OUT OF SIGHT OUT OF MIND
Tram maintenance as a neglected part of Sydney’s tram history

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Recently I was involved in pre-demolition recording of buildings and equipment at the former Randwick Tramway Workshops and Dowling Street Tram Depot, two major elements in the maintenance infrastructure behind Sydney’s once large but now extinct tramway system.

Sydney had a large fleet of trams, typically around 1400-1500 tramcars during the years 1914 to 1950. Obviously these trams needed repair and maintenance to keep them running reliably and safely. However, on researching the history of the Randwick Workshops and the Dowling Street Depot, I found that although tram maintenance services employed about 20% of tramways staff and played a crucial role in keeping the tram system operating, tram maintenance has received little, if any, mention in published histories of Sydney’s Tramways.¹

The following account is based on the author’s study of the building and operation of the Randwick Workshops and Dowling Street Depot, inspections of the surviving buildings and equipment and a study of the vast stock of contemporary tramways documents and photographs held by the Archives Authority of NSW, the Urban Transit Authority, State Rail Authority Archives, and a collection of trade union newspapers and Parliamentary reports held by the State Library of NSW.² These sources have revealed a great deal of interesting information about the two-tier system under which the maintenance of Sydney’s trams was shared between the depots and the central Randwick Workshops. The system was too involved...
to describe here in detail, but can be briefly summarised as follows:

From 1902 at least, the electrical and mechanical maintenance of Sydney's trams was carried out by staff of the Electrical Branch, under the control of the (Chief) Electrical Engineer. Tram tracks and tramways buildings were constructed and maintained by staff under the control of the Per-Way Engineer and/or the Engineer for Tramways. The public tram services were operated by drivers, conductors and related administrative staff belonging to the Traffic Branch, under the control of the Traffic Superintendent.

The suburban tram depots, where the trams were stabled, were staffed predominantly by the Traffic Branch, but also had a small contingent of men from the Electrical Branch to carry out routine daily maintenance of the trams. For example, at Dowling Street Depot (Sydney's largest, with a nominal capacity of 280-300 trams), there were typically around 1000 Traffic Branch men and 100 Electrical Branch men, the latter divided into about 50 men working night shift and 50 on day shift. The Electrical Branch men had control of the large tram sheds, which were in effect vast 'inspection pits' with the trams sitting on elevated rails about 1.6 metres above the sunken concrete floor.

Each night the 50 or so Electrical Branch men on night shift would clean the trams, lubricate the bearings, and check and adjust the brakes and other mechanical and electrical components according to their respective duties as Fitters, Pitmen, Oilers, Controlermen, Cleaners and so on. They would also certify that the trams were in good order and were safe for use in street traffic the next day - or would reject those which were not.

Each day the 50 or so Electrical Branch men on day shift would check and clean any trams missed the previous night, try to repair trams rejected as unfit by the night shift and, if necessary, send complete trams to the Randwick Workshops for major repair. They would also attend to any trams breaking down in traffic. Similar but smaller teams of Electrical Branch men looked after the daily and nightly maintenance of trams at the other depots. The second tier of tram maintenance was handled by the Randwick Workshops, which carried out all major repair work on Sydney's trams and made many of the spare parts.

The Randwick Workshops were established in 1881/82 as a combined workshops and depot for repairing and stabling steam trams. The main workshop facilities were a large Blacksmiths' and Boilermakers' Shop and a small Machine Shop and Woodworking Shop, with basic manual and steam-powered tools. They continued that way for twenty years. The Workshops were handed over to the Electrical Engineer in 1902, and were greatly expanded and upgraded during 1906-26, reaching a total of 6.5 acres (2.6 hectares) of buildings, on a site of 27 acres (11 hectares).

The pre-1902 buildings were mainly simple but soundly built timber-framed corrugated-iron clad structures, designed to provide the necessary covered space at minimum cost. The later buildings were much more substantial and permanent structures, with brick walls and south-glazed sawtooth roofs supported on widely-spaced steel columns, giving large open workspaces. Most had tracks and large doorways, enabling the trams to be driven inside.

Many new machine tools, cranes and tram transporters were installed, with most equipment driven by electric motors instead of by steam. The Workshops' staff was increased to around 1000 - 1300 men, typically about 500 qualified tradesmen, 500 labourers or semi-skilled assistants and 200 administrative and support staff. The upgraded Randwick Workshops was one of the largest, best equipped and most versatile workshops in Sydney, and could make or repair almost any part of the trams.

The main functions of the Randwick Workshops during 1902-1961 were:-

- to carry out major repair and maintenance work on Sydney's existing tram stock (electric and, for a time, steam);
- to make and repair components for trams in Sydney, Broken Hill and Newcastle;
- to make components of the tracks and overhead wiring for trams in Sydney and Newcastle, and for electrified suburban trams in Sydney; and
- to make pre-production prototypes of new types of tram, and sometimes to make new trams in quantity or to electrically fit out new trams made by commercial coach builders.
Tram maintenance was the main activity of the Workshops, being 60-70% of the hours worked. There were three standard levels of maintenance for trams sent to Randwick Workshops:

'A' or 'Heavy' Overhaul, typically done every 100,000 to 125,000 miles (160,000 - 200,000 km). The tram body was separated from its bogies or 'trucks,' all mechanical and electrical components were stripped down, checked and reconditioned, all body fittings removed and the bodywork stripped back to bare wood or metal and repainted. Then the tram was re-assembled, retested and released, 'as new.'

'B' Overhaul, when a tram had worn wheels reconditioned after 10,000-20,000 miles (15,000 - 30,000 km). The tram would be inspected, and the paint would be patched and other repairs done as deemed necessary.

'Miscellaneous' Overhaul, typically to repair some unpredicted breakdown, or damage from a traffic collision.

Non-urgent modifications, such as retro-fitting a new design of seat or controller to existing trams, were usually done while trams were in for an 'A' or 'B' Overhaul. The numbers of trams dealt with at the Workshops during the 12 months to May 1924 were:-

- 22 new 'P' Class trams assembled
- 116 new 'P' trams electrically fitted (Contract built).
- 16 existing 'L' Class trams converted to 'L/P' Class.
- 147 trams 'A' Overhauled.
- 1393 trams 'B' Overhauled.
- 1571 trams given 'Miscellaneous Repairs.'

These statistics indicate that the average tram would go to Randwick Workshops twice a year; i.e., once for a 'B' (wheel) Overhaul and once for a 'Miscellaneous' repair. At about 10 year intervals, a typical tram would have the major 'A' Overhaul.

The Randwick Workshops was organised as a number of 'Shops,' each headed by a Foreman answering to the Works Manager. Their duties indicate the wide range of work handled at Randwick. The name and function of some Shops varied slightly over the period 1902-61, but for most of that time they were:-

**Repair Shop**

The Repair Shop men tested each tram to identify problems, lifted the tram body off its 'trucks' or bogies, and separated the tram into its major components which then went to other Shops for further disassembly and overhaul as needed. Subsequently the repaired sub-assemblies were sent back to the Repair Shop for re-assembly and testing as a complete tram. The Repair Shop was also involved in the assembly and/or fitting-out of new trams.

**Electrical Fitting Shop**

Electrical Fitters repaired faulty motors, controllers and other electrical gear. Other staff, mostly semi-skilled process workers, made large numbers of motor coils, electrical insulators and so on, as spare parts for existing trams.
Car Shop & Woodworking Shop

The predominantly wooden bodies of the trams were repaired in the Car Shop, using manual carpentry and coach building methods. For 'A' Overhaul, the seats and other fittings were removed here prior to painting of the bodywork and were then refitted. Some new tram bodies were made here.

The Woodworking Shop mechanically cut, dressed and sanded rough timber down to smooth finished pieces, ready for use in the Car Shop. The Woodworking Shop was very well equipped with mostly American machinery.

Paint Shop & Paint Store

The tram bodies required a lot of painting. Up to about 1920, the trams were given as many as 15 layers of paint and varnish, mostly mixed on the premises. Later this was reduced to about 6 coats of commercially made enamel paint, with minimal use of varnish.

Truck Shop

'Trucks' or tram bogies were dismantled and inspected in the Truck Shop. Any worn gears, bearings, etc. were reconditioned or replaced, and the 'truck' reassembled. Worn wheels and other parts needing extensive machining or repair would be sent to the Machine Shop, or Welding and Blacksmiths' Shops.

Machine Shop

The Machine Shop had a large number of general-purpose machine tools such as lathes and mills, for making bearings, gears and similar mechanical components. It also had special-purpose machinery such as a bank of wheel lathes, hydraulic presses and special heating jigs for the routine task of making replacement wheel-and-axle sets for the trams or for fitting new steel rims ('tyres') to worn wheels.

Tool Shop

An elite group of Toolmakers made precise forming dies for large-quantity production of pressings and forgings, made specially-shaped cutting tools and repaired machine tools. In conjunction, a group of Millwrights installed or moved machine tools, overhead line-shafts and motors.

Brass Foundry

The Brass Foundry at Randwick Workshops made non-ferrous castings such as handles, bearings and overhead wiring components for use by the Tramways or the Railways. (In return, the Railway Workshops' foundry made ferrous castings for the Tramways).

The Brass Foundry also made ingots of reclaim metal from scrap bearings, discarded electrical coils, and (reputedly) from counterfeit coins collected as fares.
Pattern Making Shop

Before objects were made in the Foundry, the Patternmakers made precise wooden models or 'patterns' of the objects. The patterns were then used in the Foundry to form the correct shaped cavity in the sand moulds.

Blacksmiths', Boilermakers' and Welding Shop

There were originally dozens of Blacksmiths making or repairing iron components by traditional hammer and anvil methods, and with only a few steam hammers for the larger jobs. This gave way to a smaller number of men using drop hammers with shaped forging dies, or other powered tools. The Blacksmiths also hardened and tempered tools, dies and tram springs by precisely controlled heat treatment.

From 1882 to about 1910, the Boilermakers frequently made or repaired the boilers of steam trams. After 1920, boiler repair was rare but the Boilermakers remained busy using the same skills to fabricate other large steel objects, such as crossing and switching points for tram and train tracks, and hundreds of masts for the overhead wires of electric trains.

From about 1910/15, the Workshops Manager encouraged and assisted Blacksmiths and Boilermakers to become proficient in oxy-acetylene welding and then arc-welding, which led to major changes in Boilermaking techniques and in tram design and maintenance. Randwick Workshops became a local leader in arc-welding technology, and in 1918 the Workshops made an innovative prototype tram with a lightweight welded steel frame. This design went into production in 1920/21 as the 'P' Class tram, the mainstay of the Sydney system for many years and a notably early example of this construction method.

There was also a Laboratory at Randwick, but somewhat removed from the shop floor functions of production and maintenance. It served a more professional and technical role in quality control and problem solving. It served both the Tramways and Railways and was consulted by other government authorities as well.

This is a fairly sparse description of the Workshops' and Depot's maintenance activities, but shows that they warrant more than a few lines in any tramways history. The archival material holds a wealth of detailed information about the buildings, staffing, general operations of both the Depot and Workshops, and about the evolution of the Workshops' equipment, technology and power systems. The material has also revealed that the staff amenities, working conditions and industrial relations at the Workshops and Depot were at times very bad.

I recommend that historians writing about Sydney's (or other) Tramways should give more attention to the role of the tram depots and workshops in maintaining the
fleet of trams, as an integral and interesting part of the tramways system. Further, if this example is typical, then transport historians in general need to ensure that their account of any transport system gives due attention to the infrastructure as well as to the system’s more publicly visible aspects.

Finally, I would note that my attempts to record and interpret the Randwick Workshops and Dowling Street Depot were made under threat of impending demolition of the buildings, many years after trams had ceased to function (in Sydney at least) and long after most of the physical evidence of tramway operations had been removed.

REFERENCES


