NEWSLETTER No 8/2005

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

SEPTEMBER 2005

NEXT MEETING

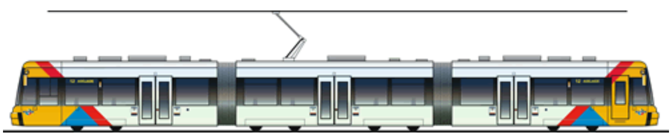
The next meeting will be held on

THURSDAY 6th OCTOBER 2005 AT BAGOT ST, NORTH ADELAIDE (Institution of Engineers) - at 17:30.

Topic:

New Adelaide Trams

Dean Lambert



As most people in Adelaide know, the SA State Government has ordered a fleet of new trams. This initiative is part of the Governments plans to refurbish the Glenelg Tramway and possibly the beginning of a new light rail network in Adelaide.

Last month we heard about the trackworks associated with the refurbishment of the Glenelg Tramline. Now we have the opportunity to learn more about the new Flexity trams themselves.

Dean Lambert will talk about the new trams in detail and provide listeners with one of the first detailed insights into the future of light rail in Adelaide.

For those interested in the renaissance of light railway in Adelaide, this meeting is not to be missed.

Light refreshments will be served prior to the meeting.

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

Upgrading of Glenelg Tramway Infrastructure

Kylie Dwyer
Project Engineer
Coleman Rail

Photo – Section of Upgraded Tramline at Forestville

The Glenelg Tramway is a 10.8km route of standard gauge dual track. 1.6 km of the route is embedded in the road surface while the remainder is standard ballasted track formation.

Coleman Rail was awarded the contract to design and construct the upgrade works on the Glenelg Tramway on the 16th April 2005. Works commenced on the 5th June 2005 with a construction duration of 9 weeks.

Successful implementation of the new rolling stock will require a track structure and wheel rail interface that will deliver a smooth, quiet and comfortable ride.

1. Scope of Works

1.1 Existing Infrastructure

The existing track is comprised of a combination of mostly 80lb/yd, 82lb/yd and 94lb/yd rail, timber sleepers on 1:20 canted sleeper plates and fastened to the sleeper with dogspikes, Rex-Lok fastening system and rail anchors.

The track geometry and ride quality along the corridor required major upgrading to increase transit speed and to maintain future safe operations. Vertical head wear and plastic flow was evident throughout much of the existing rail. The rail needed to be replaced and a rail-grinding program implemented to suit existing and proposed operations.

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Photo – View of the Glenelg Tramway before Upgrading

The existing platforms were typically 2.2m wide and 40m in length, brick paved with a single shelter. With the arrival of the new Flexity Class trams, the existing platforms would be too low to safely alight passengers.

The electrical system is currently adequate for the H Class Tram but required upgrading to accommodate the new Flexity Class trams.

1.2 Trackworks

Works associated with the track included:

i) The carrying out a detailed survey of the track horizontal and vertical alignment.
ii) Preparation of a design which improves the line running speed whilst maintaining service safety.
iii) Preparation of a detailed rail management plan. Prior to works commencing, all of the varying rail types on site were identified, all of the rail junctions were painted in different colours and mapped. The rail was also ultrasonically tested whilst still in track. All rails with head of less than 7Omm such as the 80 A rail was marked as scrap along with that which failed the ultrasonic. One criteria was to replace the curve between Greenhill Road and the Goodwood overpass where the existing rail was not suitable for reuse.
iv) Removal of the ballasted track between South Road and Brighton Road and replace it with low profile concrete sleepers and a combination of new rail and serviceable rail as detailed in the rail management plan.
v) In specified locations the existing formation had failed and reconstruction was required. Such areas included adjacent to platforms, at road crossing and isolated mud holes.
vi) Upgrading of road level crossings, from the existing bitumen to concrete encased.
vii) Removal of the existing pedestrian crossings and replacement with new bitumen. The intermediate crossings were to be kept open during construction where possible.
viii) The current points and crossing were a combination of 1 in 5 and 1 in 6 turnouts and crossovers. The existing V-Crossings had been infilled to facilitate flange running. However to maintain line speed and improve the ride, the infill in the V was to be removed and widened to allow for a 26mm flangeway. As required the existing timber bearers were to be replaced and all fastenings to be resilient.
ix) The specification called for rail grinding with 4 passes of a 16 stone grinder.

1.3 Platforms

The challenge was to upgrade the existing platform to suit the new Flexity Tram and the H-Class. Apart from the need to match the platforms with the new trams (whilst still allowing the existing H Class trams to operate) the major reason for the upgrade is to comply much as practicable with the Disability Discrimination Act. This required the platform level to be raised and the edge of the platforms to be brought closer to the rails.

Geometrically, the new platforms surface at the edge of crown was to be 235mm above rail and the distance from the face offset to the inside running edge was to be 565mm. The existing length of platform had to be maintained.

Access to platforms to be in the form of 1: 14 ramps from existing pedestrian pathways. The existing pathways are to be connected to new platforms with appropriate grade paths.

Associated with platforms were:

i) Relocation of existing lighting to comply with DDA requirements.
ii) Replacement of fencing to the back of the platform and mazes.
iii) Replacement of existing intermediate and road crossing pedestrian mazes with asphalt crossings similar to existing.
iv) Replace old TransAdelaide shelters with new shelters, or relocate existing shelters.

1.4 Electrical

An upgrade of the existing electrical system was required for the proper functioning of the new trams. The key scope items for the electrical supply system included:

i) Boosting the existing 600V DC system by installing a 400mm2 side feeder cable with connections at 500m intervals to the existing 81 mm2 trolley wire for the full length of the track.
ii) Replacing nominated catenary.
iii) Replacing any damage track circuit bonds.
iv) Upgrade the protection of 8 circuit breakers from 2000A DC to 2500 A DC.

2. Contract Details

Coleman Rail was awarded the design and construct contact for the Glenelg Tramway on the 16th April 2005. The works had been programmed to commence on the 5th of June with a 9-week construction duration. The works involved in the 9-week occupation were:

i) Removing and replacing 10.8km of dual track.
ii) Removing and replacing 38 platforms.
iii) The refurbishment of 12 turnouts.
iv) Replacing 9 road crossings during weekend occupations.
v) Constructing a trench from Victoria Square to Moseley Square.

The key to the success of the project within this time frame was dependant on:

i) The ability to make decisions quickly.
ii) The selection of appropriate personnel, equipment and construction techniques.
iii) The timely delivery of client supplied materials.

3. Decision Making

Any delays to the decision-making process resulted in delays in the works schedule. The TransAdelaide team and Coleman Rail developed a consultative alliance which worked successfully throughout the course of the contract and after 10 weeks of madness we are all still on talking terms.

Some of the challenges faced during the course of the works were:

i) Inclement Weather
ii) Design and Construct Duration
iii) Confined work area and access
iv) Approving design with days prior to construction
v) Modifications to the Sturt Creek bridge - lifting of the abutment on one end
vi) Maze design and location
vii) Signalling issues.

4. Planning

One key element to realize is that the system is a ballasted light rail networks. The clearances as stated before were 235 to the top of platform and 545 to the inside running rail. In this situation normal heavy rail equipment was not always practicable due to clearance issues.

This was realized in the tender submission phase and the equipment to be used was selected at that stage.

5. Construction Techniques and Equipment

5.1 Track Removal

The track was removed with conventional stripping techniques, dog-pullers and lots and lots of labour. The jewellery was collected by hand and placed in to the bucket of a front end loader for placement into stockpile.

Photo – Track Removed at Forrestville

The rail was cut in 110m lengths and dragged using a front end loader with a drag block. The rail was dragged to stockpile locations marked for either reuse of scrap.

The sleepers were collected using forks fitted to front end loaders and placed directly into tip trucks and transported for stockpiling to TransAdelaide's yard at Dry Creek.

The track was totally stripped in 10 days.

5.2 Formation

The existing ballast had been tested prior to the commencement of works and much of it was contaminated. Any ballast removed from the track had to be disposed of to an EPA approved dump facility. To reduce the cost to the client, the section of track that required resleepering was lifted 15Omm. By lifting track 15Omm the existing ballast was graded and compacted to a flat surface with the sleepers placed directly on top.

The formation works were sub-contracted to Davison Nominees. Davison used a grader fitted with a new 3D survey positioning system that enabled them to level the formation within 5mm of the required height.

5.3 Reconditioning

Full depth reconstruction of the formation to 45Omm below top of rail was required. This occurred in such areas as road crossings, bridge structures and concrete embedded track where the variations in the heath alignment were not permissible.

The existing formation was removed to the required level, a new ballast formation was placed from trucks and levelled by Davisons with a grader.

5.4 Contaminated Ballast.

All ballast disturbed was removed from site to contaminated material dump. The initial objective was to recycle the ballast. The ballast was to be placed through a dry screening process. The fines removed which would then be disposed and the ballast returned to site.

However due inclement weather conditions, the ballast when removed was wet and contained a significant amount of fine clay material. Attempts were made to screen the material but the fines could not be removed. Throughout the course of the nine weeks, we incurred constant rain and the stockpiled material had no chance to dry out. Further attempts were made later to screen the material but again failed. The ballast will be taken to landfill.

Coleman Rail persisted with the recycling the ballast for two main reasons:

- i) To reduce the amount of material which ends up in landfill.
- ii) To obtain a cost saving benefit to the client by not destroying a valuable asset. It also had the potential to reduce costs on further ballast track works in South Australia, by establishing a ballast recycling process.

Had the weather been more favourable the screening of the ballast would have been successful.

5.5 Track Placement

Coleman Rail placed an order with Caterpillar in Germany for 2 off 315 Caterpillar rubber tyred excavators. These machines have great versatility for track construction.

The key to reducing the amount of work required with new track construction is to get the track within 20 mm of final alignment and within 60 - 70 mm of final level. The tamper can easily achieve a lift of 7Omm in two passes. Alignment movements greater than 5Omm are time consuming. Survey control was placed along the alignment in the form of star pickets with top and offset measurements identified.

Prior to the placement on the formation the edge of sleeper was marked on the formation as a guide. The formation level were checked against survey to ensure the TOR height would be within tolerance.

5.5.1 Sleeper Laying

We had a purpose built octopus manufactured that connected to a 360 degree head. The octopus can hand four sleepers at a time. A Loader is used to distribute the sleepers at fixed intervals along the formation. The octopus removes the top stack and slues and moves to the edge of the laid sleepers. A labourer with jig helps the operator place the first sleeper then the hydraulics on the octopus is initiated to spread the other three sleepers to the required sleeper spacing, which in this case is 72Omm. The octopus has ability to place 80 sleepers on hour.

Photo – Track being Laid

The sleeper spacing adjacent to road crossings was reduced to 620 to stiffen the track on the approach to the rigid full concrete level crossing structure.

Sleeper pads to electrically isolate the rail from the sleeper were installed by hand.

5.5.2 Rail Placement

The new rail was welded into 110m strings along the side of the track clear of the works.

The existing rail was assessed, with crippled and defect rail removed and the remaining sections welded into 110m strings. The rail was then dragged into position for installation.

Excavators, fitted with rail tongs, were used placed the rail on the sleepers. The excavators were fitted with hyrail wheels to enable them to operate of the track. Once the first track was laid, it was used as a base to place the rail on the other track.

5.6 Fastenings

Pandrol side insulators were placed manually on either side of the rail to electrically isolate the rail from the sleeper.

Pandrol "e clips were then placed"in position by hand, then driven home using a manual Pandrol applicator or a mechanical applicator.

5.7 Top Ballasting

Initially hyrail tippers were used to distribute ballast. Later a Kenworth prime mover with up to four ballast wagons were employed.

5.8 Tamping

A tamper with tram bogies, hired from MVM was used to tamp the track.

5.9 Welding

All welds were carried out using the aluminothermic process.

5.10 Grinding

John Hollands RG8 Grinder' was used to grind the track.

The rail profile used was developed to match the wheel profile developed to suit the new Flexity Tram.

The rail grinder is capable of offset grinding, which was required to grind the in-road sections of track.

The rail required 17 -25 passes in the old rail and 12 - 15 passes in the new rail.

5.11 Road Crossings

Work at the road crossings included:

i) A detailed services survey was carried out on the road crossing.
ii) The existing road crossing were then removed with all material taken to dump.
iii) The section was then excavated to 59Omm below the top of rail.
iv) A capping layer was placed with the top of the capping layer being 39Omm below the final top of rail level.
v) The conduits were also installed.
vi) Track panels were then constructed with new 50kg rail and new concrete sleepers at 1.5 m spacings. The sleepers are merely to provide gauge during concreting.
vii) The track panels were then placed on the formation using two FEL, the track was then aligned with survey marks, and jacked to final height placed on timber and plastic packers.
viii) 5OMpa concrete was then poured and placed. The field side of both outer rail was left low on the merge to allow the placement of asphalt to match the existing road pavement.

5.12 Rail Bonding and Electrical

Cembre fittings were used to fit bond to the rail.

5.12.1 Rail and Track Bonding

Both rail to rail and track to track bonding was used. This helps to equalize the return current and lowers resistance for the return current.

5.12 2 Negative Bonding

Negative bonding provides a return path for the track current back to the substation.

5.12.3 Electrolysis Bonding

Bonding connected to the electrolysis boxes.

The bonding connects underground services to the track to reduce the potential difference between underground services and the rail. This mitigates against stray currents causing electrolysis corrosion.

5.12.4 Platform Bonding

All platform furniture is bonded to the rail to ensure circuit breakers in the substation are activated if for any reason live current contacts the platform furniture. It works by feeding the current into the negative return.

5.12.5 Signal Bonding

Provides connection with signalling assets.

5.13 Side Feeder

A new side feeder was installed with new tap to trolley connections to maintain the overhead supply voltage and to supply increased current.

5.14 Clearance Issues

The normal standard gauge concrete sleepers are 2550 in length with a distance of 56Omm from inside running edge to the end of sleeper. The clearance at platforms was set at 545mm. Special sleepers were required and were ordered with an end clearance to the inside running of rail of 595mm allowing sufficient room to butt up to the flat edged platform.

The shorter sleepers meant that the octopus had to be modified to lift both the normal and shorter sleeper.

During the placement of the skeleton track past the platforms, the track was left wide to allow the rubber tired excavators and normal hyrailed vehicles to clear the platforms. Once the skeleton track was laid, the track was then moved to final location prior to the placement of ballast and tamping.

Coleman Rail searched for a method of laying the ballast without damaging the platforms. We finally found it in the form of a Hyrailed Kenworth prime mover and four hired ballast wagons from Bluebird Engineering here in Adelaide. The Kenworth was fitted with air operated brakes and was capable of pulling the 4 ballast wagons each with 50 tonnes of ballast.. The wagons had both centre dump and shoulder dump capacities.

Minor modification had to be made to the wagons to ensure they cleared the platforms. This included the removal of the rear step.

Conventional track tampers have rigid axles on the front and rear, tight curves such as those incurred in the 1:5 turnout would have caused a normal machine to derail. However the Fairmont Tamper hired from MVM rail was specially designed to tamp light rail systems in the UK and was fitted with tram bogies situated a similar distance from front to rear. It also had a modified tamping head to ensure that, during operations, the tynes did not impact the platform.

The rail grinder was also modified to enable clearance to the platforms.

As the broom of the track regulator could not be operated through the platforms, nor could one side of the plough, all ballasting within the platforms were carried out by hand.

5.15 Inclement Weather

Most of the works were capable of being undertaken in adverse weather conditions. Once the ballast was in place, it acted as a drainage path.

Our employees deserve the credit for working in the extreme conditions, especially those welding rail and those pouring the concrete road crossings.

Meeting Summary

Our thanks to Kylie for a most interesting and detailed talk.

The meeting was attended by 32 members and visitors with the Vote of Thanks being given by Roger Wyatt.

2005 RAILWAY ENGINEERING EMINENT SPEAKER

Dr Hugh Hunt

Cambridge University Engineering Department

Vibration from Underground Railways

Dr Hugh Hunt gave a talk to the Institution of Engineers as the eminent speaker for 2005. Dr Hunts talk was entitled “Vibration from Underground Railways”.

While as the title suggests, Dr Hunts research has been undertaken in regard to underground railways, the talk was applicable to all railways both underground and surface and gave a good insight into the behaviour of vibrations and their source. Of particular emphasis is that vibrations do not behave in a manner that appears to follow common sense.

During the talk, your editor recorded some notes from the talk and the result follows. Hopefully, the following faithfully records the concepts that Dr Hunt presented.

Understanding Vibration

“Common sense will carry one a long way….but no ordinary mortal is endowed with an instinct for vibration” - One must develop a learned approach to vibration.

The most common approach to the understanding of vibration is to use the standard “mass on a spring” approach.

Vibration in track cannot be represented by the “mass on a spring” model. The main reason is that in track there is a high degree of damping due to relative slip and movement between the track components and particularly the ballast.

Damping is not well understood and results from differences in the connections between the various masses that may vibrate in the system.

A couple of experiments were presented to show that vibration does not follow common sense. Try them yourself. Before doing each experiment, predict the result the do the experiment to see if you are right.

Experiment 1

Take an empty plastic bottle and blow across the opening. A sound will resonate. If an amount of water is placed into the bottle, what happens to the sound?

If the bottle is distorted by squeezing the sides of the bottle in, what effect will it have on the sound produced by the bottle?

If the squashed bottle is placed in a container of water, what is the effect on the sound.

Experiment 2

Take a glass bottle and strike it with a spoon or similar and note the sound made. If water is not added to the bottle, what will happen to the sound?

Experiment 3

Take a coffee cup. Strike the cup with a spoon or similar and note the sound. Now move around and strike the cup at different locations. What happens and why?

Experiment 4

Take an empty champagne glass and flick it to make it ring. Fill the glass with champagne and flick it again. Does it still ring? Fill the glass with tap water and try again. What happens to the sound?

If you try each of the above experiments, the chances are that the responses will be different to what you might expect. The reasons as to why each experiment behave the way they do may be found later in the newsletter.

The “mass on a spring” model is still basically correct, but what may be different is the understanding of which components form the vibrating mass and which form the spring.

Vibration from Railways

Vibrations can be transmitted from railway tracks to nearby buildings. In earlier studies the mass on a spring model was used to try to understand the vibrations. The predictions did not correlate with actual measurements.

Vibration Measurements

An example was given of a building in Britain that was equipped with base and side vibration isolation.

Vibration Isolation of Rail Track in Tunnels

A number of methods are used to isolated vibrations from rail track including:

- i) Floating Slab Track – Track is supported on a large mass that in turn is supported on resilient pads. This system works well but is expensive and requires significant extra space.
- ii) Vibration attenuating pads between the rail and sleeper.
- iii) Ballast Mats – Vibration is attenuated by the damping properties of the ballast. Works well when new but deteriorates with time as the ballast breaks down and consolidates.
- iv) Embedded Rail – The rail is embedded in a resilient material that provides the necessary resilience.

A new innovation is the Pandrol Vanguard system that supports the rail directly below the rail head, providing very good vertical resilience and good lateral control. Measurements show that this system is effect in reducing the vibrations into the ground but the ambient noise in the tunnels rises significantly. For modern trains with good noise insulation, this is usually not a problem.

Effect of Resilience

To reduce the vibrations that are transmitted into the ground, the track requires a high degree of resilience. The higher the resilience, the lower the level of vibration transmitted into the ground. Resilience effectively changes the roughness characteristics of the track.

Roughness in track may be related to the following track features:

- i) Track bed
- ii) Bent rails
- iii) Variation of rail support stiffness
- iv) Variation of rail flexibility or stiffness
- v) Variation of sleeper spacing
- vi) Rail surface irregularities
- vii) Wheel surface irregularities

Generally when considering track vibrations, only the last two features are considered. However when examining vibration transmission into ground, these two features are probably the least likely causes as the vibration frequencies emitted by these features are two high compared with those measured in the ground. The top five features are more likely to cause ground vibrations.

To establish which features are more likely to cause ground vibration it is necessary to measure the long wavelength irregularities in track when under load. At present the technology to do this is not available. This is the next challenge in understanding the source of the vibrations that are transmitted into the ground.

The addition of resilience to the track structure increases vertical deflections but reduces the apparent roughness of the track. Measurements have shown that vibrations may be reduced by up to 20 dB by the addition of suitable resilience.

Conclusion

The conclusion is that resilience reduces roughness and therefore the amount of vibration transmitted into the ground.

A VIEW FROM AFAR - by Max Michell

This month I have veered away from the usual commentary style piece in deference to what I consider to be a development of quite considerable importance – a watershed new technology that may well be seen by history as one of the landmark rail improvements.

Conventional air braking has developed over the 130 years or so since George Westinghouse perfected the freight air brake. Improved technology and materials have allowed refinement of the application and holding capabilities of the air brake, but that has not really changed the basic concept of air pressure changes applying and releasing compressed air brakes along the length of a train. The air brake is robust, reliable and almost universal in its application to railway braking these days.

A major shortcoming of the conventional head-end air brake is the time taken for the air pressure wave to run the length of a long thin train pipe on a long train. Even with the modest length 1500 - 1800 metre trains now running on the national network there is a build up time of up to 60 seconds before the full brake is actually applied along the length of the train. In that time the train has run maybe as far again as it will take to stop the train after the brakes are fully applied – in other words the train stopping distance can be double or more than if the brakes were able to be immediately applied on the whole train. Distributed power and end of train monitors with air dump capability are partial solutions. The good news is that there is a whole solution, and QRN have taken a lead in its introduction to this country.

QRN have fitted Electronically Controlled Pneumatic braking (ECP braking) to their new Hunter Valley coal trains. This type of braking has long been used on multiple unit passenger cars and can be found on the suburban operations in most capital cities. Applying this form of braking to freight operations is something that until recently has eluded technology.

ECP braking as applied by QRN to their standard gauge coal trains is still operated by air but is activated electronically using a 230v dc bus line along the train. It enables all brakes on the train to be applied at the same time and the only delay (of a few seconds) is due to the time for the appropriate pressure to be admitted to the brake cylinder from the auxiliary reservoir on each wagon (in fact they are in pairs so one control valve does two wagons). This system not only allows graduated application of brakes but also allows graduated release, something that cannot be done with normal air brakes (air brakes require full release then reapplication if a lower braking level is required). In fact the ECP train line is always kept at full pressure and when the brakes are applied, consuming some air, it will recharge straight away regardless of the amount or duration of the brake application. A full service ECP brake application and release on a mid length train (say 75 wagons) can be achieved in less time than the brake build up time to apply the brakes on a conventionally braked train.

The ECP system however is far more capable than just dealing with braking precision. Since the train is electrically coupled it can handle a number of data tasks as well as other (future) tasks such as control of distributed power in the middle of trains (QR has a 30 year history of using distributed power so they see that type of operation as entirely normal). ECP requires positive identification of the front and back of trains, enabling continuous train integrity checking as well as (brake) health monitoring of every wagon and identifies the actual wagon numbers on the train and their condition (loaded or empty). It also gives the driver the ability to conduct continuity, retention and other tests from the controlling locomotive cab. The end of train device reports end of train pressure, voltage and motion sensing data, while also providing a high intensity LED marker light.

Additional (wagon) health and status data could be generated from each wagon, although any significant additional data load may have to be carried by an extra pair of train wires that would need to be built in from the beginning to be cost effective. AAR tests indicate that ECP can save 60 minutes for every 600 km of travel (simply as a result of greater precision in braking) while they also report a potential for 25% reduction in derailments arising from in-train forces (ECP substantially reduces in train forces at application and release of brakes). Despite this the application of ECP to normal commercial freight operations at this stage is more or less limited to Canada, South Africa and now Australia – I guess it could be called early production application of this technology.

QR prototyped ECP on a trial train set from the Callemondah narrow gauge coal fleet starting around 2003. A number of issues came up that were able to be resolved in time for the Hunter trains – in fact it is anticipated that as a result of QR and CRC work an Australianised ECP capable of retrofit to existing wagons and able to inter-work with air braked wagons may be developed.

QR adopted 30 tonne axle load locomotives with A.C. high adhesion traction for their Hunter Valley operations. This has allowed them to haul 74 wagon trains (8880 tonnes loaded) with two locomotives. The time lost on upgrades compared to PNL (two loco 60 wagon) trains (due to more tonnes but similar power) is made up by faster and more precise braking with ECP on the level and downhill sections. In fact technically there is no reason why the QR coal trains could not run at 80 km/h safely with existing signals, other than the fact that they would catch up to the existing 60 km/h air braked train ahead.

In terms of braking in this country it may not be unreasonable to suggest that ECP braking for freight trains may be the biggest single step forward since the adoption of the air brake in the 19th century.

ASIARAIL 2005 12TH INTERNATIONAL CONGRESS

AsiaRail 2005 12th International Conference will be held from 6th to 8th December 2005 in Bankok, Thailand.

The conference covers the latest projects in the region and the key operational issues.

Members wanting more information about this conference, please refer to www.asiarail.com.

ARTC NSW UPDATE

The following news from NSW was issued recently by ARTC and has been included here for information.

Hunter Valley

ARTC has made a significant contribution to the overall efficiencies of the Hunter Valley Coal Chain by managing and maintaining very high track standards and for most of the year providing track infrastructure almost free of speed restrictions. This has greatly assisted rail operators to improve cycle times and to reduce operating costs.

ARTC has managed a total of 9,800 export coal services (calendar 2005?) for a tonnage delivery of 53 million tonne, plus an additional 1.76mt of Domestic Coal deliveries to power stations. Current forecasts are for the provision of rail infrastructure and train control functions for close to 16,000 export coal services for a tonnage delivery between 80 - 81mt for the year, an increase of 2-3mt from last year.

While throughput has not been as strong as forecast for the first 8 months of the year resulting in significantly lower delivery of export coal and under utilised capacity, the outlook for the remainder of the year shows demand to be reasonably high with a capacity utilisation of 84.5mt annualised, September to December.

In the Hunter Valley ARTC has also overseen the safe introduction of Queensland Rail National to coal operations. On 21 August QRN hauled its 1 millionth tonne of coal to the Port of Newcastle.

North/South and the North Corridor

In Operations, operational performance (on time?) has improved from 70% in January to the present 85%.with the emphasis being placed on on-time running across the North / South corridor including arrivals and departures into and out of terminals,

Brisbane – Sydney – Melbourne.

Speed restrictions have come down by 60% across the North Coast, including a zero level achieved at Taree, with some of these having been in place for over 7 years.

Resurfacing productivity improvements have been in the order of 25% and tamping improvements in the order of 43% (679mtrs/day to 938mtrs/day).

Freight and passenger train delays as a result of infrastructure maintenance works have been at a zero level. This has been achieved despite the significant works that have been undertaken on the refurbishment and reconstruction of bridges, reconstruction of two Category 3.1 geotechnical failures sites and contracted resleepering on the corridor.

Western Corridor

As the anniversary of the 'take up' draws near, the efforts of all staff throughout the 12 months are being rewarded with significant improvements in speed restrictions, track condition indices and OH&S safety statistics. Speed restrictions on the Broken Hill Line currently total less than 2 minutes thanks to a targeted campaign by the local teams.

Southern Corridor

The objective for the Country Regional Network (not leased) lines has been to complete the agreed program resulting in an overall improvement in the track. This has included track resurfacing programs and the installation of steel sleepers and bridge renewals. Over 70,000 steel and timber sleepers have been installed and 14 bridges renewed or repaired.

The Southern Leased lines have represented a major challenge with poor initial asset condition. The focus for the last twelve months has been on stabilising and holding the infrastructure so as to maintain performance and allow time for the preparation and establishment of the North South Strategy.

EXPLANATION OF EXPERIMENTAL VIBRATION RESPONSES FROM DR HUNT'S PRESENTATION

Experiment 1 – Plastic Bottle

Instinctive understanding of vibrations suggest the when one blows across the top of the bottle, the air begins to vibrate up and down in the bottle and a resonate sound results. When the water is added, instinctive understanding says that as the distance between the surface of the water and the top of the bottle reduces, then the distance that the vibrations have to travel reduces and the frequency of the vibrations increase. So far, instinctive model seems fine.

When the empty bottle is squashed, what happens? Instinctive understanding suggests that as the distance is the same as before, the note should remain the same. In fact the frequency of the sound becomes lower.

When the empty squashed bottle is placed in the container of water, what happens to the sound. Again instinctive understanding says that there should be no change. However the sound resonates at a higher frequency. The results of the last two exercises do not seem to follow the instinctive model.

The reason is that not all of the column of air in the bottle is vibrating. Indeed it is just the air in the neck of the bottle that vibrates and the air below is acting as the spring.

When the bottle is squashed, the change in shape affects the spring rate of the air below the neck – the bottle walls are more flexible and therefore the spring rate is lower, hence the lower frequency sound emitted.

When the bottle is placed in the container of water, the sides of the bottle becomes stiffer, raising the spring rate and increasing the frequency of the sound emitted.

The mass and spring model is correct, but it is the understanding of what constitutes the vibrating mass and what constitutes the spring, that needs careful determination.

Experiment 2 – Glass Bottle

When the wall of the glass bottle is struck, the wall vibrates causing the air to vibrate and hence we hear a ringing sound. The addition of the water acts to dampen the vibration in the wall and hence the frequency diminishes and we hear a lower frequency sound.

Experiment 3 – Coffee Cup

If one strikes the coffee cup at various intervals around the lip of the cup. The frequency of the sound emitted will change depending on the location. The reason for this is the presence of the handle, which acts to locally stiffen the cup wall and control the shape of the vibrations in the cup. The handle acts to create vibration node points at positions of 90^o, 180^o and 270^o around the cup wall. At these points vibration is dampened and the frequency of sound emitted when these points are struck is low. Mid way between the node points the cup wall is free to vibrate so if the cup is struck at 45^o, 135^o, 225^o and 315^o from the handle, the cup produces a high frequency sound.

Experiment 4 – Champagne Glass

An empty champagne glass when flicked will ring with a high frequency. If filled with champagne and then flicked again, the result is a dull noise with no ring to it. The reason for this is that the bubbles within the champagne act to dampen out the vibration. If the champagne is left to go flat or the glass refilled with tap water and again flicked, the glass will ring again but at a reduced frequency.

NEWSLETTER No 8/2005

Railway Technical Society of Australasia
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SEPTEMBER 2005

Conclusions from the Experiments

These experiments show that there is no simple explanation to the mechanisms of vibration and that each situation must be clearly thought out. The part of the vibrating system that forms the mass, that which forms the spring and the effect of dampening must be clearly established if a true prediction of vibration response is to be determined.

MEETINGS FOR 2005

Future Speakers/Dates/Topics				
Date	**Speaker**	**Organisation**	**Topic**	**Venue**
06/10/05	Dean Lambert	Trans Adelaide	New TransAdelaide Trams	Engineers Australia Chapman Hall (RTSA to host)
28/10/2005	Railway Quiz Night	PWI	Open to RTSA members	The Adelaide Baseball Club Urbrae Terrace, Plympton
03/11/05	George Erdos Alistair Morrison	TransAdelaide (Introduction) Alstom / United (Technical Presentation)	Joint Meeting IRSE & RTSA New CTC System for TransAdelaide	Riviera Motel and Function Centre Site Visit to TransAdelaide Control Centre
29/11/05	Annual General Meeting of RTSA - SA Chapter Dinner Meeting Guest Speaker – Mr Bill Watson, General Manager TransAdelaide			

NOTICE TO MEMBERS RECEIVING RTSA NEWSLETTER BY EMAIL

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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 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@jhg.com.au

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