder No 4 developed a crack in the water jacket and the engine was then only used in extreme emergencies. When this happened the injector was often removed from No 4 cylinder to keep the water/metal temperature low (5) and they could work it longer. This engine carries a brass plate depicting its ownership by the Ministry of Munitions. Some other machines throughout the workshops also carry the same ownership plate.

At the end of WWII the Coppershop employed 80 people, 21 coppersmiths, 17 apprentices, 11 sheetmetal workers with 3 apprentices, 3 plumbers and 1 apprentice, 2 galvanisers and office staff (5).

During the 50's the Midland Railway Co Paint Shop was relocated and erected to the West of the Coppershop, this in time became known as the Panel Shop. This building constructed from large jarrah beams and posts is clad in asbestos sheeting. It is a fine example of a railway workshops building, and is one of the few Midland Railway Co, and possibly the best remaining example in the Midland area.

During the early 1960's the remaining timber flooring in the Boiler Room was removed, the ash tunnels filled in and the floor concreted and levelled (6). A number of machines were purchased during this decade, and included a 3 metre "Hydrabend" and a 3 metre guillotine, which survived to 1997 (4). However during this period there were still 40 - 50 maintenance people attached to the machinery of the workshops to keep the ageing machines in good shape (5) The "Water Accumulator" was supplied by the water pumps in the Powerhouse, the two accumulators had centre rams 250mm to 300mm in diameter and were very difficult to seal as water scoured out these seals constantly. Eventually the press was removed and the 1,000 tonne press located in the Flanging Shop was used for all pressings. (5)

The role of the railways in Western Australia changed over the 90 years with the deregulation of various traffics from rail commencing in 1978 and the last in 1995. It became increasingly evident that there was a need for the Railways to become truly competitive and profitable in all areas. A point was arrived at where the economics of Midland, either as a Railway Workshop, or a Commercial entity had to be seriously considered. The rolling stock and locomotive stock had annually reduced to the current low maintenance "Core Task" rolling stock level.

A number of Economic Investigations for the Workshops, as previously with the State Engineering Works at Rocky Bay had been carried out and finally the Government announced in 1993 that the Railway Workshops at Midland would close its doors for the last time on March 3, 1994. The closure was announced on the 28th April 1993, ironically six days after a Quality Assurance (QA) accreditation audit supervised by Lloyd's Register gave the Workshops QA one month later (7) .

The first real change came to the workshops in 1991 when it first embarked on a QA program. This was seen as necessary for survival in the engineering marketplace outside of the depleting WA Railway needs. If the workshops were to survive it meant they must seek work other than traditional; QA seemed to be the first step in the re-modernisation process.

Part of this process meant that a large number of the old machines, dies etc could not meet the requirements of the modern QA workshops, so they were scrapped. It is a sad fact of life that two or three years prior to the complete closure a number of heritage machines were sacrificed in the Foundry, or Salvage Yard. On the other hand what is remaining is still of great heritage value with a number of Fremantle and 1903 machines remaining.

The closure saw a number of groups interested in heritage issues assess the older and original workshop buildings including machinery of "Heritage Value" to this State. A second vision is now beginning to emerge: We trust it will not, like O'Connor's take 14 years to become a reality.

Many overseas visitors have said the same words: “That we in Western Australia have something unique in the world - a railway workshop with both machines and patterns and buildings, something very few countries can say - Keep it intact - it is unique"!

O'Connor's vision may now be lost, but the spirit lives on!

(1) Midland Workshops - Industrial Archaeology Study C &MJ Doring Pty Ltd 1994.

(2) A History of WAGR Steam Locomotives by Adrian Gunzburg 1984

(3) Notes from a talk by Arthur Rowcliffe (ex Plant Engineer WA GR Midland

(4) Extracts from an article by Bob Taylor in "The WESTLAND" Feb 1988.

(5) Notes from a talk by Arthur Rowcliffe (ex Plant Engineer WAGR Midland)

(6) THE CHIEF C.Y. O'Connor, by Merab Tauman

(7) Midland Workshops - Industrial Archaeology Study C &MJ Doring Pty Ltd 1994.

References:

Suggested reading and acknowledgments to:

The Railway History of Midland Junction by Lindsay Watson.

The Annual Reports of the WAGR (1900, 1901, 1902, 1903, 1904, 1905, 1906)

Interview with Neil Hammer, ex Scientific Manager Midland Workshops.

A History of WAGR Steam Locomotives by Adrian Gunzburg 1984

Visit to the museums along ‘The Golden Pipeline’ for additional information