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Production at the Workshops

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The Ipswich Railway Workshops have served the Queensland Railways from the very beginnings of railway construction in Queensland. The railway system in Queensland developed as isolated railways based on coastal ports at Cairns, Townsville, Bowen, Mackay, Rockhampton, Bundaberg and Maryborough. Railway workshops were established to service these isolated railways. Even after the state's isolated railway systems were finally linked together many continued to operate servicing locomotives and rolling stock allocated to their district. Ipswich, however, remained the main railway workshops in Queensland for over 100 years. During the past 140 years, Ipswich has manufactured a huge variety of locomotives, carriages, goods wagons, rail motors, parts, and innumerable other items that would be impossible to tabulate. Canvas water bags for use by track gangs and train crews as well as tents for railway track gangs and even the military were amongst items manufactured. New boilers and many other items were manufactured at Ipswich for supply to workshops and depots across the state. Ipswich was the only Queensland Railways workshop to build new steam locomotives in addition to the usual tasks of a railway workshop – the general and partial overhaul of locomotives, rail motors and rolling stock.

❑ *Railway, workshop, locomotive, rail motor, rolling stock, Ipswich.*

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Queensland's first railway workshops were established at Ipswich in 1864 to support the construction of the first public railway. Ipswich, which had been declared a port in 1860, was chosen as the starting point for the Southern & Western Railway and the new workshops would continue to provide the necessary maintenance facilities for the railway when it was built. The buildings required for the workshops were brought out from England and assembled on the northern bank of the Bremer River. The first consignment of railway material arrived from England on 15 August 1864. Once the workshops were established, one of the first tasks required was the assembly of the four locomotives and necessary rolling stock that had been imported from England. Almost everything had to be imported from England. There were no local engineering works or foundries for the fledgling Southern & Western Railway to call on for the fabrication of parts or the numerous other supplies necessary for the construction of a railway (Queensland Railways, 1914: 20-21).

A WORKSHOP BEGINS

It is hard to imagine today the difficulties that those early railway engineers and labourers must have faced in handling the heavy items that were required for building the railway. The transfer of sections of heavy machinery like locomotive boilers, frames, girders, machine tools and so many other things from the ships arriving from England onto small paddle steamers would have been a challenge. These paddle steamers then transported the machinery up the Brisbane and Bremer Rivers to the railway wharf at Ipswich. Unloading from these paddle steamers onto the railway wharf must have presented an even bigger problem than the transfer in Brisbane. Ships from overseas would have at least had the rigging and heavy tackle necessary to handle these items but unloading at the railway wharf in Ipswich would have tested the ingenuity of those railway pioneers.

All of the locomotives and rolling stock brought out from England for the Southern & Western Railway had to be handled in this way, at least until the railway was opened through to Brisbane in 1876.

Once the railway line had been built from the railway wharf to the workshops site, a horse team was used to move the items up the steep river bank to the workshops until a locomotive was assembled and became available for this task.

The Queensland Government appointed Charles Fox and Sons, London as their engineering consultants and agents in England. This firm acted on the government's behalf calling tenders, letting contracts, purchasing equipment and undertaking the necessary inspections before despatch to Queensland. The company even arranged for the employment and passage to Queensland for the necessary skilled workmen. When the rolling stock had passed inspection it was disassembled and transported out from England as a kit of parts. They were sent out in small sections to enable easier handling when being trans-shipped at the mouth of the Brisbane River and transported to the Ipswich site where they were assembled (Queensland Railways, 1914: 20).

Slaughter, Gruning & Company were contracted to supply the initial order for four locomotives in 1864 (QRAR, 1866: 7). This company was at that time undergoing a re-organisation and name change, becoming the Avonside Engine Company (Fitzgibbon, 1866:7).

The first four locomotives were classed as the A Class (Figure 1). The first locomotive to be put in steam after assembly at the workshops was named "Faugh-a-Ballagh" which

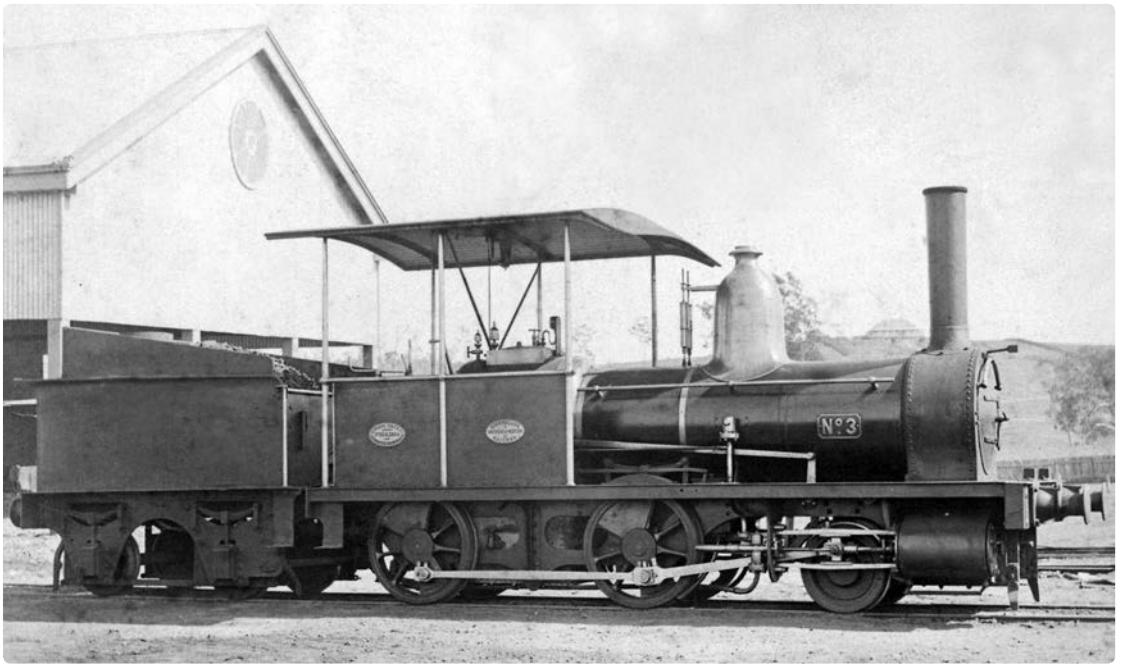

FIG. 1. No.3 was one of the first four locomotives delivered from the UK. It was assembled at Ipswich in 1865. Image courtesy TWRM / QR.

is Gaelic for "clear the way". This took place on 11 January 1865 when it spent most of the day hauling a goods wagon and eight-wheeled coach between the workshops, Wide Gully and the railway wharf, giving free rides to local people (Queensland Railways, 1914: 23).

The Ipswich Railway Workshops had assembled and trialled the remaining three locomotives which had been named, "Premier", "Lady Bowen" and "Pioneer" by the end of February 1865.

Ashbury Railway Carriage & Iron Co Ltd., Manchester, England supplied the first carriages and wagons for the new railway. One Smoking Saloon, six composite, four second class and six third class passenger carriages along with two passenger brake vans were supplied. Goods wagons delivered comprised twelve ballast wagons, six covered wagons, four timber trucks, six wagons suitable for sheep and a further six for cattle, four horse boxes and two wagons suitable for carrying horse-drawn vehicles. These 38 items of rolling stock were assembled at the new workshops.

The workshops, using some imported parts, constructed 12 new goods wagons between August and December 1865 following the official opening of the railway line from Ipswich to Bigge's Camp on the 31 July 1865 (Fitzgibbon, 1866: 8).

Following the opening of the railway to Toowoomba on the 1 May 1867 it was found that there was a significant increase in repairs needed. Ipswich Railway Workshops now had to deal with turning tyres for locomotives and wheels for carriages and wagons which had travelled less than a third of the previous distances before such work was required. The constant sharp curves on the ascent of the Main Range to Toowoomba

caused considerable wear on locomotives and rolling stock.

This work was an unexpected addition to their already heavy workload assembling new wagons, carriages and rolling stock and all the other work associated with the establishment of a new railway system (Plews, 1867: 7).

Ten years after the opening of the first railway the Ipswich Railway Workshops had settled into a routine of maintenance work on locomotives and rolling stock as well as the assembly of imported locomotives and rolling stock, and the manufacture of local rolling stock using imported parts. By the end of 1875, expansion of the Ipswich Railway Workshops site was hampered by its cramped location, as its workload increased. During that year five new locomotives imported from Kitson and Co. were assembled and entered traffic and a further 11 locomotives went through the Workshops for overhaul. The overhaul work included the fitting of a new boiler barrel to A Class locomotive No. 2, retubing of boilers and general boiler maintenance, fitting of new tyres, bearings and motionwork. Stationary boilers and portable engines also received attention. The rolling stock section was also busy having constructed 11 new passenger carriages, 2 brake vans and 65 goods wagons as well as undertaking extensive overhauls on a further 58 carriages and wagons. The whole wagon fleet then available, numbering some 380 vehicles, received some attention during the year. The major overhauls of rolling stock included body repairs and renewals, new wheels, axle box brasses and new brake blocks as well as painting. During this year the Workshops also turned out castings and fittings for the extension of the railway to Brisbane, office and station fittings and furniture as well as lamps and sack barrows (QRAR, 1875: 20).

The engineering facilities that the Workshops provided extended to new areas. The Workshops supplied the iron roof, water pipes, hydrants and other fittings for a new steam locomotive shed 150 feet long for the Railway's Traffic Department at Ipswich in 1876. Points and crossings were provided for the trackwork associated with the new station in Brisbane as well as palisading for the station itself. Castings and other items were produced for external customers such as the Ipswich Waterworks and the Government Roads Department (QRAR, 1876: 27).

The Commissioner for Railways, A.O. Herbert, pointed out in his 1875 report that there were concerns that work at the Ipswich Workshops was being hampered by the late arrival of imported parts and the long delays that occurred from the date of placement of an order for locomotives and their arrival date. The construction of new locomotives at the Ipswich Railway Workshops had not previously been considered to be an economically viable proposition.

Timber stocks, imported years earlier with rolling stock from England, were running low by this time and local sources for timber were being considered for future needs. Space near the Workshops was being sought to store and properly season the timber (QRAR, 1876: 6).

BUILDING OUR OWN

The Government decided in 1876 to test the viability of local locomotive manufacture through the building of five locomotives at Ipswich Railway Workshops using material that had been supplied as spare parts with the first four locomotives from the Avonside Engine Company. The locomotive was a 2-4-0 similar to the first four locomotives but was fitted with a larger tender and a different style cab. This locomotive was numbered 36 and

issued to traffic on the Southern & Western Railway in August 1877. The locomotive was sold into private ownership in 1892 but had a total service life that lasted for 60 years. The longevity of this locomotive is a tribute to the workmanship of the men at the early Ipswich Railway Workshops.

It was at this time that Ipswich Workshops extended the width of new carriage stock from 6 ft 6 inches to 7 ft 6 inches which reportedly resulted in an improvement in riding qualities as well as an increase in interior space for passengers. A special 16 ft long, 4-wheel carriage was built at Ipswich Workshops for use by the Posts & Telegraphs Dept in 1877. This was the first time that such carriages had been provided. They were used by post office staff to sort mail while the train was in transit. Mail bags could be collected or delivered without the need for the train to stop. A further three Postal Vans were built in 1879. These vehicles were referred to as T.P.O. – Travelling Post Office vans (Figure 2). The postal train service was introduced on 1 January 1877. These 4-wheel carriages were

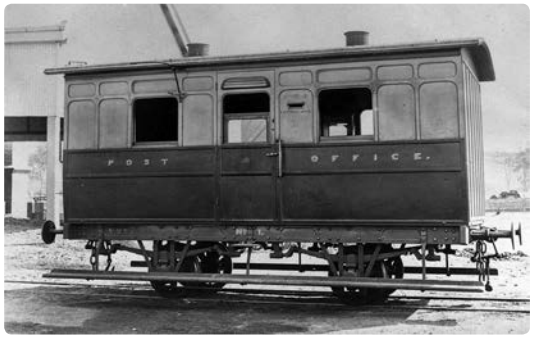

FIG. 2. Early 4-wheel Travelling Post Office Van built at Ipswich Workshops. Image courtesy TWRM/QR.

FIG. 3. E Class 2-6-0 No.34 built in 1878 is one of six locomotives built at the Ipswich Workshops between 1877 and 1885. Image courtesy TWRM/QR.

later rebuilt into two bogie cars at Ipswich Workshops by mounting two 4-wheel bodies onto a single frame. A number of postal vans were built and operated over the years but the last vans were finally withdrawn in 1932 (QRAR, 1877: 4-5).

Two E Class 2-6-0 locomotives were completed at the Workshops in 1878, using some duplicate parts that had been supplied by Kitson & Co, with earlier contracts for these locomotives (Figure 3). They carried running numbers 34 and 35. Henry Horniblow, the Locomotive Superintendent, reported that although they cost about £400 more than a similar locomotive supplied by Dubs & Co, Glasgow he considered the resultant difference to be favourable. A.O. Herbert, the Railway Commissioner, felt this comparison was unfair and went further by comparing the cost of construction against the average cost of the last twelve locomotives imported from the UK. The difference was now only £8 more, indeed a very favourable result (QRAR, 1878: 5).

Following a report from the Select Committee on the Ipswich Railway Workshops in September 1879, no more locomotives were built there for a time, despite parts having already been acquired from the UK. However, a saloon carriage, 32 feet long, was built in 1879 especially for the Sydney Exhibition at the Garden Palace. The workmanship reflected great credit on the Ipswich Railway Workshops staff. The quality and appearance of Queensland timbers were also a highlight and much remarked upon by visitors to the Exhibition (QRAR, 1879: 5).

HENRY HORNIBLOW

Henry Horniblow, who had been employed on 28 June 1864 as Assistant to the Locomotive and Carriage Foreman, Southern & Western Railway, was appointed Locomotive Superintendent for the Southern & Western Railway on 1 January 1877 and on 1 July 1883 became Locomotive Engineer, Queensland Railways, responsible for all the railways across the Colony (Figure 4). Whilst Horniblow worked mainly out of the railway offices located in Brisbane he was assisted by a Locomotive Foreman at each of the railway workshops and a Locomotive Superintendent, Richard Thomas Darker, at Ipswich Railway Workshops. It is obvious reading the Commissioner's Annual Reports for the ensuing years that all the workshops facilities, especially those at Ipswich were being severely strained by the increasing workload. The railway construction work being undertaken meant a significant increase in the requirements for new locomotives and rolling stock as well as a very heavy demand for maintenance work. The manufacture of replacement boilers for locomotives was now being undertaken although boiler repairs and the fabrication of new fireboxes had been commenced in earlier years.

The parts purchased in 1877 for the construction of further locomotives were finally put to use in 1883. The boilers for these locomotives had already been built in 1879. They were designed at Ipswich Railway Work-

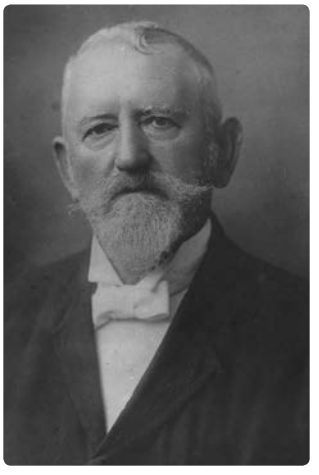

FIG.4. Henry Horniblow. Image courtesy TWRM/QR

shops with two completed in 1884 followed by another in 1885. These were small tank locomotives designed by Henry Horniblow. Their design was a break with the construction of progressively bigger locomotives. Intended for local trains near Brisbane, they had a 2-4-2T wheel arrangement and were fitted with cow-catchers at either end. They were classed as 4D10 and given the running numbers 72, 73 and 74 (QRAR, 1884: 149).

Construction work for new carriages had been undertaken in the open for some time due to the cramped nature of the site on the north bank of the Bremer River (Figure 5). The construction of new rolling stock was made easier when the Workshops were expanded to a new site north of Wide Gully, in the mid-1880s. Several brick workshop buildings were provided at this location between 1884 and 1888 providing more spacious under-cover working areas.

The old workshops were severely affected by the floods in 1893 with water rising to 13 feet above rail level in the erecting shop. Some floodwater also entered the new buildings at the northern end of the site. Much work was needed to clean up the site and get the machinery going again, with the additional problem of coping with repairs to the rolling stock that had been under water as well as continuing the normal maintenance programs (QRAR, 1893: 57).

FIG. 5. A carriage supplied by Ashbury in 1864 rebuilt at Ipswich Workshops in 1876. Image courtesy TWRM/QR.

BOILER EXPLOSIONS AND NEW WORKSHOPS

Following the explosion of two locomotive boilers that took place at Roma Street within a few months of each other in 1898, assessments were undertaken regarding the state of all locomotive boilers then in use and their inspection and maintenance programs.

> The workshops at Ipswich have for years past been totally inadequate to the work involved in carrying out ordinary running repairs, as they are not only far too small, fully one-half of the work having to be performed in the open air, entailing during wet weather and in the heat of the summer considerable loss to the Department, but they are insufficiently equipped with the necessary labour saving devices. Robert J. Gray, Commissioner for Railways (QRAR, 1898).

The resulting inquiry led to the government appointing William H. Nisbet, a locomotive engineer with experience in the UK and India, as Queensland Railways first Chief Mechanical Engineer whilst Horniblow became his deputy. Nisbett had been employed as General Manager of the Westinghouse Brake Company of Australia at the date of his appointment.

William Nisbett, who took up his duties on 11 August 1899, was scathing in his reports about the inadequate facilities at Ipswich. Nisbett oversaw the development of the early stages of the new Ipswich Workshops. He ensured the government maintained its commitment to the construction of a new and more spacious workshop facility at the northern end of the Ipswich site something

which had been long overdue. Modern equipment was installed including machine tools powered by electricity.

> The existing workshops and appliances are totally inadequate for the amount of work required to be done in order to maintain things at a proper standard of efficiency, and the fact that for some years past the amount of work done in repairing engines has fallen short of the necessary requirements by about 50 percent will give you some idea of the trouble which I have now to face. William H. Nisbett, Chief Mechanical Engineer (QRAR, 1900:77.)

Nisbett's reign was short-lived however as he resigned suddenly, following the death of his brother, who had taken over from him at the Westinghouse company.

The primary purpose of a railway workshop such as Ipswich is the maintenance of locomotives and rolling stock in use on the railway. The various shops within the Ipswich Railway Workshops each contributed to this overall task. The Boiler Shop (Figure 6) repaired and manufactured new boilers, as well as heavy metal shaping. The Wheel Shop (Figure 7) prepared new wheel-sets and axles for use and retyred and machined old wheel-sets to the necessary tolerances. The Foundry cast metal fittings while the Pattern Shop produced the wooden patterns required to produce the castings and the Machine Shop (Figure 8) machined the

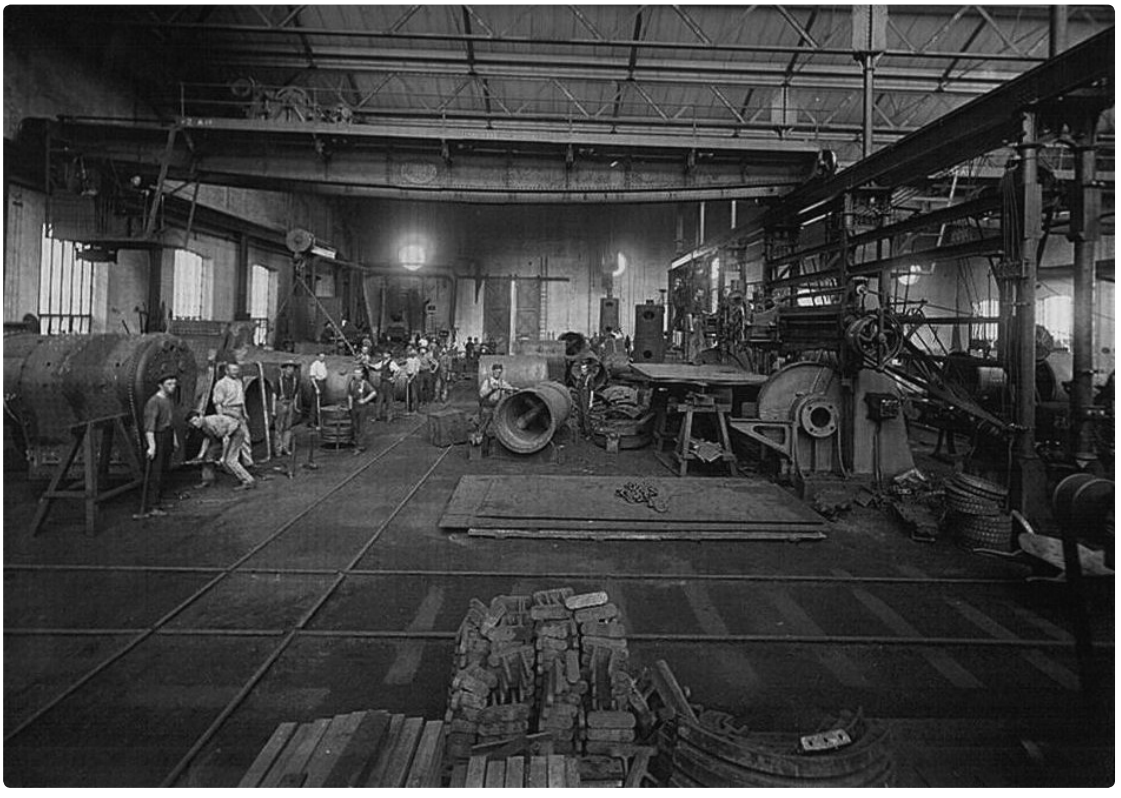

FIG. 6. Boilers under construction in the Boiler Shop. Image courtesy Whitehead Studios.

rough castings, fittings and forgings to the tolerances required for use. Some of the other shops included the Blacksmiths and Spring Shops, the Electroplaters Shop where the chromed door handles, luggage racks and other fittings were produced, the Sawmill supplied the required timber and the K-Mill used this timber to produce the specialised timber shapes for use in carriage building and repairs (Figure 9). The Wagon & Carriage Shop built new goods wagons and passenger cars as well as undertaking repairs on old rolling stock. Locomotives were dismantled for overhaul in the Erecting Shop (Figure 10). Replacement parts, new boilers were fitted and the locomotives reassembled in this

FIG. 7. Wheel sets take up almost every square inch of floor space in the Wheel Shop while the lathes are busy along either side of the building turning the tyres to the required standard. Image courtesy Whitehead Studios.

FIG. 9. Interior view of the K-Mill where timber was milled to the special shapes required for building the wooden carriages. Image courtesy Whitehead Studios.

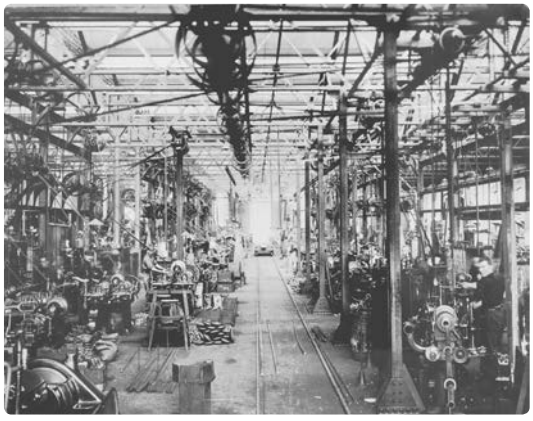

FIG. 8. The Machine Shop was a cluttered workplace with the machine tools lined up either side of a trolley track used to deliver and collect the items that needed machining. The line shafting and drive belts added to the general clutter. Image courtesy Whitehead Studios.

FIG. 10. The Erecting Shop was where all the components to build a locomotive from the various workshop buildings came together for assembly into the end product. Image courtesy Whitehead Studios.

shop. New locomotives were also built and imported locomotives were assembled or completed here.

PRODUCTION

Conversions of carriages and wagons at Ipswich Workshops were frequently undertaken through the years, to cater for special requirements and to meet the needs of traffic demands. Locomotives were also sometimes the subject of rebuilding and conversions to improve performance (Figure 11). The 93 members of the B15 Class 4-6-0 steam locomotives had been built between 1889 and 1900 with several more being made for the Chillagoe Mines and Railway Co. up to 1909 and which subsequently came into the ownership of Queensland Railways. The Ipswich Railway Workshops did not build any of these locomotives but many of those working in the Southern Division were rebuilt at Ipswich between 1903 and 1929 with larger driving wheels to increase their speed and other improvements. Other B15 Class were similarly rebuilt at railway workshops in other centres. These locomotives were classed as B15 Converted or B15 Con as they were more commonly called.

By the end of 1901, there were 237 locomotives, 361 carriages and 4,672 wagons in the Southern Division which were usually overhauled at the Ipswich Railway Workshops (Figure 12). When required some assistance was rendered from smaller depots at Toowoomba and Warwick (QRAR, 1902: 75).

Other locomotive and rolling stock workshops were built at strategic locations across Queensland to serve the needs of the separate railway systems that had been built. However, the workshops at Townsville and Rockhampton did not build new locomotives. Even after the isolated systems were finally linked (with the exception of the Cooktown to Laura and the Normanton

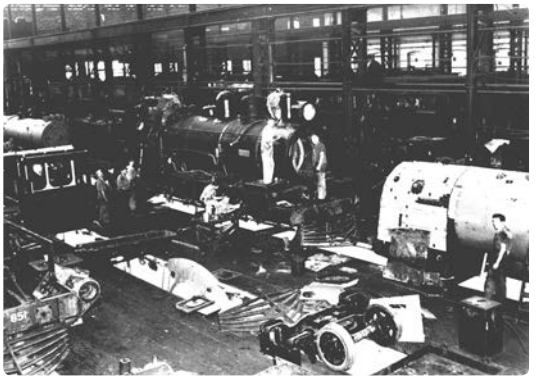

FIG. 11. Steam locomotives being assembled in the Erecting Shop. Overhauls were also carried out here with the locomotive disassembly taking place and later reassembly after worn parts were replaced or repaired. Image courtesy TWRM/QR.

to Croydon lines) in 1924, the provincial workshops were retained and a new one built in Toowoomba to minimise the distance required to travel to Ipswich. This also fostered the state's policy of decentralisation. Queensland Railways was administered by divisions and each division had its own workshops with additional workshops at Cairns and Maryborough.

The completion of the major new building program at the Ipswich Railway Workshops and installation of modern machinery meant there were now improved facilities that were better equipped to manufacture locomotives.

Following Nisbett's resignation in 1901, George B. Nutt became Chief Mechanical Engineer. Production at Ipswich Railway Workshops improved as new facilities became available. Night shift had been abolished but some overtime still needed to be worked in the Boiler Shop because of the large volume of work (Figure 13).

Nutt also put forward plans for a new locomotive type in 1902. This was for a 4-8-0, 16" diam. cylinders with an overall weight suitable for operation on 41 ¼ lbs rail. Despite disquiet from the Civil Engineering depart-

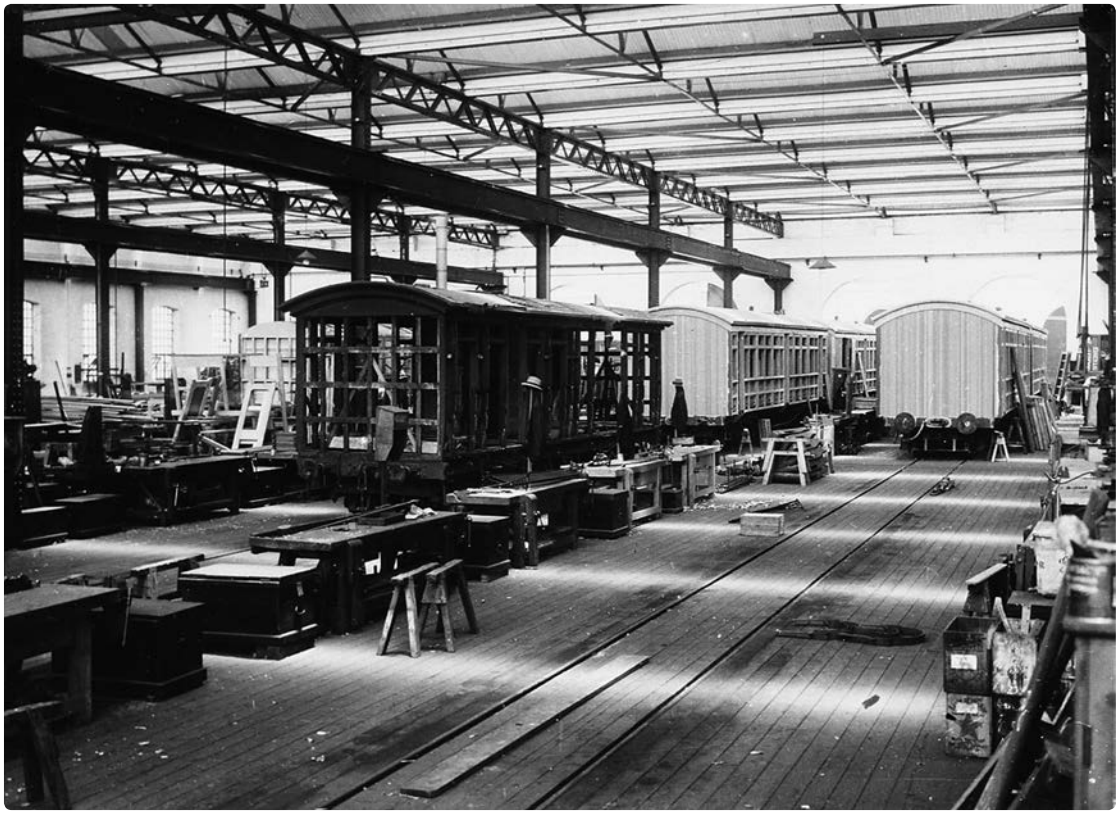

FIG. 12. The Wagon and Carriage Shop, unlike the Erecting Shop, required mainly timber working skills to manufacture the many carriages and wagons needed for the railway. Overhaul of the rollingstock was also an important task. Image courtesy TWRM/QR.

FIG. 13. Tubeplates for steam locomotives were manufactured in the Boiler Shop using a large hydraulic press. The heavy steel plate was heated in a furnace until it was red hot to soften it before being placed in the press. Image courtesy Whitehead Studios.

FIG. 14. The first C16 Class locomotive No.395 was built as an experiment at Ipswich Workshops in 1903. The locomotive was a success and production commenced in 1907. Image courtesy TWRM/QR.

ment concerning the use of this locomotive on older main lines without some bridge strengthening, approval was given for a prototype to be built at Ipswich (Figure 14).

This locomotive, with running number 395 and classed as a C16, emerged from the new Ipswich Railway Workshops in November 1903. It was the first of 210 steam locomotives to be built at the new workshops location (QRAR, 1903: 83).

During 1903, an example of the fine craftsmanship of the workshops staff, and the use of Queensland native timbers was turned out of the Ipswich Railway Workshops. This carriage was intended as an Inspection Car to replace Car 327 which had been burnt out in 1901. This vehicle, numbered 445, when it entered service in September 1903, was referred to as a Special Saloon or Governor's Car (Figure 15). On 19 October 1903 an article describing the car was published in the "Brisbane Courier":

> A new car has recently been constructed at the Government railway shops, Ipswich, which possesses many new features in carriage building in this State. The principal dimensions are:- Length over platforms 50 ft. 6 ins; length of body, 45 ft; width of body 8 ft 7 ins; height from rail level to top of roof, 12 ft; total weight 24 tons.
>
> The outside appearance of the car is decidedly handsome, the lower portion of the body being sheeted with narrow match boarding of Queensland cedar, while above the windows extends a wide fascia relieved by decorated panels of silvered plate-glass. The roof is made of a large clerestory, having ventilators which are protected with wire gauze for excluding ashes from the interior of the car. The end platforms are provided with ornamental railings and hinged gates; one of these platforms is specially extended and provided with seats and ornamental canvas sunshade to form a lounge where travellers can have an uninterrupted view of the country through which they are passing. The carriage runs on two four-wheeled bogies constructed of steel, having wheels 3 ft diameter; each bogie is provided with a swinging bolster carried on compensating spiral springs, which further distribute the load through the main bogie frame on to four long laminated springs over the axleboxes. The smooth running of the bogies is further enhanced by the employment of India rubber washers, between the bearing spring connections and the frame. The main underframe of the car is constructed of steel special sections, riveted together; this frame is provided with buffers and draw-gear, having Spencer's patent India rubber springs. The car is equipped with the Westinghouse brake, which can be operated from each platform. The carriage body framing is made of Indian teak and Oregon pine, and built on a system in which the sides of the car form a girder, thereby obtaining strength and rigidity, which is impossible in carriages that are provided with side doors.
>
> Internal Arrangements – The internal arrangements of the carriage may be described as follows:- On entering the end door from the platform there is a small general compartment provided with seats, which can be made up as beds; off this compartment there is lavatory accommodation on one side and on the other a pantry

containing stove, kitchen utensils, racks for plates and dishes, etc, and that very important accessory in this climate, a good ice chest. Proceeding further along the carriage there is a side corridor, off which open two state rooms and a bathroom; each state room is provided with suitable seating accommodation, and the back of the fixed seat can be operated by a somersault gear to form a bed, thus giving sleeping accommodation for two persons. The state rooms are provided with separate lavatory accommodation of the most up-to-date pattern. The bathroom is provided with a shower and sitz bath; the whole of the water service throughout the car is operated by the Westinghouse brake air pressure. The further end of the corridor opens into a large compartment, which is termed the "Observation-room"; this room has no fixed furniture, everything being movable in the way of easy chairs, couches, etc which have been specially made of silky oak, upholstered with hair cloth. The treatment of the interior is highly decorative with columns and arches of the composite order, and having several paintings by the artist, Edward Fristrom, introduced as panels in a most effective way. A table is provided in the "Observation-room" giving dining accommodation for six persons. The inside of the car is ornamented with photographs and panels of beantree and crowsfoot elm, with mouldings of carved silky oak. All the roof timber is of Queensland pine, and the ceiling panels are of Lincrusta Walton, and the general finish is enriched by the introduction of a number of bevelled edge mirrors, and various silver-plated fittings, which are usually to be found in railway carriages. Special attention has been paid to the floor, which is double boarded, with insulating material between for deadening the noise. The floor is covered throughout with cork carpet of special thickness, over which is laid handsome Axminster carpet. The car is lighted through with electricity, which is supplied from a dynamo fixed under the carriage, and worked off one of the axles.

FIG. 15. The interior of Special Car 445, The Governor's Carriage. Image courtesy TWRM/QR.

A further six small 0-6-0T locomotives were constructed at Ipswich in 1904. These were built using a mixture of parts resulting from the conversion of B15 Class locomotives including wheelsets from the original B15 Class locomotives and cylinder blocks that had been ordered by the Chief Mechanical Engineer, W.H. Nisbet, before his resignation. Nisbet had intended to use these 13 ½" cylinder blocks on B15 Class locomotive conversions. These new locomotives carried the running numbers 396 to 401 and were intended for use as shunting engines in larger marshalling yards such as Mayne

FIG. 16. B18¼ Class 4-6-2 No.231 and a set of Sunshine Express carriages all built at Ipswich Railway Workshops in 1935, photographed at Mayne. This train was for service on the North Coast Line between Brisbane and Cairns. Image courtesy TWRM/QR.

(Armstrong, 1985: 88-89).

Construction of fifteen new carriages for the Sydney Mail which operated between Brisbane and Wallangarra began at Ipswich in 1909. These cars were said to be "equal in width to those on English railways". Each train was to consist of five corridor coaches as well as a Travelling Post Office and brake van (QRAR, 1909: 9).

Orders were placed for further 4-8-0 locomotives following the successful testing of the prototype between Brisbane and Toowoomba. Forty were built at Ipswich between 1907 and 1912. A further ten C16 Class 4-8-0 locomotives were built at Ipswich between 1915 and 1917. The demand for new locomotives, carriages and wagons could not be met by Ipswich Railway Workshops alone so much of the rolling stock was built by private contractors.

By the 1930's, although wagons and carriages were still being produced externally, Ipswich Railway Workshops built all the carriages for the new Sunshine Express service linking Brisbane and Cairns which commenced operating in May 1935. (Figure 16).

In a change of focus, at the request of the Commonwealth Government, during World War I the Commissioner for Railways entered into a contract during 1915-16 to produce 18-pounder High Explosive Shells at Ipswich Railway Workshops. This work necessitated the installation of specialised plant and machinery. The production caused some problems as it was a line of work very different to what the Workshop staff were used to. The work was stopped on 30 June 1916, again at the request of the Commonwealth. A total of 4,157 shells had been delivered in that time with a further 15,800 at varying stages of manufacture. The logistics of World War I were far different to the those which the Ipswich Railway Workshops would have to face during World War II when it was imperative that the Workshops keep locomotives and rolling stock operational for the movement of

troops, ammunition and supplies at all costs (QRAR, 1915: 20).

C F PEMBERTON

C. F. Pemberton, joined the railways in 1891 as Locomotive Foreman, Ipswich, and became Chief Mechanical Engineer in 1911. Pemberton oversaw the completion of a new 4-6-0 locomotive type that had been designed by the Locomotive Engineer, Henry Horniblow in 1909. The B17 Class were intended for use on the Sydney Mail train between Brisbane and Wallangarra. Twenty-one of these locomotives were built at Ipswich until mid-1914 (QR, 1914: 94). As Chief Mechanical Engineer, Pemberton was considered an innovator as he implemented a number of new ideas. The C18 Class 4-8-0 locomotives, designed in 1914, are considered to be one of his finest achievements. These impressive express passenger locomotives were, like the B17 Class, intended for use on the Sydney Mail. The three locomotives in this Class were all built at Ipswich in 1914. The second one built, builder's number 70, was the first superheated locomotive on Queensland Railways. This locomotive became No.693 and was named "Sir Wm MacGregor". The final C18 Class No.694 carried the name "Lady MacGregor" (Armstrong, 1994: 39).

Electricity was produced in the Workshops Power House to power the machine tools and electric lighting around the Workshops site since Nisbet's time. A new 1,000 kW generator was installed in 1914 and by 1915 the Workshops Power House was producing electricity for lighting at Ipswich station, goods yard and the locomotive depot in addition to the Workshops requirements (QRAR, 1915: 142).

In 1914 the State Government took control of a 2′ 0″ gauge shire tramway based around Innisfail, together with a section of mill

FIG. 17. The 3′6″ gauge Aramac Shire Tramway closed in 1974. The small diesel locomotive was a product of Commonwealth Engineering, Rocklea to the same design as the 2ft 0in gauge cane locomotives. It was rebuilt and regauged at Ipswich Railway Workshops for further use on the Queensland Railways' owned Innisfail Tramway. Image courtesy TWRM/QR.

tramway. This tramway became known as the Innisfail Tramway when it came under the control of the Queensland Railways. Despite the distance from Ipswich, the Workshops were involved in work associated with the tramway. The Ipswich Railway Workshops produced nine passenger cars and 114 goods vehicles for this tramway between 1915 and 1966. A number of the diesel locomotives which had taken over from the steam locomotives on the tramway during the 1950s were sent to Ipswich Workshops for modification to multiple-unit operation in 1966 (Figure 17). A 3′ 6″ gauge diesel mechanical locomotive built by Commonwealth Engineering, Rocklea and purchased second-hand from the Aramac Shire Council, was rebuilt and regauged to 2′ 0″ gauge by Ipswich Workshops in 1974 (Armstrong & Verhoeven, 2000: 88).

RAIL MOTORS

Queensland Railways have always been proud of their innovation. Locomotive development was stifled by light-weight track and bridges and there was little financial ability to improve this. The small

locomotives serving the Queensland population were generally able to cope with much of the traffic. The railways provided services to small country communities that often did not necessitate or warrant the expense of a steam locomotive and carriages. Gasoline powered rail motors were first tried in 1913 with the purchase of five cars built by the McKeen Motor Car Co. in the United States. They were not a great success but their use encouraged Queensland Railways to look further into the use of petrol powered rail motors. The Ipswich Workshops turned out the first of many rail motors in 1916. The first production vehicles were very small and were based around Napier or Studebaker road vehicles (Knowles, 1967: 147-150).

Perhaps one of the most famous of these early rail motors was the Panhard & Levassor built in 1918 (Figure 18). It was used on the isolated Normanton to Croydon Railway until 1941 when it was written off and stored in a shed until rescued for the Redbank Locomotive Museum in 1969. The Panhard is now on display at The Workshops Rail Museum at Ipswich, where it had been built almost 90 years previously. Unpowered trailers for carrying additional passengers or goods, such as cream were also built (Knowles, 1993: 22-25).

A total of 96 rail motors were built at Ipswich between 1916 and 1957 with a further 143 trailers (Figure 19). The final two rail motors to be built were to be the prototype for the 2000 Class (Figure 20). The Chief Mechanical Engineer's office at Ipswich Workshops

FIG. 18. The Panhard Railmotor, also known as RM14, on display at The Workshops Rail Museum. Image courtesy TWRM.

FIG. 19. Railmotor RM 83 was built in 1936. It was one of the early diesel railmotors built at Ipswich Railway Workshops. Prior to 1934 they had been built with petrol engines. RM 83 is seen here at Mayne with two trailers also built at Ipswich. Image courtesy TWRM/QR.

FIG. 20. The last railmotor to be built at Ipswich Railway Workshops was the prototype for the 2000 Class. These units, 2000 and 2001, were designed at Ipswich. Image courtesy TWRM/QR.

designed these, with all work including construction of the cars, bogies and all installations being carried out at Ipswich. These vehicles were unusual in having their bodies covered with satin finish aluminium sheeting. Subsequent 2000 Class rail motors were built by Commonwealth Engineering at Rocklea with the bodies sheeted in stainless steel (Winney, 1956: 144-147).

STEAM LOCOMOTIVE IMPROVEMENTS

The advantages of superheating had been recognised before the last C16 Class locomotive had been turned out in 1917. An improved version of the C16 Class having a superheated boiler and larger 17" diameter cylinders with a 4-8-0 wheel arrangement was designed. A contract with Ipswich Railway Workshops to supply ten of these new locomotives was let in 1915. However, delays in the supply of material such as the superheaters and man-power shortages caused by World War I meant that the first of these locomotives did not leave Ipswich until 1920. The C17 Class became the second most numerous class on Queensland Railways with 227 locomotives built, although only the first ten were actually built at Ipswich Railway Workshops. Remaining members of the class were supplied by external contractors. The most numerous class was the PB15 with 232 locomotives but only one of these was built at Ipswich and that was for a shire tramway.

Problems with smoke and cinders were encountered in the two long tunnels between Roma Street and Central and Central and Brunswick Street stations on Brisbane's suburban rail network. In an effort to overcome this problem a prototype coke burning locomotive was built at Ipswich Workshops in 1918. This locomotive was unusual for Queensland Railways in that it had a 2-6-2 wheel arrangement and was fitted with Southern valve gear. The two-wheel trailing truck enabled the fitting of the wide firebox, necessary for a coke burning locomotive. It had 16½" cylinders and was numbered No. 204 of the B16½ Class (Armstrong, 1994: 46-47). This was the sole representative of this type built.

The state railway system in Queensland had developed through the construction of several isolated lines running inland from coastal ports in order to tap the rich agricultural resources of the state. Most of these were gradually joined as the railways were extended. The final link was made at Daradgee, north of Innisfail, on 10 December 1924, providing a continuous railway line from Brisbane to Cairns. As the line along the east coast was extended a decision was made to build further examples of the successful C18 Class locomotives. However in 1920 Pemberton decided that the C18 design could be improved and an order was placed with Ipswich Railway Workshops for twenty superheated 4-8-0 locomotives with 19" diameter cylinders. These were classed as C19 and were turned out of Ipswich between 1922 and 1927. During 1923, the one hundredth locomotive to have been built by the Ipswich Railway Workshops was produced. This locomotive, No. 702, was fitted with nameplates, "Centenary", to mark this milestone (Figure 21). Fortunately one of these locomotives, No. 700, survived to be placed on display at the Redbank Steam Locomotive Museum until its closure in 1992 and it is hoped it will be a future exhibit at the new Workshops Rail Museum which was opened at Ipswich Workshops in 2002 (Armstrong, 1994: 66-70).

One of the more unusual production tasks to occupy the workforce at Ipswich Workshops took place in late 1919 and January 1920 when an engine from a Vickers Vimy bomber was repaired for Ross and Keith Smith. The aircraft was being flown from England to

FIG. 21. The one hundredth steam locomotive to be built at Ipswich Railway Workshops was C19 Class 4-8-0 No. 702, entered service in December 1923. It was named Centenary a year later, one of the few steam locomotives to carry a name on Queensland Railways. Image courtesy TWRM/QR.

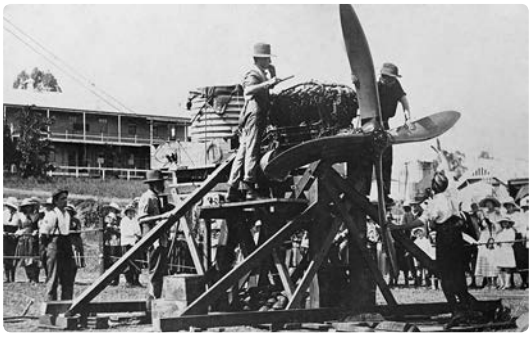

FIG. 22. Ross & Keith Smith's aircraft engine from their Vickers Vimy bomber being tested at Ipswich Workshops after repairs in 1920. Image courtesy TWRM/QR.

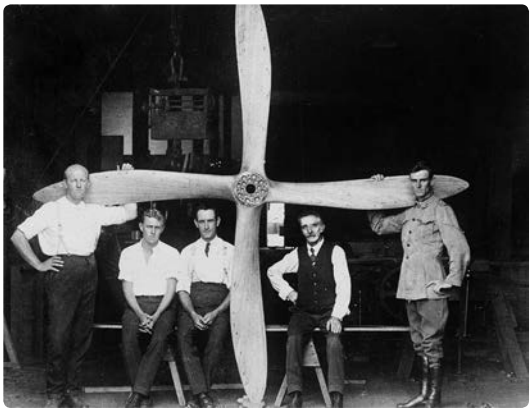

FIG. 23. Propeller for Sir Ross and Keith Smith's aircraft made in the Pattern Shop in 1920. Image courtesy TWRM/QR.

Australia and force landed at Charleville with engine problems. The offending engine was removed and transported by rail to Ipswich Railway Workshops where the ingenuity of staff successfully repaired the engine and also manufactured a new wooden propeller (Figures 22 and 23). The completed engine assembly was set up on a frame in front of the Power House and test run, much to the delight of visitors who had come to the Workshops by special excursion train to view this new technology. This work was undertaken by the railways for no charge (BC, 10/01/1920: 4).

An important area of production that is sometimes not fully appreciated is the training of skilled tradesmen. The railways have always been a major employer of apprentices across a wide range of skilled trades. In 1923 a new approach was made in

producing the specialist tradesmen required. A number of apprentice instructors, drawn from a selected group of competent tradesmen, were appointed to Ipswich Workshops. These men represented skills in the Boiler, Machine, Erecting, Carriage and Paint Shops. They were assigned to the apprentices in each section and reported on each apprentice's progress to the Works Foreman on a monthly basis. Instead of the apprentices having to attend Technical College they were taught in a room, specially set up for the purpose, on site at Ipswich Workshops. It was found that this saved time and improved discipline. There were 132 apprentices undergoing tuition in 1923 (QRAR 1923: 22-23).

> *I believe that the railways produced the best tradesmen in Queensland.* Colin Ford – Patternmaker

In 1924, Ipswich Railway Workshops built a PB15 Class locomotive for the Aramac Shire Council. The locomotive was required for the Council's Aramac Shire Tramway which operated between Barcaldine and Aramac. This locomotive is unusual in a number of ways. It was the only PB15 Class locomotive to be built at Ipswich Workshops. It was also the only locomotive to be built at Ipswich for an operator other than Queensland Railways, and furthermore it was built to a design that dated from 1900, as this locomotive was fitted with Stephenson's valve gear rather than Walschaert's valve gear then in use (Armstrong, 1985: 68).

The increasing population in Brisbane meant that passenger numbers on the suburban rail network was also expanding. There were insufficient 6D16 Class locomotives available and the Traffic Department was forced to use tender locomotives to destinations not having suitable turning facilities. Tender-first running on suburban passenger trains was undesirable as the reduced speed caused problems in maintaining schedules. There was a pressing need for additional tank locomotives to cope with the demand for suburban passenger workings. The 6D17 Class tank locomotives were designed at Ipswich and were similar to the 6D16 Class but were fitted with superheated boilers as well as having an increased cylinder diameter. The first ten were supplied by Walkers Ltd, Maryborough in 1924 and a further ten were built at Ipswich between 1925 and 1926 (Armstrong, 1994: 71-73).

In an attempt to cope with the requirements for increased haulage capacity and speed on the main lines, a new class of locomotive was designed and built at Ipswich Workshops as an experiment. This locomotive had a 4-6-2 wheel arrangement, 51" diameter driving wheels and 18¼" diameter cylinders. The B18¼ Class locomotives introduced several new design features to Queensland Railways.

A further ten D17 Class tank locomotives were turned out from Ipswich Workshops between 1937 and 1942. The "6" was dropped from the class designation at this time as 6-coupled locomotives were the only type of tank locomotives then operating.

The Drawing Office, located in a large timber administration building on the hill at the northern end overlooking the Workshop site, was responsible for much of the innovative design at Ipswich Railway Workshops. A Locomotive and General Section was located on one side of the building and a Carriage and Wagon Section on the other. The Drawing Office was responsible for

> ...I little dreamt that I would be there for the next 41½ years...

producing the many thousands of drawings needed to manufacture and overhaul locomotives and rolling stock at the Ipswich Railway Workshops.

In May, 1940, I was called to Mr

> *Deacon's office and he asked me if I wished to be transferred to the Drawing Office. I said "Yes", and was told to report there for duty the following morning. When I did so, I little dreamt that I would be there for the next 41½ years.* W.W. Henderson, B.E. (Qld), retired Engineer for Design and Construction, Mechanical Branch, Queensland Railway.s

Continuing the theme of railway innovation a small diesel mechanical locomotive was

FIG. 24. The first Government Railway diesel locomotive was built at Ipswich Workshops in 1939. Image courtesy TWRM/QR.

designed and built at Ipswich Railway Workshops in 1939. Cyril Renton, Designing Mechanical Engineer at the Workshops was responsible for the design of Queensland Railways' first diesel locomotive (Figure 24).

It was originally built as a 0-6-0 with outside frames and a jackshaft drive from the gearbox under the cab floor driving the axles with connecting rods. It was trialled in the Brisbane area and found to travel with a pronounced sway from side to side. This was overcome by the Workshops staff through the addition of a leading bogie, making it into a 2-6-0, an arrangement which helped stabilise the locomotive. This locomotive was intended for the lightly trafficked and lightly laid Etheridge Railway which ran from Almaden to Forsayth, west of Cairns. The design and success of this diesel locomotive was a credit to all concerned at the Ipswich Railway Workshops, considering they had never built anything like it before. A further three were built by other builders between 1935 and 1961. They could be operated by one man either as a single locomotive or in multiple up to all four of the class depending on the seasonal loading requirements of the branch. They continued to serve the Etheridge Railway after an initial attempt to replace them with 60 ton diesel electric branch line locomotives which were found to be prone to derailing on the line. The diesel mechanicals were finally replaced by the Walkers Ltd, 40 ton diesel hydraulic locomotives introduced in 1969 (QRAR, 1940: 7).

The depression years in the early 1930s and the years following until World War II severely affected the Ipswich Railway Workshops, resulting in dismissals and short time working. Little or no new construction took place and many repairs were deferred. Some locomotives were never repaired and were written off – six C16 Class locomotives in 1935 and over 30 PB15s and some B15 Con locomotives (although some of these were later reinstated). The same occurred on the carriage and wagon side too.

WORLD WAR II

The War Years between 1939 and 1945 were particularly busy for the Ipswich Railway Workshops with many additional jobs needed for the Defence Forces besides the requirements of the railways. Production was tested to the limits with additional workers from interstate, shift work, double shifts and much overtime required. The skills and ingenuity of the Workshops staff came to the fore during this trying period. The Workshops were heavily involved in many aspects of wartime manufacture including

FIG. 25. Ambulance Train at Tolga, c.1942. Image courtesy TWRM/QR.

the production of machine tools, heavy castings and many other items required for the war effort. A special workshop was built by the Commonwealth Government specifically to supply the specialised tools and accurate gauges necessary for the manufacture of ammunition and other military equipment. In addition to this work, the Workshops had a very heavy workload to ensure the locomotive and rolling stock fleet were kept operational. The war in the Pacific meant that Queensland was in the front line and it was essential that trains were kept moving transporting troops, munitions and supplies needed for the war effort. Rolling stock was even altered for war purposes. Recruiting and ambulance trains were set up by the conversion of a number of passenger carriages (Figure 25). They subsequently were converted back again once the requirement for these conversions had passed.

> The past year has been a strenuous one for this department, and considerable reorganisation has been undertaken to cope with the increased demands on the railways and the increased war effort. A. S. Deacon, Chief Mechanical Engineer & Workshops Superintendent 19/8/1942.

The Tool and Gauge Shop, built by the Commonwealth Government, came into production in August 1941. By 30 June 1942, the Tool and Gauge Shop had supplied 11,000 tools and gauges to the Rocklea Ammunition Factory, with a further 9,000 items in various stages of production. A staff of 187 produced 41,527 tools during the following year to the end of June 1943. The variety of tools included Small Arms Ammunition Tools (36,100), Quick Firing Case Gauges (1,352), Allison Aircraft Overhaul Tools (308) and Rutherford Naval Shell Projectile Tools (435).

Attached to the Tool and Gauge Shop was an air-conditioned Metrology Laboratory. This area was responsible for the very accurate measurement and checking of the tools and gauges being produced. The small arms gauges were required to have a tolerance no greater than 0.0003 inch. In order to meet

this specification the Tool & Gauge had to manufacture check gauges to a tolerance of 0.00003 inch. All gauges were required to be submitted to the Inspector General of Munitions at Maribyrnong in Victoria before final acceptance (MEB-AR, 1942).

> The year's activity has revealed the pleasing fact that we have now built up a staff of highly skilled toolmakers capable of undertaking the manufacture of any gauge or tool within the capacity of our machines, or to any tolerance within the limits of precision of our measuring equipment. W.L. Wood, Officer-in-Charge, Tool and Gauge Section 17/8/1943.

There was also an urgent need to increase the production of specialised castings in the Foundry at Ipswich whilst still maintaining output of normal production needs for the railways (Figure 26). The Ipswich Railway Workshops took over the nearby Barbat's Foundry in September 1941. Barbat's had closed during the depression years. The site provided an extra 8,000 square feet of moulding floor space. The first 2½ tons of mouldings were poured on 30 October 1941. This foundry produced 995 tons of light castings, including 845 tons of locomotive brake blocks to the end of June 1942. Other casting work here included firebars, baffle plates and wagon and carriage axle boxes. The combined output of railway brake blocks from the two foundries amounted to 1,788 tons or 186,070 individual brake blocks an increase of 77% above the production of the 1940-41 year.

> *I joined the railways in 1942 when part of the moulding shop had been moved to Barbat's old foundry to cope with the wartime demand. It was so busy the*

FIG. 26. Foundry – casting headstocks for a 36" lathe, 1943. Image courtesy TWRM/QR.

moulders had to work a six day week. Vic Kay – Moulder.

The Ipswich Workshops foundry created history at this time with the casting of a marine engine bed, high pressure cylinders and smaller brackets and sundry fittings for the manufacture of a 3,000 hp marine engine. During the 1941-42 period the foundry also undertook the castings for fourteen sets of distilling machinery for defence force ships as well as beds for lathes used in the production of gun barrels. These castings weighed up to 30 tons. The heaviest brass casting produced was a 30 cwt brass liner for the tail shaft of the 3,000 hp marine engine (Figures 27 and 28). Whilst the foundry undertook the castings they then were forwarded to the Machine Shop for machining and finishing. The Railway Workshops had the staff with the skills and the machinery capable of undertaking this work (Jones, 1942).

The Barbat's Foundry was closed at the end of May 1943 and the staff and equipment

FIG. 28. The lathe was been dismantled, packed into crates and loaded onto a train ready for Despatch. Image courtesy TWRM/QR.

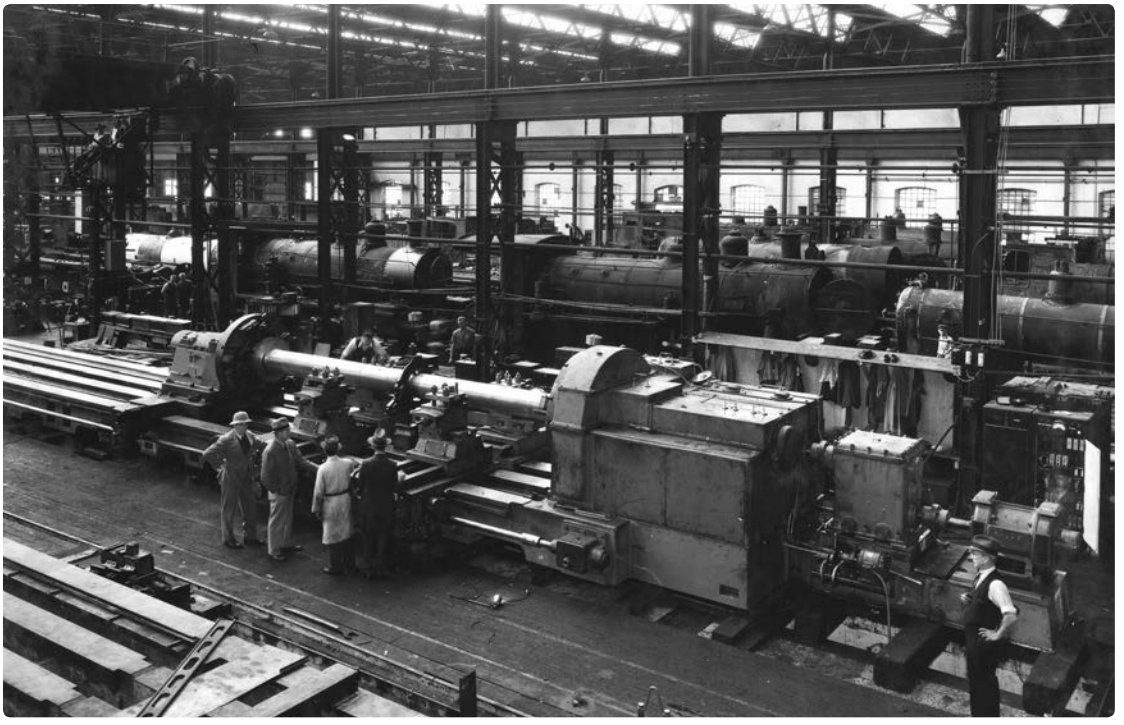

FIG. 27. The largest machine tool to be made in Australia up until 1943 was made at Ipswich Workshops during World War II The 36" lathe is being tested in the Erecting Shop before being crated and despatched. Image courtesy TWRM/QR.

transferred back to the Ipswich Railway Workshops. The machinery at Barbat's was dismantled following completion of work on Friday afternoon, transported to the Workshops, and refitted in readiness for production to recommence on Monday morning (Jones, 1943).

The Workshops even stepped forward during 1943 to make crates for aircraft engines, when delays were being encountered in the production of wooden packing cases for the Department of Aircraft Production by Hancock Bros at North Ipswich, due to shortages of timber.[1]

The war in the Pacific meant that Queensland Railways were suddenly in need of more motive power. The Railways were keen to acquire more C17 Class locomotives but there were no resources available to construct them in Australia and they could not be obtained from Europe. The specifications for a C17 type were supplied to the Americans and the result was the AC16 Class. Twenty 2-8-2 steam locomotives manufactured by the Baldwin Locomotive Works, Philadelphia in the USA were obtained by the Commonwealth Government in 1943. The Ipswich Workshops assembled these locomotives and prepared them for service (Armstrong, 1994: 103-108).

The Commissioner for Railways summarised the contribution of Ipswich Railway Workshops to the War Effort in his report for the year ended 30 June 1945 when he said

> The railway workshops also assisted materially by the production of large amounts of munitions of war. A railway workshop designed for construction and repair of locomotives, carriages and wagons is necessarily at a disadvantage in the production of war equipment while still continuing its normal job at higher pressure than ever. Railway workshops in Queensland, particularly those at Ipswich, and Rockhampton, rose to the occasion, and by intelligent improvisation on the part of both engineers and tradesmen a remarkable variety of work essential to the effective prosecution of the war was carried out. Amongst the great number of jobs handled at Ipswich might be specially mentioned a number of large lathes (one of the largest machine tools built in Australia up to that time, 78 feet long by 10 feet wide), crank shafts for aeroplane engines, distilling and evaporating machinery for the Navy, 100 ton presses for the production of shell and cartridge cases, machining of castings for 1,500 ton presses, preliminary turning of 25-pounder gun barrels, patterns, castings and forgings for 3,000 hp marine engines (the bed plates of these weighed 16 tons each, and the mould for the castings occupied a cavity 17 feet square by 10 feet deep in the foundry floor), "Hepburn" lathe beds, forging presses, bottle jacks and salt baths, depth charge carriers, machines for loading machine gun bullets, saddles and aprons for shipbuilding lathes, containers for aero engines and many others.

The years immediately following the end of World War II presented a serious problem to the Railway Department. There were staff shortages as well as shortages of material. These issues were a source of frustration as they caused delays in delivery of new locomotives, as well as repairs to those in service. The economy was booming and there were better opportunities for workers in private industry. The introduction of the 40 Hour Week also exacerbated the problems.

The war years had seen the locomotive and rolling stock fleet put under severe strain with these items kept operational beyond their normal service lives.

There was a big demand for new, modern rolling stock and almost all of it was let to outside contracts.

POST-WAR PRODUCTION

> *I joined the railways with 70 other apprentices in 1952. I was an apprentice wagon builder. In the 1950s we worked in teams of four. A team would only take a week to build one wagon from start to finish*. Rod Parkinson – Wagon Builder.

Post-war production continued apace. The pace and variety of production is well illustrated by the Paint Shop. It was always a busy place and they, like many other sections in the Workshops had to cope with a diversity of work. The work of the painters was often one of the final workshops' tasks before a product was issued for use whether it was a locomotive, carriage or a lavatory seat. In addition to painting tasks the Paint Shop was responsible for cutting glass sheets to size for use within the Workshops and for supply to outside depots. Paint was mixed and prepared for outside depots as well. An example of the diversity and volume of this work can be seen in Table 1.

LAST OF A GENERATION

The last steam locomotives to be built at Ipswich Railway Workshops were the DD17 Class suburban tank locomotives. The design for these locomotives was undertaken in the Chief Mechanical Engineer's Drawing Office at the Workshops. Their tractive effort at 80% boiler pressure was 19,584 lbs compared to the 16,950 lbs of the D17. They also for the first time gave the suburban

Table 1. Example of the Paint Shop Output – 1959/60 Financial Year [2]

Item	Quantity
Carriages – painted, repainted and touched up (includes 3 new air-conditioned cars & 21 repainted)	223
Rail motors and trailers repainted	13
Locomotives repainted (including 3 diesel electric locomotives)	123
Wagons spray-painted	968
Goods brake vans repainted	31
Wagons retarred	1900
Carriage roofs painted	343
Springs painted – new	4117
Springs painted – repaired	4974
Screw couplings painted – new	228
Screw couplings painted – re-paired	235
Turton buffers painted	716
"D" links painted	336
Pressure gauge dials repainted and rewritten	97
Chairs polished	151
Cash boxes painted	30
Guard's kit boxes painted	8
Ambulance stretchers painted	30
Guard's boxes painted	11
Glass frames and blinds painted	835
Glass cut for stores and depots	6065
Destination boards painted and written	97
Apprentice's tool boxes painted	10
Soil pipes painted	96
Miscellaneous items painted	671
Window beading painted	4500 ft
Casing painted	2600 ft
Buffers and side lamps painted	1170
Car sheathing painted	5500 ft
Lavatory seats and flaps painted	104 sets
Tables for Redbank	50
Paint Manufactured:	
Roof paint	3780 gallons
Other colours	424 gallons
Apexior	190 gallons
Varnish remover	1500 gallons
Leather dressing	340 gallons

FIG. 29. DD17 No. 950 on display at the Queensland Industries Fair, held at the Brisbane Exhibition Grounds in 1949. The DD17 suburban tank locomotives were the last class of steam locomotive to be built at Ipswich Workshops. Image courtesy TWRM/QR.

tank engines sufficient capacity in water and coal to make the trip to Ipswich from Roma St without the need to stop at Wacol, as the D17 black tanks had needed to do in the past. There were innovations in the design and construction used for the first time in Queensland (Figure 29). The cylinders were of welded construction fabricated from mild steel plates instead of the usual cast iron castings. All steel fireboxes fabricated with welded seams and using flexible stays at the front and sides of the crown were fitted. Acceleration from a standing start at station platforms was improved. The engines used a modified valve gear which allowed a longer travel for the piston valve and an increased stroke for the piston. There was also an improvement through a modification to the counterbalancing of the driving wheels. The bogies incorporated control springs and links to permit greater freedom of side movement when rounding curves. All axles were fitted with roller bearings similar to the 6D17 Class locomotives built in 1938.[3]

DD17 Class No.1051 left the Workshops in July 1952, the last of a long line of locomotives to be built at Ipswich. Between 1877 and 1952, the Ipswich Railway Workshops had manufactured 216 steam locomotives and one diesel locomotive.

Up until about 1959, the Ipswich Railway Workshops continued its primary function of overhauls to steam locomotives and rolling stock much as it had done for the past 94 years. At the same time, diesel electric locomotives, first introduced to the railways in Queensland late in 1952, were prepared for service and painted at Ipswich Railway Workshops and were also overhauled at Ipswich. The transfer of maintenance on the diesel electric locomotives to the newly opened Redbank Railway Workshops saw a gradual drop off of work at Ipswich. The end of steam locomotive traction on the state's rail system in 1969 meant the focus of production at the Ipswich Railway Workshops changed considerably. The overhaul of steam locomotives and the manufacture of new boilers for the steam locomotive fleet was now no longer required. The Boiler Shop was turned over to the production of steel wagons and containers. Refrigerator wagons and bogies from air-conditioned carriages were repaired in the former Steam Shop. The Foundry had been transferred to the Redbank Railway Workshops in 1965. The old Foundry building was now used for Westinghouse brake repairs and bogie repairs and was renamed the Bogie Shop (Anon, 1970:247).

Some products formerly made or maintained at Ipswich continued to be produced but new business was also being introduced. A program to improve efficiency and overhaul work practices was announced by the Minister for Transport in January, 1987. This was expected to lead to the loss of almost 450 jobs in the Ipswich workforce over two years bringing the number of employees down to 1,115. New business was to include the overhaul of the electric suburban trains

(Lane, 1987).

Despite the track between Ipswich station and the Workshops not being electrified, Ipswich was given the task of undertaking the first overhauls of the electric multiple unit suburban cars introduced in 1979. A

FIG. 30. Following electrification of the Brisbane suburban rail network the first suburban electric trains were overhauled at Ipswich Workshops. Image courtesy TWRM/Queensland Rail.

diesel locomotive would tow the units to and from the Workshops. The first units entered the Workshops in November, 1988. By the 30 June 1989, the Ipswich Railway Workshops was refurbishing electric multiple units at the rate of one three-car set every twenty working days (Figure 30). This work was subsequently transferred to Redbank Workshops.

A number of additions were made to the machinery and equipment at Ipswich during 1988-1989, including two new 12 tonne overhead cranes in the Boiler Shop and a radio-controlled overhead crane in the Wheel Shop to assist in improving production efficiencies (QRAR, 1989:17).

Ballast wagon VBO 46303 entered service in March 1993 bringing to a conclusion the production of 112 of these wagons at Ipswich Workshops. In 1991, Ipswich had been awarded a contract to construct 60 of these wagons but this was subsequently increased to 112. Ipswich Workshops staff demonstrated their commitment, despite reduced numbers of workers, with all wagons delivered ahead of contract and within budget (QRAR, 1993:34).

The first Chief Executive Officer of the new Government Corporation, Queensland Railways, Vince O'Rourke, envisaged a new, modern, Queensland Rail with the latest technology and innovative ideas. He also felt strongly that the Railways should not forget their "roots" and that the heritage of Queensland Rail was important. Vince O'Rourke had selected DD17 Class No.1051 from the Redbank Museum as a suitable candidate for restoration. Following its re-entry into service in September, 1993 another steam locomotive was removed for restoration to working order from the closed Redbank Steam Locomotive Museum. This was the largest steam locomotive ever to have worked in Queensland, Beyer Garratt No.1009 (Anon, 1993: 251).

Ipswich Railway Workshops was also continuing to produce major items of rolling stock. In 1993/1994, the Workshops turned out 54 VSN class 90 tonne coal wagons and 49 PCZY 80 tonne container wagons, a total of 193 wagons. In 1994/95, the Workshops were also producing BCZY class container wagons with an order for 100 vehicles being extended by an order for a further 70 (QRAR, 1994: 41-42). These were to be the last pieces of rolling stock produced on the site.

The Ipswich Railway Workshops has had an enviable history of quality production spanning innumerable product types, not just new rolling stock as listed above. Everything from canvas water bags to staff boxes, lamps and production of components

Table 2. New Locomotives & Rolling Stock Produced at Ipswich Railway Workshops 1865 to 1970 (Source: McDonald, n.d.). (Not including imported items assembled or only partly manufactured in conjunction with external contractors)

Locomotives and Rolling Stock	Quantity Produced
Steam Locomotives	216
Diesel Locomotives	1
Railmotors	96
Railmotor Trailers	143
Passenger Carriages	874
Guard's Vans	207
Goods Wagons	11802

for use by external contractors and other railway workshops. Between 1877 and 1952, the Ipswich Railway Workshops had manufactured 216 steam locomotives (Table 2). Together with the manufacture of new rolling stock including rail motors and rail motor trailers between 1865 and 2000, this is a very impressive record.

NOT THE END OF AN ERA

Despite the end of the steam locomotive era in 1969 and the phasing out of wooden rolling stock, Ipswich has continued to maintain its association with these two production areas. Three steam locomotives were maintained in working order at the direction of the State Government. These locomotives were used for excursion traffic and on special occasions. These locomotives were maintained by the staff at Ipswich Workshops who have passed down to newer staff members the skills necessary to maintain a steam locomotive. A fleet of wooden heritage carriages is also maintained at Ipswich for this excursion traffic. The special skills of the carriage builders at Ipswich are needed for this work.

Several steam locomotives from the closed Redbank Locomotive Museum were selected for restoration to working order by the Ipswich Railway Workshops. A new boiler was made in Victoria as part of the restoration project for AC16 Class locomotive No. 221A. This project led to QR designing their own welded boiler for the popular C17 Class of which there were a number in operation on heritage railways in New South Wales and Queensland. Two welded boilers were built at Ipswich Workshops although the plates were cut out and rolled outside the Workshops as the necessary plant was no longer available at Ipswich. All the other work, including the specialist welding required, was undertaken at Ipswich. One of these boilers was sold to the Southern Downs Steam Railway in Warwick who were restoring C17 No. 917. The second boiler was fitted to C17 No. 974 which had been in continual service with QR since it was built in 1951 being one of the three locomotives retained for excursion service following the end of steam in 1969 (Figure 31). The growing Heritage Fleet, which now comprises six locomotives, is a source of pride for QR and its staff and greatly appreciated by the general public (Figure 32).

The Workshops main focus has always been the repair and maintenance of locomotives and rolling stock but there have been numerous other projects associated with Queensland Railways operations and external customers as well. The workers have undertaken many tasks. Through, their efforts during two World Wars and during the difficult times of Queensland's history they have tried new and innovative ideas and have given the Ipswich Railway Workshops a reputation for quality and workmanship that should make all the workers, past and present, justifiably proud.

FIG. 31. Welded boiler in the Ipswich Railway Workshops, c.2000. Photo D. J. Mewes.

FIG. 32. C17 No. 974 undergoing a major overhaul. Photo D. J. Mewes.

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❑ ENDNOTES

1. Letter Assistant Chief Mechanical Engineer & Workshops Superintendent to Chief Mechanical Engineer, 19/7/1943

2. Summary of Work Performed – Ipswich Railway Workshops, Year Ended 30 June 1960 – W A Castley, Chief Mechanical Engineer & Workshops Superintendent

3. Chief Mechanical Engineer's Office, Ipswich 18/8/1949