

The Bellcord



A Collingwood bound cable tram in Lygon St, Carlton soon to turn right into Elgin St (Dec, 1938). The number 5 to the left of the dummy's destination sign is its run number, displayed on cable trams from c1934. In the background is the office of the long established undertaker Josiah Holdsworth, now the location of the Nova Cinema. Photo: Dr A K Sewell

Melbourne's Cable Tram System: Was it the Largest?

The size of Melbourne's historic cable tram system often astounds students of history. But how did it compare in size to similar systems around the world?

At the 19th Australasian Engineering Heritage Conference in October 2017, engineer Miles Pierce, FIE Aust, presented a detailed paper about the engineering heritage significance of Melbourne's cable trams.⁽¹⁾ One of many aspects covered was its relative size. With his permission, we reproduce his answer to this question.

Melbourne's boom period in the mid 1880s saw the inauguration of a cable tram system that by 1891 had grown to encompass 17 routes with a combined length of 46 miles⁽²⁾ (73 km) of double track. In its

extent, it was only surpassed by San Francisco's cable tram network.

The 43.7 miles (70 km) of double track constructed by the Melbourne Tramways Trust, representing 12 municipalities, was leased for operation by the Melbourne Tramway & Omnibus Company (MTOC).

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A further 2 miles (3 km) was constructed by the independent Northcote to Clifton Hill line.

The MTOC evolved from the determined vision of Francis Boardman Clapp and was implemented under the guidance of renowned cable tram engineer, the Dunedin-born George Smith Duncan. It had the distinction of being the largest cable tram network in the world to be operated by a single company.

The last cable tram service closed in 1940.

USA

The first successful application of a continuous loop of wire-rope to propel streetcars or 'trams' was in San Francisco where Andrew Smith Hallidie, who had interests in wire rope manufacture, set up a cable tram service on the steeply inclined Clay Street. It had its first run in August 1873 and was an immediate success.

Four years later another company inaugurated a separate cable tram service in nearby Sutter Street that incorporated a number of improvements including to the design of the cable gripping mechanism.

Yet other lines followed, and by 1890 San Francisco had 23 cable tram routes totalling some 53 miles (85 km) of track. They were operated by a variety of private companies, some of which later amalgamated.

Chicago was the next USA city after San Francisco to implement the technology with its first cable tram route starting operation in 1882. Other lines then followed such that this city hosted about 41 miles (66 km) of double-track cable tram routes at its peak.

In contrast to San Francisco, Chicago's streets were essentially flat and the advantage of being able to accommodate steep gradients was not applicable. Nevertheless, the enterprise was successful until superseded by electric trams in the first decade of the twentieth century.

Cable tram systems were established in a total of 29 USA cities during the 1880s. Kansas City with some six separate systems and operators had a combined track length of 38 miles⁽³⁾ (61 km) while New York, Denver and St Louis each had around 25 miles (40km) of cable tram tracks. Other USA cities had less extensive systems.

New Zealand and elsewhere

The first cable tramway to be constructed outside of the USA was the 0.7 mile long (1.1 km) line between the CBD and the suburb of Roslyn in the hilly city of Dunedin, New Zealand. It was constructed by local engineer George Smith Duncan, via the consulting engineering practice of Reid and Duncan, and commenced operation in 1882, comprising a single track with passing loops.

A double track line about 1 mile (1.6 km) in length to service the Dunedin suburb of Mornington was commissioned a year later following the early success of the Roslyn cable tramway. It in turn was later extended to serve the suburb of Maryhill. The Dunedin lines used dummy vehicles and cable grips similar to the San Francisco Sutter Street system.

Short cable tramlines were also built in London, Birmingham and Edinburgh between 1884 and 1889.

Two short-lived cable tramlines to serve steeply inclined routes in Sydney were opened in 1886 and 1894 respectively, with a combined length of just under 8 km.

Melbourne

Although the Melbourne cable tramways were based on principles and experience developed in the USA, George Smith Duncan, having been engaged by Francis Boardman Clapp, successfully adapted the technology to Melbourne's conditions.

He also implemented a range of significant modifications including improvements to the all important grip design and operation, and to car braking arrangements.

San Francisco	85 km
Melbourne	73 km
Chicago	66 km
Kansas City	61 km
New York	40 km
Denver	40 km
St Louis	40 km



Cyclists and a fully loaded cable tram en route from St Kilda Beach to Queensberry St race each other along St Kilda Rd as they approach Princes Bridge (late 1890s). Cyclists sometimes preferred the smoother road surface between the tracks to the uneven surface either side.

The undeveloped land to the tram's left and the presence of overhead electric arc lamps assist with the date. The tall building in the background is the Homeopathic Hospital built on the southern corner of St Kilda Rd and Grant St in 1885.

Photo: State Library Victoria

The Melbourne cable tramway system, as well as being second only in total extent of routes to San Francisco, the 'birth place' of cable tram technology, greatly outlasted most of its sister systems.

Progressive replacement of its cable tram routes with electric trams, or in a few instances motorbuses, did not commence until 1924 and the last route from the city to Northcote survived until 1940.

Even as the replacement of some lines was underway, the short independent cable tramway through Northcote to Clifton Hill was joined to the city to Clifton Hill cable tramline by the M&MTB in 1925.

This was in marked contrast with most other cable tramways that were replaced by electric traction by the end of the first decade of the twentieth century.

Geoff Brown with assistance from Miles Pierce

FOOTNOTES:

(1) 'Cable Trams in Melbourne – A Major Nineteenth Century Engineering Achievement'. (The museum's library has a hardcopy of the paper and PDF digital file copies can be made available – contact the museum).

(2) Some other writers, e.g. John Keating, 'Mind the Curve!' (1970), quote marginally different total length figures. However, they do not change Melbourne's place as the second longest cable tramway system anywhere in the world.

(3) Correction advised by Miles Pierce to the figure of 41 miles in his original paper.

“Rolling the Groove” into Melbourne’s tram rails

During January, the museum received a query from England about how the groove in tramway rail is rolled into the rail. Researching an explanation has revealed a number of interesting details.

As outlined in our website article *Lost the Groove* by Russell Jones, Melbourne’s and other Australian tramways could source locally manufactured grooved rail only between 1946 and 1970. During these years BHP manufactured 102 lb/yard (51 kg/m) grooved rail for local tramways.

In the decades before and since, grooved rail has been imported or other options used. In Melbourne from the 1960s, the M&MTB used a 43 kg/m rail Vignoles, or railway style rail, which required the groove to be formed in the concrete road surface. On sharp curves a heavy check plate was fitted to rails to prevent derailment.

Austrian manufacturer

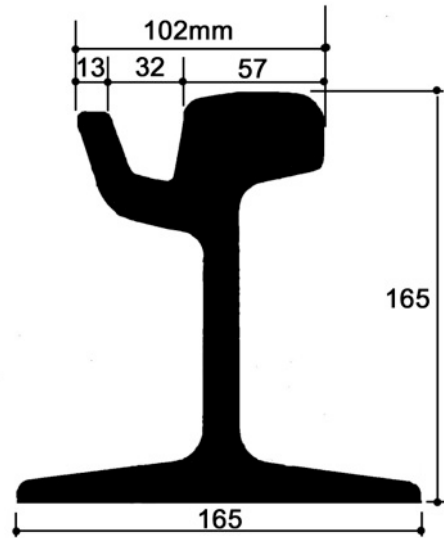
From the mid 1990s, Melbourne’s tramway rail has been manufactured in Austria by voestalpine Schienen GmbH in Donawitz, a city between the Austrian tramway cities of Linz and Graz.

A company web page in 2016 outlined its work for Melbourne noting that it had been manufacturing rail for us for 21 years. It also noted that the profile had been specifically developed for Melbourne and that it was delivering large quantities of rail each year.

Melbourne’s trams use a thinner wheel flange compared to the wheels used by many other tramways. This allows for a narrower and shallower groove which reduces hazards for cyclists and other road users.

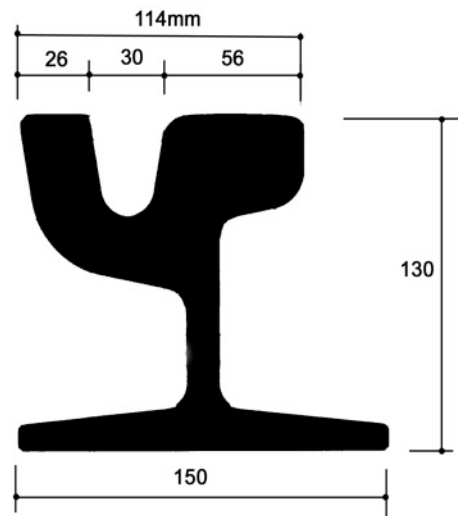
Matching the rail and the wheel profiles in tramways and railways is vital for energy efficiency and for preventing derailments.

The rail profile used in Melbourne is also used by other Australasian tramways – Adelaide City, Ballarat Tramway Museum, Bendigo Tramways, Christchurch Tramways and in Auckland. Most of these cities use a wheel profile similar to that used in Melbourne.

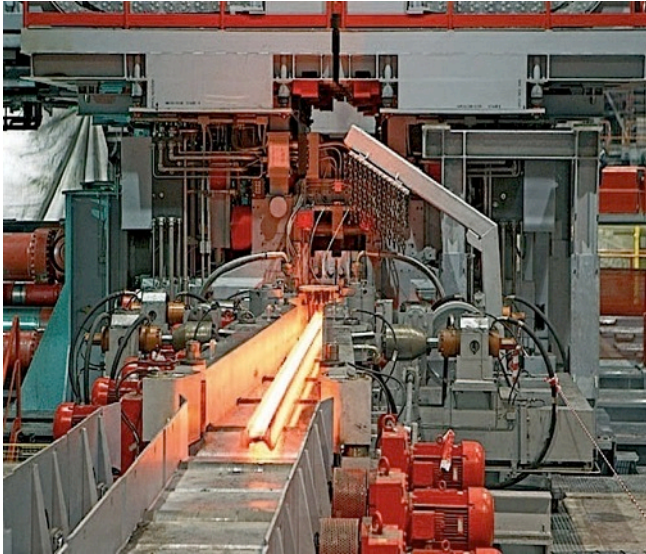


ABOVE: Profile of BHP produced grooved 102 lb/yard (51 kg/m) tramway rail.

BELOW: Profile of voestalpine produced RI57A (57 kg/m) tramway rail. Diagrams: Warren Doubleday



ABOVE: voestalpine Schienen GmbH applying the curve to grooved tramway rail. Photo: voestapline



voestalpine Schienen GmbH rail rolling machinery.
Photo: voestalpine website

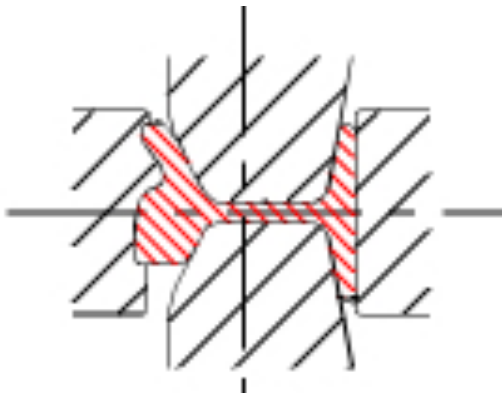


Diagram illustrating the rolling of the rail while on its side.



The Erzberg mine in Austria Photo: voestalpine

voestalpine has noted that it provides the rails for all new Australian tramways under construction or recently completed. (*Tramways and Urban Transit*, April 2018)

voestalpine produces up to 100 different rail sections including 26 different forms of grooved rail. It produces lengths up to 120 metres which reduces the number of welds and joints. Compare this with BHP's maximum length for grooved rail at just less than 14 metres.

The company also curves tram rails to customer specifications. In Europe the longer rails are delivered to the worksite by train, not by lorry.

Manufacturing process

Through a contact in Yarra Trams, voestalpine provided a rolling diagram and an explanation of the manufacturing process for grooved rail. The first steps are similar to those of rolling railway rail, and several YouTube videos are available that illustrate this process.

Then the tramway groove is rolled into the rail while lying on its side. Various rollers of different sizes simultaneously form the railhead and the groove. In all there are some 14 passes through various rollers including a furnace reheat to form the final product.

Ensuring the rail is straight, not twisted and within the dimensional tolerance standards is a complex process involving monitoring and high tech measurement and correcting equipment.

Personal reminiscence

In researching the Austrian manufacturer, I realised that I had passed through the town of Donawitz in 1975 while visiting the steam hauled Erzberg Rack iron ore railway. Iron ore mining and smelting has been undertaken at the Erzberg mine for well over a thousand years. Today it supplies the mills in Donawitz and Linz for part of the production of voestalpine's steel and probably Melbourne tramway rails.

It is a pity that we don't make tram grooved rail in Australia any more. However, knowing where it comes from and how it is manufactured in such a scenic part of Austria is well worthwhile.

Warren Doubleday

Transporting Art Exhibition

A new exhibition is taking shape in the museum display room. It focuses on the three series of Melbourne art trams from 1978 to 2017.

The art trams arose out of a lunchtime discussion between artist Clifton Pugh and Lord Mayor Irvin Rockman in early 1978, with the objective of brightening up Melbourne's streetscapes with trams as mobile artworks. The idea quickly caught fire – between 1978 and 1982, sixteen prominent Victoria artists painted 50 year old W2 class trams.

They were asked to prepare plans but were otherwise free to choose colours and designs. The artists worked at Preston Workshops, using materials provided by the Victorian Ministry for the Arts. Painting each tram took about a month to complete, and the artists were paid a commission of \$5000 for their work.

Immediately popular with the general public, the project was not without controversy. In 1978 the Japanese Embassy protested over the appearance of Peter Corrigan's tram, which displayed the 'Rising Sun' naval ensign along with the enigmatic slogans 'Mother Knows' and 'Sayonara Koala'.

The offending flags were quickly overpainted, and Corrigan's artwork on No. 567 was replaced four years later with a new work by artist Paul Mason.

In 1985, as the W2 class trams were facing withdrawal, a second series of art trams was commissioned, using twenty SW5 class trams. These were produced over the period 1986 to 1992, but the trams were hurriedly withdrawn due to the presence of asbestos.

From 2013 art trams have been produced through the sponsorship of the annual Melbourne Festival. Unlike the original project, the new trams are not painted. Instead, the art is applied to the trams via computer generated transfers, as used in vehicle 'all over advertising'.

Developing the exhibition

A year ago we approached the Public Record Office of Victoria (PROV) seeking the loan of wall-hangings which feature the first two series of art trams. These arrived and now hang in the exhibition room.



SW5 760 displaying artwork by abstract painter and sculptor Robert Jacks. Photo: PROV

The head of marketing from the Melbourne Festival, David Geoffrey Hall, provided digital images and artist statements for the 2013-17 art trams. These were used to produce a slideshow as the centrepiece of the exhibition. Another slideshow has been developed on the first series of art trams (1978-82). Mal Rowe's contribution of images has been invaluable, while members Warren, Noelle, Mike, Russell and Kevin have laboured on assembling the exhibition.

Can you assist with photos?

A slideshow on the second series is being developed, but is short of suitable images of the SW5 class art trams, especially 724 (Micky Allan), 824 (Aleks Danko) and 837 (Terry Mattasoni). If you can help with suitable photos of these three trams before they were withdrawn or, in fact, any of the SW5 class art trams, we would be grateful for your contribution.

Photographs need to be high resolution colour (Kodachrome is best), in focus with good lighting and composition, and feature the artwork on the tram. Please email info@trammuseum.org.au if you can assist.

Also, if you have artefacts associated with the art trams that you wish to loan or donate to the museum for this exhibition, please email the same address and include images of your items.

The Transporting Art Exhibition is open during museum operating hours. *Editor*

Driver Training Tales



Y1 613 and Y1 610 at Hawthorn Depot (1979) were often used for driver training. Photo: David Kemp

The theory of driver training was easy but the practical training was rigorous. I remember my trainer being at the controls of Y1 611 inside Hawthorn Depot facing the back wall which was 150 metres distant. He cranked up the tram and as it gathered pace, he suddenly stood aside and yelled, "Now you stop it."

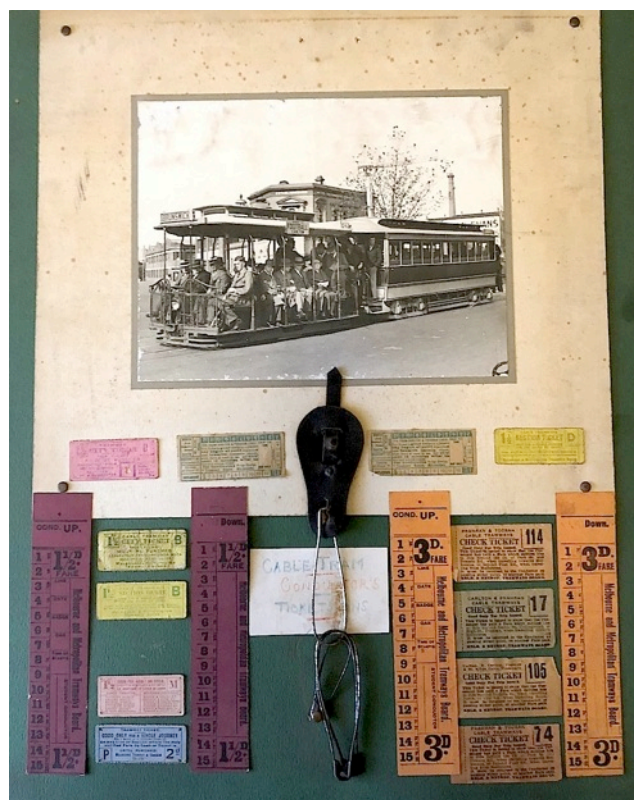
Needless to say I failed, performing only two of the three braking procedures required. He hipped me aside in an action that would have done Lee Matthews proud and stopped the tram two metres from the back wall. "Fail!" he called. "Come back in two months." I was back on the bag.

When I returned, yours truly and his co-trainee were travelling in Y 469 with our trainer at the controls. He pulled up at the Swan St shunt opposite Olympic Park and asked my co-trainee to prepare the tram for the return trip to Hawthorn. The trainee was meticulous in ensuring that the points were set correctly with the point bar and that the correct pole was raised.

Our trainer then asked, "Are you ready to proceed?" Yes, and proceed he did – but suddenly found himself driving bang road (wrong track). On that trip we had a second trainer who had slipped out and reset the points to bang road while the poor unfortunate trainee was raising the rear pole. "Fail! Come back in two months."

Kevin Tierney

Our Collection



Vic Solomons of the Sydney Tram Museum recently donated the above poster. It features four M&MTB cable tram bell punch strip tickets, 12 cable tram prepaid or check tickets and a leather button ticket pin holder with the safety pins that held the strip tickets. The cable tram set pictured is at the corner of Elizabeth St and Pelham St close to the Haymarket.



This photograph of conductor John McMahon with the strip tickets pinned to his jacket was donated by his family in 2016.

Received from Gavin Young of the Ballarat Tramway Museum was a book titled *Victorian Railways Instructions re Working of the St Kilda and Brighton Electric Street Railway* (1927). The definitions in the book are very precise:

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“Street Railways shall mean any Electric Railway Line operated on any public roadway between St Kilda Station and Brighton Beach, Sandringham Station and Beaumaris, or between such other points as may be authorised under the orders of the Victorian Railways Commissioners. Tramways shall mean Railway Line worked under the management of the Melbourne and Metropolitan Tramways Board.”

A pdf digital copy of the book in four parts has been placed on the member only access section of the web page. One interesting aspect of the book is the spelling of the word employé (sic), instead of employee. A bit of research shows that during the first part of the twentieth century there was a battle in Australia between American and English spelling.



Museum member Geoff Dean and partner Vicki recently donated the M&MTB Special Concession check ticket illustrated above. The great advertisement for Bushell's Coffee is a reminder of the days when you dressed up to the movies. Note the Taxi – it should have been a tramcar, don't you think?

Warren Doubleday

Museum News

Name badges carrying the new museum logo have been issued to members who assist at the museum. New vests will be designed and ordered in the near future.

Repainting of some of the museum's rooms has commenced and will continue in stages over the next couple of months.

Annual General Meeting: 22 September

Our AGM will be held in the exhibition room at the museum on Saturday 22 September at 9.30 am, prior to the scheduled open day. Those receiving a printed copy of this newsletter will find a separate notice in the same envelope. Those receiving the newsletter by email will find details attached.

Classic Melbourne Poster

Now in stock at the museum shop:

A reimagining of a Melbourne travel poster commissioned by Victorian Railways in 1930.



Designed by the noted Australian commercial artist Percy Trompf, it is available in two sizes – 595 × 422mm (\$45) or 894 × 630mm (\$80) – printed on 230gsm archival quality paper.

The Melbourne Tram Museum Inc is open on the 2nd and 4th Saturdays of each month (except the 4th Saturday of December). Normal opening hours are 11am–5pm. It is also open by appointment.

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