

NEWSLETTER No 3/2006



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

MARCH 2006

NEXT MEETING

The next meeting of the PWI - SA Section will be held on the 6th April 2006. This meeting will be a site visit to:

Intercast & Forge
1 Shumacher Road
Wingfield

The visit will commence at 5:30pm.

Intercast and Forge mass-produce castings for the rail, automotive and other industry segments. The equipment used by Intercast and Forge is some of the modern available today. As such they are able to compete and supply product to the components market, worldwide.

The site visit will allow members to observe Intercast & Forge's foundry in operation and learn about the latest in high-speed mass casting technology.

Following the site visit, a barbeque 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

Improving Railway Safety through Accident Investigation

Tony Simes

Senior Transport Safety Investigator
Australian Transport Safety Bureau

Introduction

The Australian Transport Safety Bureau (ATSB) has the aim of maintaining and improving transport safety and increasing public confidence through excellence in:

- i) Independent investigation of transport accidents and other safety occurrences
- ii) Safety data research and analysis
- iii) Safety communication and education

The Role of the ATSB

The ATSB is responsible for investigating safety in the Aviation, Marine and Rail areas of transport as well as for transport related research. The ATSB operates within the regulations of the Transport Safety Investigation Act 2003.

It is important to note that ATSB investigations do not apportion blame or liability nor can ATSB investigation reports cannot be used as evidence in civil or criminal proceedings. All investigation reports must be publicly released.

The Act gives ATSB considerable investigative powers. Within the rail sector, these powers mainly relate to the defined interstate rail network.

The Rail Investigation Team consists of:

- i) Adelaide – Three investigators
- ii) Canberra – Two investigators – One shared with the Marine team
- iii) Brisbane – Two investigators – One shared with the Marine team

The following matters are immediately reportable to the ATSB:

- i) Death or serious injury
- ii) Collisions between one or more rail vehicles resulting in serious damage to any vehicle
- iii) A collision between a rail vehicle and a person or road vehicle at a level crossing
- iv) A collision between a rail vehicle and an obstruction resulting in serious damage
- v) Running line derailments.

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Not all reported matters or incidents are investigated by the ATSB. Guidelines have been established to decide which matters ought to be investigated and these are determined by:

- i) Potential safety values
- ii) Fatalities and or serious injury
- iii) Public profile of the occurrence
- iv) Resources available
- v) Risks associated with not investigating

Some incidents that have been investigated include:

- i) Beranjondo – 15th November 2004 – Tilt Train Derailment – A joint investigation with Queensland Transport. Factors related to this incident were speed, location awareness, and driver distraction.
- ii) Bates SA – 9th November 2003 - Bearing failure
- iii) Murarrie Queensland – 8th June 2004 – Signal Passed at Danger (SPAD). Factors included a lack of concentration, medical issues and a history of previous SPADS.
- iv) Sandgate NSW – 25th February 2004 – Safeworking – Factors related to this incident were training, workload/distraction, and process.
- v) Alumatta WA – 15th March 2004 – Derailment – Factors include speed through points and track maintenance.
- vi) Glenalta SA – 21st November 2004 – Derailment – Factors related to the accident include track and rollingstock, residential property close by, TransAdelaide passenger facilities, a level crossing and roadway.

The Glenalta Derailment in Detail

This incident occurred approximately 10.00am on Sunday 21st November 2004. The train involved, 7MP5, was owned by Pacific National and was traveling from Melbourne, through Adelaide to Perth. The train was descending the western slopes of the Mt Lofty Ranges and this section of track is known for its steep gradients and low radius curves.

At the entrance to the Belair passing loop, a single bogie on an unloaded wagon derailed. The derailed bogie traveled the length of the passing loop and at the departure turnout, the bogie became detached from the train. As this happened, two other bogies became derailed.

The derailed wagons continued to the Main Road level crossing at Glenalta, where as a result of no longer being constrained laterally, they moved sideways across the TransAdelaide track and piled up on the

Glenalta Station platform. Further wagons then derailed and piled up on and to the side of the track including some wagons in the back yard of an adjacent private residence.

Initial Observations

Markings at the initial point of the derailment on the entrance turnout to the Belair passing loop indicate that a wheel had ridden over the checkrail, thereby allowing the opposite wheel to travel up the wrong side of the Vee-crossing of the turnout. The wheel markings on the checkrail were not continuous over the entire width of the checkrail head, indicating that the wheel was airborne prior to contact with the head of the checkrail.

VAMPIRE® Vehicle Dynamics Software

VAMPIRE® is one of the world's leading railway vehicle dynamics simulation packages. VAMPIRE® allows the user to build a virtual model of any rail vehicle and run it over measured track geometry. Simulated test runs allow the users to assess the behaviour of the vehicle, without the need for real test runs.

The dynamic modeling indicated that wheel lift is likely when any wheel makes contact with a checkrail. The amount of lift is governed by the amount of loading on the wheel and the amount of longitudinal compression forces within the train. The modeling suggested that there is a high likelihood that an unloaded wagon with high longitudinal compressive forces will generate a wheel lift sufficient to lift it over the rail.

Likely Cause of Derailment

The most likely direct cause of the derailment of 7MP5 was a significant wheel unloading as a wheel made contact with a checkrail at the entrance to the Belair crossing loop. The wheel lift was sufficient to allow the wheel to become airborne and land with its flange tip on top of the checkrail, allowing the wheel set to shift laterally and for the opposite wheel to travel up the wrong side of the Vee-Crossing and subsequently derail.

Contributing Factors

The investigation determined that a number of factors combined to contribute to this derailment. Any one factor in its own right was unlikely to have resulted in a derailment, but the four factors acting together greatly increased the likelihood of a derailment. The contributing factors are:

- i) Train loading and marshalling - Empty wagons were marshaled to the front of the train with almost 2900 tonnes of load trailing the empty wagons.

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- ii) Train handling – The controlling of the train speed was achieved by using only the dynamic braking. This would have created higher compressive forces at the front end of the train when compared with the use of a combination of train air braking and dynamic braking.
- iii) Wagon Design – RQZY class wagon is relatively lightweight. It has very stiff vertical suspension and relies on torsional flexibility in body when in the tare condition. The high vertical suspension stiffness reduces ability to absorb discrete wheel impacts.
- iv) Track Geometry – Track geometry influences the oscillating motion of the rolling stock. This may have resulted in the right hand wheel flange coming into rail contact as the left hand wheel came into contact with the checkrail.

Recommendations

The ATSB made a number of recommendations relating to:

- i) Procedures for train loading, marshalling and handling
- ii) Functionality of software management tools
- iii) Review of rolling stock design and performance acceptance requirements
- iv) Review of civil construction and maintenance requirements
- v) Review of documented standards
- vi) Implementation and monitoring of safety standards

Actions Taken

As a result of the investigation, the following actions were taken:

- i) Loading and marshalling procedures were reviewed
- ii) The intent of the marshalling requirements were recognized
- iii) The ratio of trailing loads to lightly loaded platforms was reassessed
- iv) Future enhancements to software tools (OASIS and TIMS) are being implemented.

Ongoing Investigations

The ATSB has a number of ongoing investigations of which some are:

WA – Koolyanobbing and Booraan
SA – Eden Hills and Regency Park
Victoria – Dynon and Horsham
NSW – Thornton and Yerong Creek

Qld – Greenbank

ATSB is also providing assistance to the following investigations by other bodies:

Bloomfield (OTSI NSW)
Kaleentha (OTSI NSW)

Further Information

For further information about the ATSB, look up its website at

www.atsb.gov.au

CORE 2006

Core 2006 will be held between 30th April 2006 and 3rd May 2006 at the Grand Hyatt Melbourne.

A total of 62 high quality technical papers will be presented over two days. The papers will focus 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 will be held on the third day.

All Core conferences are noted for their excellence and value and this conference is expected to be one of the best.

Registrations are now being accepted. To register or for additional information about the conference, go to:

www.core2006.org

POINT OF VIEW – Max Michell

In recent times the issue of *capacity* has risen in a number of contexts. There is the Connex (Melbourne) issue where the western and northern lines, long orphans in the Melbourne network, are claimed to have reached something of a crisis of capacity. There is the inter-capital east coast route between Sydney and Brisbane, which has reached capacity for freight trains of 1500 metres. And of course there are the various NSW and Queensland coal lines and ports, which have received more than a passing, mention recently. In each case there are a series of factors and indicators at work that point to capacity constraint.

In Connex's case the overfull electric trains, multiplication of inter-urban trains on the Geelong, Ballarat and Bendigo lines and lack of paths in the inner city area all point to an imbalance of demand and capacity. On the NSW North Coast line the combination

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of limited freight paths and curfews between Sydney and Newcastle combined with irregular spacing of 1500 metre loops north of Newcastle limits the throughput. The coal lines issue is one of continuous and rapid demand growth straining both the rail network and ports despite continuing work to enhance capacity.

The fundamentals of capacity on rail come down to just two elements that matter – how many trains can the infrastructure reliably handle and how much can each train carry. There are NO other basic issues that matter.

In the case of the Melbourne suburban issue the number of trains able to be handled on the inner part of the network is the key issue. Trains are of fixed length and lengthening them for higher capacity would involve rolling stock, platform and track modifications that would be very costly. Increasing capacity by going to double deck trains (as is the case in Sydney) not only involves a new train fleet but also is partly self defeating in that the DD trains have demonstrably long dwell times (if you doubt this check out Sydney's sadly slow suburban train times). The problem in this case requires a largely infrastructure solution – enhanced track and signal capacity in the inner area to match the capability of the sum of the outer limbs, with the whole aligning to realistic future demand change and growth.

The NSW North Coast line could take more freight trains provided that they ran at commercially unattractive times and / or that they run to a shorter maximum length (1200, 900 or 750 metres depending on pathing). However on this line the trains timed for 1500 metres are on average running considerably shorter than this (at last look it would be around 1200 m) so there is additional available capacity in the existing trains. However in the current competitive climate this capacity will be overlaid with a number of constraints that could loosely be defined as 'never give a sucker an even break'. Despite this the dominant inter-state operator (Pacific National) has enough overall control in the freight market to fully utilize all their spare capacity (which is after all comes at a very low marginal cost) if they were of a mind to. As far as infrastructure goes a relatively low investment in full length loops that will 'infill' the gaps in the existing spacing, coupled with some cooperative action between ARTC and RailCorp in RailCorp territory can significantly increase long freight train capacity between Sydney and Brisbane. This is the core of the current ARTC North – South enhancement plan.

The coal capacity issue is best understood by looking at the ARTC Hunter Valley Coal Capacity Improvement

Strategy that is on the ARTC web site (www.artc.com.au). This follows through a process of identifying all the capacity constraints over the whole coal network and relating these to projected demand – in particular by 'smoothing' capacity so that line sections have compatible capacity throughout their length. It is understood that ARTC will have a new version (version 5) of the strategy up on their web site in the near future. The situation in Queensland is similar, although in their case large parts of the coal network is (more or less) dedicated to coal.

One small-scale coal haul that rarely gets in the limelight is the export of southern coal through the Port of Brisbane at Fisherman Islands. Not all that long ago this mainly originated from the West Moreton coalfields in the Ipswich area (on the western boundary of Brisbane). However a combination of high coal prices and large reserves has resulted in an almost total shift of production west to the Darling Downs some 200 km west of Brisbane. The narrow gauge railway (the 'main line' in old parlance) between Brisbane and Toowoomba has two very difficult range sections which involve 1 in 50 grades on curves down to 100 metre radius on single track (double track on this route is restricted to the easier sections between the range sections). The end result is a line with limited axle load (15.75 tonnes axle load), limited clearances (containers to 8' 6" max under sufferance), slow running times and little scope for additional crossing loops or duplication. There is a well-documented proposal for a completely new high-speed deviation to by pass the range sections, but at a cost that is variously quoted at \$700 million or more it is not high on the agenda right now.

As a simple capacity issue there are a number of capacity enhancements that could be undertaken to enable more coal to be handled, although not all are realistic in physical, political and /or financial terms. In fact the extent of improvement to this route is in the end a matter of vision – long range and the new high-speed line would get up, but short range and the options are all about band-aid fixes.

The existing route has a twice-weekly passenger train, fuel, cotton, container, livestock and grain freight as well as the coal business so there is a complex mix of issues that are relevant to the line. However as far as coal goes there are a number of possible choices, among which are –

1. Continue to prop up the existing line as primarily a coal and grain railway, with intermodal (a lot of which is boutique grain and cotton industry output - lint, seed,

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cotton), fuel, livestock and passenger being progressively phased out.

2. The existing line could be upgraded for higher axle loads (but it would have to be full length Redbank to Toowoomba and beyond to the coal mines, approx 200 km) and loading outline (mainly the little Liverpool and Toowoomba range tunnels) at quite considerable cost which would allow capture of some of the additional coal opportunities due to more efficient train loading (more tonnes per wagon) but would be unlikely to increase the number of paths available over the line.

3. Additional to item 2 above, work could be put in hand to increase paths on the existing line by partial realignment or additional loops and /or partial duplication (all very hard and likely to be at high cost) – which might allow capture of all additional coal opportunities but at 'existing line' costs.

4. Closure of old line beyond Rosewood (end of electrification and the outer metro passenger service) and handover of much of the freight task to road - in this case the coal business would collapse while the grain would be seriously constrained and some might be diverted south to an improved Newcastle grain port. The biggest loser would be the Port of Brisbane, which would potentially lose most of its regional bulk traffic.

5. Closure of the old line but provision of a link between the Darling Downs to Gladstone (either Everalde Compton's plan between Wandoan and Moura, or the Tarong proposal extended via Kingaroy or Monto to the Qld North Coast line) so that coal and grain would be siphoned off to Gladstone with some of the southern grain roaded to Brisbane or railed to Newcastle. The remaining general freight and passengers would be abandoned to road, as in item 4 above.

6. Construction of 'cheap' range bypasses, to improve alignment and capacity, by using grades and curves rather more demanding than the high speed route proposals but better than the existing route alignment (i.e. a 'low vision' solution)

I have no idea what costs would be involved in any of these options but anecdotal evidence suggests that QR reckon on a high cost for 2 and 3 while retention of any of the inadequate parts of the existing line would result

in increased maintenance out of proportion to the added traffic task.

While the price of coal is high it will move via even quite inefficient routes and might even have enough in reserve to provide the critical mass to get a link to Gladstone and/or the high speed Toowoomba railway on the agenda.

Grain on the other hand has little in reserve and is increasingly being handled in boutique (i.e. less than hatch load) lots in containers. So even a poor quality railway will continue to handle coal as long as the price remains high but other traffics are likely to progressively fall off (although the capacity created could be taken up by coal).

The difficulty with this approach is that the gap between the existing freight capacity from the Darling Downs (maybe 5-6 million tonnes?) and the critical mass of coal that would inspire a commitment to either the Gladstone link or new Toowoomba railway (maybe >10 million tonnes?) means that there is no easy strategy of growth until a new link or line is built. For this to happen there will have to be an act of faith - that coal prices will stand up over time, that the coal producers can economically exploit reserves for a long period, that coal markets will continue to favour Darling Downs coal for many years and that the port will be able to expand for increased volumes while avoiding show-stopper environmental or social issues as tonnages more than double.

The great railway conundrum is this issue of finite existing capacity not matching to new higher capacity, thereby creating a gap, which the railway (and transport department) economists and planners have not yet managed to bridge. The road people seem to succeed in similar situations as a matter of course, so is there a fundamental flaw in railway thinking and logical processes?

I leave you to ponder, and hopefully to contribute to the resolution.

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MEETINGS FOR 2006

Future Speakers/Dates/Topics				
Date	Speaker	Organisation	Topic	Venue
6/4/2006	Site Visit	Intercast & Forge	Tour of foundry including new facilities	Intercast & Forge, Wingfield - Joint with PWI
1-3/5/06	Core 2006			Melbourne
Late May 2006	Eminent Speaker Tour		TBA	IEAust Building – Bagot Street
	No Meeting in June			
6/7/2006	TBA			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		ARTC	Structural Clearance Management	Joint with PWI - IEAust Building – Bagot Street
2/11/2006	Mike Sowden	ARTC	Wayside Detection and Wheel Profile Measurement	IEAust Building – Bagot Street
28/11/2006				RTSA AGM

KEY RTSA CHAPTER COMMITTEE CONTACTS

Chairman	Rob Schweiger	03 9610 2948
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Secretary	Tom Hampton	
N/L Despatch	Malcolm Menadue	8270 2873
N/L Editor	Stephen Townsend	0400 135 481

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.

Disclaimer

This Newsletter is a publication of the South Australian Chapter of the RTSA. The opinions expressed within are not necessarily those of the Chapter, Society or Editor.

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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, or by phone on 0413 128 775.