

# NEWSLETTER No 5/2006



Railway Technical Society of Australasia  
SA Chapter  
Engineering House, Bagot Street  
NORTH ADELAIDE SA 5006

MAY 2006

## NEXT MEETING

### Please note:

### There will be NO meeting in June 2006

The next RTSA meeting will be held on Thursday 6th July 2006.

However RTSA members are welcome to attend the PWI Meeting to be held on 1<sup>st</sup> June 2006 at the Adelaide Riviera commencing at 5.30pm.

The topic of the meeting is:

### The L-Kopia Laser Clearance System

The talk will be presented by Ron Fraser of Railtrak Systems with an overview by Pat Gray of ARTC.

The L-Kopia Laser Clearance System is a high-tech laser based measurement system that can measure and record track features and structural clearances. In particular, the following is claimed:

- i) Total clearance survey including track centre measurement and videotaping.
- ii) Collection of continuous track centre distances.
- iii) Cross sectioning and area and volume calculations in tunnels.
- iv) GPS and kilometre position identification.
- v) Load surveys – Checking clearances for oversized loads in real time.
- vi) Express roadbed and track centre surveys including ballast volume calculation.

The presentation will describe both the set up of the system, its components and its method of operation.

Following the meeting, light refreshments will be provided.

### Continuous Professional Development (CPD)

IEAust members are reminded that attendance at RTSA technical meetings contribute towards CPD requirements. Each RTSA technical meeting generally has a value of 1 CPD point.

## LAST MEETING

The May meeting was cancelled.

### CORE 2006

Core 2006 was held between 30<sup>th</sup> April 2006 and 3<sup>rd</sup> May 2006 at the Grand Hyatt Melbourne.

A total of 62 high quality technical papers were presented over two days. The papers focused on a range of railway related issues including Projects and Planning, Systems and Management, Safety and Risk Management, Track and Rail Maintenance, Vehicle and Wheel Maintenance, Vehicle-Track Interaction, Signalling, Rolling Stock, Locomotives and Condition Monitoring. A range of site tours were held on the third day.

Our thanks to Bill Edmonds for providing the following review.

The theme of the conference was "Rail Achieving Growth".

The conference was opened by the Transport Minister of Victoria Peter Batchelor who was proud to announce that nowhere is rail growth more evident than in Victoria where the new Vlocity trains are now operating into the country areas and suburban services are being extended.

In the opening plenary session David Marchant (Chief Executive Officer of ARTC) gave an insight on the work they are doing in upgrading the track between Melbourne and Sydney and also Sydney to Brisbane. David explained that rail only had 20% of the freight task between these cities and must improve its performance (ie reduce transit times) to win more business from road. He now wants the operators to start doing their part and invest in more rollingstock to handle the expected increase in patronage. David was also very supportive of the RTSA as the pre-eminent technical society for the rail industry and pledged his ongoing support for it.

Over 600 delegates attended the 2 day conference. 61 technical papers were delivered ranging from fixing up a drainage problem on ore wagons in Brazil to the design of new 4000HP AC traction locomotives for the Hunter Valley. The general comment from delegates was that papers were of high quality and in tune with the requirements of the industry.

Exhibitors were also well represented with 49 different booths on display ranging from crossing switch machines to lasers for measuring clearances.

The final session of the conference was a panel discussion comprising seven industry critics including

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Brian Nye (ARA) and Max Michelle which, as you would expect, was quite a lively discussion and very entertaining.

The formal part of the conference was closed by George Erdos as the outgoing National Chairman RTSA who also introduced Ravi Ravitharan as the incoming Chairman. It was also announced that CORE2008 would be in Perth in September 2008.



Photo – Outgoing Chairman George Erdos (right) with Incoming Chairman Ravi Ravitharan (centre).

Also pictured are newly elected members of the National Committee from left are John Dring, Martin Baggott and Robert Schweiger.

On Tuesday evening delegates, exhibitors, presenters and their wives all were treated to a wonderful gala dinner in the Grand Hyatt ballroom and were entertained by the fabulously talented James Morrison. All agreed it was an evening to remember.

On day 3, delegates were invited to tour the many rail facilities in and around Melbourne. This included an inspection of the Newport Workshops to a ride on a historic steam train at Maldon.

## POINT OF VIEW – Max Michell

The recent CORE conference in Melbourne was a great success as is now the customary expectation. It followed the reasonably traditional format of an opening plenary session, a day and a half of parallel streams and a closing plenary session. The consequence of this is that individual attendance at sessions is limited to probably no more than around 35% of presentations, although all papers are provided to delegates so the other 65% can be at least read.

One of the issues that concerns me is demonstration of a holistic attitude to rail, placing whatever the presenter has as their topic into the broader context of a bigger / brighter / better rail service or system - the reliability / capacity / transit time / yield continuum.

The theme of the conference "Rail Achieving Growth" sort of pointed in this direction but without being prescriptive about what is meant by "Growth".

David Marchant in his opening plenary session address covered the issue quite well with a quick coverage of threats and opportunities on the east-west corridor; threats were PAN shipping, fuel pricing and the then unresolved Toll / Patrick fracas while strengths were single voyage permits now folded back into Australian hands, relative fuel efficiency of rail compared to road and the possibility of a greater level of competition between rail operators as a consequence of changes following the Toll takeover of Patrick. David followed this with a quick overview of the north-south and Hunter Valley works plans, including significantly the fact that ARTC has now committed to well over a million concrete sleepers (maybe 900 track km) at cost equivalent to or better than timber. An example of the 'doing the most with the least' policy that ARTC are quite good at.

ARTC followed this up later in the streamed sessions with a paper presented by Derek Harris that provided a quite detailed and original economic analysis of the justification for expenditure on the north-south corridor - a very good exposition of the need to have a strategy that is market driven. Derek demonstrated how the issues of price, availability (to the customer), reliability, capacity and transit time are inter-dependent and not separable issues. His analysis process was able to support the ARTC projections for increased market share on the north-south corridor as a result of the current investment program - from a relatively modest 50% - 80% market share gain on the short MEL-SYD and SYD-BNE corridors to a 100% market share gain on the longer MEL-BNE corridor.

A very interesting paper was presented by Ray Bartlett (a 'graduate' of that most excellent practical rail learning institution – Victorian Railways) on a high level study of a rail route to Tullamarine airport. He covered the choice of routes, decision making process for the preferred route and then the overall context of a rail link as compared to the existing high quality bus route. The end conclusion, not surprisingly for anyone familiar with the Sydney and Brisbane experiences, is that the bus service is time and capacity competitive for now and will not change until numbers of passengers through the airport are significantly higher. As Ray rather cleverly put it this is a case of "Growth Achieving Rail". Once gain a good example of holistic thinking.

A number of presentations were on various aspects of safety. While safety issues can have a direct bearing on costs they also have a number of less financially accountable aspects, not the least of which could be categorized as political (remember Waterfall?) and

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social. Safety in these contexts was categorized by Alan Ross as "You are only as good as your last accident". An important aspect of safety, which came up more than once, was the tendency to 'risk aversion' on the part of rail management. The point that seemed to be coming through was that properly made safety cases can remove the 'fear' aspect from decision making, hopefully allowing reasonable commercial decisions with a modicum of entrepreneurial risk that is not circumscribed by a 'fear' agenda.

The conference proper wound up on the second day with a panel session. Since I was part of the panel I feel it would be inappropriate for me to comment on that other than I felt it was very well moderated by Jon Faine (a local ABC radio identity), challenging and great fun.

A splendid dinner on the same evening was very well attended, well served by Shane Bourne as MC and James Morrison and group as entertainment (not that Shane was not entertaining!). Even at 00.30 or so there were a couple of dozen die-hards still there.

There was a choice of three technical tours next day - I chose the Castlemaine and Maldon tour, in part to see the much altered Bendigo line, to sample the Velocity railcars and to investigate the mysteries of steam technology. On the Velocity trip we averaged 100 km/h without even trying (for now they are restricted to 130 km/h), inclusive of stops, over the 125 km journey. On the Maldon steam trip I managed to talk quite a few luminaries into travelling in one of those icons of country Victoria from many decades ago, a BPL car (Bouncing Passenger Lounge to those old enough to remember). Lightweight and high capacity they may have been but good riders they never were, at any speed. In years gone by they were run consistently at 70 mph (113 km/h) on mainline trains without any qualms, although fortunately for the future wellbeing of the luminaries we travelled sedately at maybe 40 km/h this time.

All in all a most enjoyable conference (again), with a number of additional social occasions adding to my enjoyment of good old Melbourne, ranging from dinner with friends from 30 and more years ago to the first inter-state gathering of the 'Grumpy Old Optimists' - aka the Old Codgers - one evening at Footscray.

If there is one change I would like to see for the 2008 CORE in Perth it would be an indication of a higher level appreciation of the value of the presenter's topic to railways as a whole - how does it fit into the reliability / capacity / transit time / yield continuum?

## ADELAIDE HILLS RAILWAY PUBLIC MEETING REPORT

Your editor attended the public meeting held on 12<sup>th</sup> April to discuss issues related to the existing railway through the Adelaide Hills. His report is presented in two parts. In the last newsletter details of the presentations by invited speakers was presented. In this Newsletter, details of the discussions and some observations from the meeting are provided.

### Observations and Comments

The main issues raised at the meeting effectively relate to:

- i) Noise and specifically Wheel Squeal.
- ii) Operational safety of the line.
- iii) Suitability of the line for modern requirements.

Each of these issues will be discussed in turn.

### Noise

The main complaints regarding noise were related to locomotive noise and wheel squeal.

### Locomotive Noise

Modern locomotives are much quieter than earlier generation diesel locomotives and steam locomotives. The issue of locomotive noise is associated mainly with older designs that are still in use and date from the 1950's. These locomotives are usually found on intrastate short haul low profit haulage tasks such as grain haulage and some of the low cost hook and pull interstate services operated by smaller train operators. Extensive reconstruction of these locomotives would be required to make them quieter and this would require significant investment. Given the low return from the services on which they are used, this is probably not an economical proposition. Likewise, replacement of these locomotives with newer Locomotive designs is also probably not economical.

The locomotives are allowed to operate under the current environmental legislation as it would appear from comments made by representatives of the EPA, that the current noise legislation is not designed to cover the type of noise issued by locomotives. The current legislation is reported to be in the process of being changed to cover the type of noise emitted by railways.

The possible changing of the legislation may lead to the introduction of bans on noisy locomotives. Without any strategy to assist rail operators to either rebuild the current locomotives or obtain suitable replacements, the introduction of tighter legislation must be carefully examined. Considering the marginal economical

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viability of intrastate train operations it is likely that such a ban would cause the haulage task to go to road. The safety, environmental and economical consequences of transporting this haulage task by road would likely be far worse than that of maintaining the current situation of rail haulage.

## Wheel Squeal

Wheel Squeal has been a major noise issue in the Adelaide Hills and elsewhere over the past 15 to 20 years. Wheel squeal is noted by its piercing high pitched frequency and extremely loud volume. Most people living within 500 metres of the track can hear a train emitting wheel squeal.

Despite many claims over the years that wheel squeal will be reduced by the introduction of new technology and operating methods, the general view is that wheel squeal has not been reduced and in fact has become much worse.

The cause of wheel squeal and all associated factors is very complex and is not fully understood and subsequently its control is very difficult. A simplified description of wheel squeal and its causes is provided below.

What is Wheel Squeal? Wheel squeal is a high frequency, high-energy noise emitted by wheels.

Wheel squeal occurs in disk wheels when lateral vibrations equivalent to the resonance frequency of the wheel. Most modern rail vehicles use disk wheels.

Researchers generally agree that the lateral vibration is induced by a slip/stick mechanism as a result of the wheel not running in a direction truly parallel to the rails. This can occur during the negotiation of a curve or when the wagon bogie is not correctly aligned with the track.

Not all wheels squeal. What are the factors that cause some wheels to squeal at full volume when others make hardly any sound at all?

Factors that influence wheel squeal are:

- i) Curve radius – The sharper the curve the more likely that wheel squeal will occur
- ii) Track strength – A stronger track hold the rail more rigidly thus allowing the generation of higher frequency lateral vibrations in the wheel.
- iii) The surface condition of the rail and wheel – This influences the coefficient of friction at the contact point.
- iv) Wheel profiles – Worn wheel profiles reduce the ability of the wheel set to track around curves

- v) Bogie rotational stiffness – Bogies with high rotational stiffness require a greater force to overcome the rotational resistance between the bogie and the wagon. If sufficient tracking force is not generated, the bogies will not rotate and align themselves to the track.
- vi) Bogie design – More sophisticated bogies such as used on passenger and specialized freight wagons such as road/railer wagons have reduced incidence of wheel squeal.
- vii) Axle load – Higher axle loads increase the amount of vibrational energy within the wheels.

Other factors mainly associated with the wagons may also influence wheel squeal.

Because of the many variables effecting the generation of wheel squeal, a detailed analysis and understanding of the phenomenon is quite difficult. Controlling all of these factors to minimize or eliminate wheel squeal has proved extremely difficult.

Many people, and this was evident from the questions aimed at ARTC at the meeting, appear to think that the solution lies in altering or modifying the track. Over the past 10 to 15 years, this indeed has been the approach used by many rail authorities in their attempts to reduce wheel squeal. Different track structures, many different types of lubricants and friction modifiers have been trialed with varying and usually inconclusive results.

Every wheel is different and has its own unique resonance frequency. What appears to be happening is that the alteration to the track causes a change in response by the wheels. For example wheels that squealed prior to the application of a friction modifier compound to the rail running surface may cease to squeal because the horizontal vibration input to the wheel no longer matches its resonance frequency. On the other hand, wheels that previously did not squeal, may squeal after the application of the friction modifier compound because the change in input frequency now matches its resonance frequency.

When the range of variables associated with wheel squeal is examined, the majority that can be effectively addressed are associated with the wagons and bogies. It is in this area that future research should be aimed. The approach by ARTC to collect data related to the type and level of sound emitted together with the identification of squealing wagons and bogies by the use of RailSQAD is a significant step forward. It is expected that the examination of wagons and bogies frequently identified for squealing will lead to a greater understanding of the factors that cause wheel squeal and the actions required to minimize its occurrence.

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## **Operational Safety of the Line through the Adelaide Hills**

Is the current line through the Adelaide Hills safe?

There have been a number of incidents on the hills line over the past few years that have brought the railway to the attention of the public and media. Some of these, such as the two Glenalta derailments, were quite spectacular and had the potential to cause injury or death if the circumstances had been a little different. Thankfully this did not happen. But does the fact that these incidents occurred mean that the railway is intrinsically unsafe?

Every day approximately 18 trains on average travel over the line. Despite the trains weighing up to 5000 tonnes with a length up to 1.5 kms, almost all negotiate the line safely without incident.

In the past 10 years there have been 3 derailments in the Adelaide Hills, all in the section between Eden Hills and Belair. When the number of trains that passed over the line in that period is considered, the derailments represent less than 0.005% of total train movements. In the past 15 years that I have lived in the Adelaide Hills, I am not aware of one person who was injured let alone killed as a result of an incident related to a freight train. By comparison, an incident involving heavy road vehicles appears to occur every few months and people have certainly been injured and killed during the past 10 years.

Considering the huge task performed by the rail line and the few incidents that occur, one must conclude that the line is intrinsically safe and certainly is significantly safer than if heavy road vehicles performed the same task.

## **Suitability of the Adelaide Hills Line for Modern Requirements**

At least one of the speakers claimed that the existing railway is obsolete, not fit for purpose and should be replaced. The basis for this was that it was claimed that the curves and gradients found on the line are not suitable for modern requirements.

It is true that if a new railway were being designed, every effort would be made to avoid the low radius curves and steep gradients of the existing line. This would be very difficult to achieve along the existing general line of the railway considering the height and closeness of the Mt Lofty ranges near Adelaide and the level of residential development. In all probability, any new line would be built across easier topography to the north of Adelaide near Truro. Indeed, proposals by Australian National and more recently by ARTC and Pilarna both suggest this general line of route.

However a preliminary examination the northern route between Murray Bridge and Adelaide suggests it has a distance of approximately 175kms and a travel time of just under 3 hours whereas the existing route through the Adelaide Hills has a distance of approximately 105kms and a travel time of approximately 2.5 hours. The northern route will be new and as such it is reasonable to expect that a return on investment for its construction (some estimates of approximately \$400 million were mentioned at the meeting) as well as a charge for the maintenance and renewal of the track would be required. On the other hand the major portion of the construction cost of the existing route has been written off and therefore would only have a maintenance and track renewal cost. Given a choice, it is clear that operators would choose the existing line for reasons of both cost and time. An alternative route across the Mt Lofty ranges to the north of Adelaide does not appear to be justified on a purely commercial basis.

If a new line to the north of Adelaide was to be built and the existing line closed, there is a danger that Adelaide may become disadvantaged and possibly cut off from the interstate rail network. It is possible that with the new railway to the north, railway operations and marshalling yards would also move north to new green field sites leaving Adelaide served by a branch line. The marshalling and running of additional trains between the new yards and Adelaide or worse still, a movement of freight to road transport would add to the cost of transport without adding any real value. This could affect the viability of industry in Adelaide especially in the southern areas.

Major reconstruction of the existing line would be difficult and expensive for the reasons of topography and the extent of residential development in the area that the line passes. It is unlikely that reconstruction to reduce the gradient of the line, reduce the number of curves or increase their radius is economically possible.

The existing line does impose limitations on the maximum speed, mass and length of trains that use the line. The mass and length limitations are still quite reasonable for modern standards and the relatively short distance over which the speed limitation applies counters the low speed. At present and for the foreseeable future it is unlikely that these limitations will affect the overall viability of the line.

The above arguments and the comments on rail safety in the previous section support the conclusion that the existing line is suitable for current operations and for those in the medium future.

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## Overview of the Meeting

The high level of attendance at the meeting by local residents shows that there is an equally high level of interest in the Adelaide Hills Railway. Noise is the major concern followed by safety of the railway.

The attendance by ARTC, TransAdelaide, the Department of Transport, Environment and Infrastructure and the EPA show a high level of commitment towards the railway and towards addressing the many concerns raised by the meeting. Each of these organisations and their representatives are to be congratulated. Considering that the concerns raised equally affect the above rail operators, it was a disappointment that no rail operators participated in the meeting.

The City of Mitcham must also be congratulated for their initiative in organising the meeting.

Will anything result from the meeting? As summed up by the Mayor of the City of Mitcham, the issues related to the Adelaide Hills Railway are greater than that that

could be address by any of the individual organisations represented at the meeting. The issues must be addressed at a higher government level. Either the State or Federal Governments must take the leading role if substantial improvement is to occur.

In the mean time, some progress by the rail authorities is being achieved to make the line quieter and improve safety.

## 2006 AETA Interstate Convention

The Australian Electric Traction Association is holding its 2006 Interstate Convention in Adelaide on Friday 9<sup>th</sup> June through to Monday 12<sup>th</sup> June 2006. The convention consists of various meetings, site tours and social events. For Phone Enquiries contact David Beres 08-83365818 or Roger Wheaton 08-83319043 after 8pm or by email to either [davidb@txc.net.au](mailto:davidb@txc.net.au) or [thornewheaton@telstra.com](mailto:thornewheaton@telstra.com).

## MEETINGS FOR 2006

Future Speakers/Dates/Topics				
<u>Date</u>	<u>Speaker</u>	<u>Organisation</u>	<u>Topic</u>	<u>Venue</u>
6/7/2006	G Erdos	ATSB	The Tilt Train Derailment	IEAust Building – Bagot Street
3/8/2006	R Nancarrow		History of Ultrasonic Rail Flaw Detection/ Current Practices	Riviera Motel and Function Centre – Joint with PWI
7/9/2006	TBA			Joint with IRSE
5/10/2006	Mike Sowden	ARTC	Wayside Detection and Wheel Profile Measurement	Joint with PWI - IEAust Building – Bagot Street
2/11/2006	TBA		TBA	IEAust Building – Bagot Street
28/11/2006				RTSA AGM

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Articles or editorial comment for Newsletter are very welcome. We have over 100 members locally some of whom will have stories, events or developments of interest that could be reported in Newsletter.

Part of the function of RTSA is to keep members in touch with what is going on in the industry and with each other and to that end we are only too happy to publish items of interest.

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Electronic despatch of Newsletter is undertaken by Malcolm Menadue – contact Malcolm on [mmenadue@ozemail.com.au](mailto:mmenadue@ozemail.com.au) if you have any problems receiving Newsletter electronically or in hard copy. Note that electronic subscribers will get their Newsletters and flyers as soon as the editorial stuff is done, while the hard copy mail will of course be some days slower.

For all other matters relating to RTSA SA Chapter contact Robert Schweiger (Chairman) at e-mail [robert.schweiger@jhq.com.au](mailto:robert.schweiger@jhq.com.au), or by phone on 0413 128 775.

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