

# *SA Newsletter*

*April 2009*



ENGINEERS  
AUSTRALIA

**RTSA**

---

**NEXT CHAPTER MEETING:**

**Thursday 7<sup>th</sup> May**

**Improved Turnout Technologies**

**and**

**Update of Australian Track Material Standards**



**by**

**John Lazaro of Pacific Rail Engineering**

**&**

**Rob Schweiger, Track Materials Committee**

**Venue: Engineering House, 11 Bagot Street, North Adelaide**

**Light Refreshments from 5.30pm, meeting commences 6.10pm**

## Contents

Chapter Meetings.....	2
News .....	2
Coming Events.....	3
Chairman's Chatter .....	3
Point of View .....	4
New Ultrasonic Rail Flaw Detection – Alex Ivachev, RTI.....	8

### Publisher

This newsletter is a publication of the South Australian Chapter of the Railway Technical Society of Australasia, Engineering House, 11 Bagot Street, North Adelaide SA 5006. Opinions expressed within are not necessarily those of the Chapter, Society or Editor.

### Contributions

Contributions, including news, opinions, or letters to the editor, are always welcome. Send material by e-mail to [sa-editor@rtsa.com.au](mailto:sa-editor@rtsa.com.au)

### Continuing Professional Development

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

### RTSA Website

The RTSA website [www.rtsa.com.au](http://www.rtsa.com.au) has details of RTSA activities, including future meetings and reports from past meetings, for all Chapters.

### Membership

Information for potential new members and an application form may be found at [www.rtsa.com.au](http://www.rtsa.com.au).

### Chapter Contacts

Chairman	Duncan McLeod	8338 7919
Deputy Chairman	Daniel Martucci	8204 8213
Secretary	Tom Hampton	8291 5383
Treasurer	Michael Forbes	8217 4127
Newsletter Despatch	Steve Torok	8264 2552
Editor	Lucie Mitchell	7129 8284

### Newsletter Dispatch

Dispatch of the newsletter is undertaken by Steve Torok. Contact Steve on [storok@tge.com.au](mailto:storok@tge.com.au) if you have any problems receiving newsletter electronically or in hard copy, or change your e-mail address.

## Chapter Meetings

### Thursday 7 May 2009

Chapter meeting, 11 Bagot St, North Adelaide – Improved Turnout Technologies + update on Australian Track Materials Standards – see Page 1

### Thursday 4 June 2009

Chapter meeting, 11 Bagot St, North Adelaide – Rail Maintenance Developments in the Pilbara.

### Thursday 2 July 2009

Chapter meeting, 11 Bagot St, North Adelaide – Belair Line Upgrade, by Philip Agnew.

### Thursday 6 August 2009

Chapter meeting, 11 Bagot St, North Adelaide, with joint Mechanical Groups.

### Thursday 3 September 2009

Chapter meeting, hosted by IRSE.

### Thursday 1 October 2009

Chapter meeting, 11 Bagot St, North Adelaide.

### Thursday 5 November 2009

Chapter meeting, 11 Bagot St, North Adelaide – ARTC Network Enhancement investment update by Ben Leske.

### Tuesday 1 December 2009

Annual dinner meeting + AGM, Hyde Park Tavern.

## News

### IRSE Convention

The Institution of Railway Signal Engineers held its conference entitled 'Controlling Railways – Australia's Next Generation Systems' in Adelaide on 3<sup>rd</sup>-5<sup>th</sup> April 2009. This event was a great success, attracting a large contingent of railway professionals keen to learn more about rail developments, both planned and already underway for South Australia, and of the challenges that have been overcome in a variety of rail related projects.

---

## Coming Events

### Study Tour on Railway Engineering

The NSW Chapter has released a brochure containing details and an application form for its Study Tour on Railway Engineering (STORE) of Asian Metro Systems which will take place on 12<sup>th</sup> – 23<sup>rd</sup> September 2009, visiting Singapore, Kuala Lumpur, Shanghai, Beijing and Hong Kong. This brochure can be downloaded at the following location:

<http://rtsa.com.au/assets/2009/04/store-2009.pdf>

### AusRail Plus 2009, Adelaide

Between 17<sup>th</sup>-19<sup>th</sup> November, Adelaide will host the largest annual rail event in the Asia Pacific region, AusRail Plus, at the Adelaide Convention Centre. With trade exhibitions, networking functions and a

program of international speakers, this 3-day conference will be the biggest rail event of 2009.

Full details can be obtained from [www.ausrail.com/informaoz/AusRAIL/](http://www.ausrail.com/informaoz/AusRAIL/)

### CORE 2010

RTSA's biennial Conference on Railway Engineering, CORE 2010, will be held in Wellington, NZ on 12<sup>th</sup> – 15<sup>th</sup> September 2010. The conference theme is "Rail – Rejuvenation & Renaissance". Details are becoming available on:

[www.core2010.org.nz](http://www.core2010.org.nz)

## Chairman's Chatter

The presentation to our April meeting, hosted by PWI, contained an interesting but nevertheless disappointing observation:

In describing the mobilisation of a new contract for ultrasonic rail flaw detection on the ARTC network, the speaker noted that a major challenge was to obtain all the accreditations and approvals needed to operate a hi-rail test vehicle across the network.

It appears that, notwithstanding earlier encouraging signs, reform in this area is moving at a glacial pace.

Back in 2006, the Australian Transport Council announced that "in a decision that marks a significant achievement in national rail reform, Ministers approved the proposed model national Rail Safety (Reform) Bill and associated aspects of the Rail Safety Reform Package. Once implemented in all states and territories, Australia will have, for the first time, a nationally consistent legislative framework for rail safety.

This initiative is part of the COAG reform agenda and is an effective demonstration of the

improvements in regulation of transport that can be achieved."

This may have been so, but unfortunately the improvements do not seem to have trickled down to the point where operators are deriving significant benefits from the "nationally consistent framework".

Inconsistencies arise partly because different jurisdictions have amended the framework to suit their own requirements, so national consistency has not been achieved. And, more importantly, the different jurisdictions interpret and enforce their own Acts and Regulations in different ways.

So, in practical terms, we seem to be little better off than before the process started. The issue of jurisdictional interoperability is, if anything, becoming increasingly important, as greater numbers of track owners and rail operators expand their activities beyond a single state or territory.

But all is not lost.

In July 2008, the Australian Transport Council requested a Regulatory Impact Statement from the National Transport Commission, on a single national

---

rail safety regulatory and investigation framework. The statement was published in November 2008, and public comments closed at the end of the year.

This is a useful step forward, but not exactly ground breaking, considering that recommendation no. 1 in the Independent Review of Rail Safety Arrangements in Australia, carried out for the Australian Transport Council way back in September 1999, was that the Commonwealth establish a national body for rail safety regulation. Ten years later, we are just moving off the starting line.

As expected, the Regulatory Impact Statement is generally supported by organisations operating in multiple jurisdictions, and opposed by some incumbent regulators.

It is disappointing that, despite State and Territory transport ministers having collectively resolved to move towards a national regulatory body, the pace of implementation of the agreed policy is so slow, and the spirit of reforms appears to be failing to be implemented with any expediency.

It is to be hoped that establishment of a national rail regulator can proceed at a more rapid rate than has

occurred up until now, to improve the efficiency of interstate operators and track owners, and to place rail in a more even competitive position in comparison to road.

A common example of current regulatory hurdles is the way in which operating standards or practices, well established in one or more jurisdictions, must go through a full notification/approval process to be implemented in another State. And items of rolling stock registered in some jurisdictions must on occasions be dealt with as new vehicles, including a full testing regime, in order to run in another State.

There is no inherent reason why the operation of trains across state borders should be tied up in so much more bureaucracy than the operation of road vehicles. The need for meaningful reform is long overdue.

**Duncan McLeod**

## Point of View

*The following is an abridged version of an address to the RTSA Victorian Chapter by Tony Canavan, Coordinator General, Nation Building and Jobs Plan, Victorian Department of Premier and Cabinet.*

*Although specific to Melbourne, the observations expressed have much wider applicability, to Adelaide and elsewhere.*

*The full address can be found on the RTSA website.*

### Introduction

Late last year, the Victorian Government released its long-anticipated \$38 billion Victorian Transport Plan. It looked at the whole of Victoria – and it went further, in looking at Melbourne’s urban form and demographics, and how transport decisions can shape that form.

Making the right investments in transport will help secure the future prosperity of Melbourne and Victoria. And failure to do so will imperil that prosperity.

### The Development of Melbourne

Victoria was producing a third of the world’s gold in the 1850’s, and suddenly Melbourne and our regional cities were developing as fast as any cities in the world.

The transport planners responded to the needs of the day and railways were built to underpin both the gold-based economy and agriculture, linking the minefields, farms and regional cities to the export ports, including Melbourne. Indeed the first railway in Australia opened in 1854 between Flinders Street Station and the port of Melbourne.

During the twentieth century, Melbourne and Victoria became the country’s manufacturing hub,

---

initially capitalised through gold, and then leveraged off an abundance of labour and cheap energy.

Agricultural and manufacturing sectors will continue to be vital in Victoria. It remains critical that we continue to think about the transport links these sectors need.

We need to maintain efficient transport links for our grain exports in Victoria – a point made very clear in the Fischer report, also handed down late last year.

Likewise, our manufacturers, they more than most understand that competition is global and efficiencies must continue to be found at every step in the production and distribution process. In Melbourne, we have been enormously successful in establishing a first class transport and logistics capability.

After the Second World War, mass production of the affordable motor vehicle revolutionised transport and the development of Melbourne and Victoria. Indeed, the development of cities has always been linked to transport.

Today there are nearly 15 million vehicles registered in Australia, with just under 4 million in Victoria. 15 million vehicles is incredible for a population of 21.5 million people – now approaching 600 vehicles per 1,000 Australians. Australians, and indeed much of the western world, love their cars. Our motor vehicles provide us with a freedom of movement that matches the Australian way of life. And nowhere more than Melbourne has that love affair been more passionate.

But what of the future? Is our transport system today, or the one we are planning to build, the best one to fit the economy of today and the economy of the future?

Is allowing developments in transport technology to drive the urban form of Melbourne and Victoria – as we have with the motor vehicle - likely to deliver a city form that gives us the best chance of future prosperity?

### **The future economy**

While manufacturing and agriculture remain critical to the Victorian economy, it is the services economy,

not manufacturing, that now employs 75% of our workforce.

But what is manufacturing? The nature of manufacturing has changed, and is now pretty well misunderstood. For many people, the notion of manufacturing conjures up images of large production facilities such as factories – best exemplified in Victoria by the great car plants in Dandenong, Geelong and Broadmeadows.

But the production part of the manufacturing value chain is just one link.

When considering the manufacturing value chain, ask yourself which part of the chain is most vulnerable to global competition and off-shoring during a recession and into the future.

As borne out so starkly by the Pacific Brands decision, our fellow citizens engaged in the “making bit” of the value chain, that is, production, are our most vulnerable to globalisation and the harsh scrutiny of free trade.

As we ride out this recession, and the economy improves, it is difficult to see off-shoring production decisions being reversed in great numbers, with unit labour costs being so low in developing countries to our immediate north and north-east.

When Ford perfected mass production, he inspired an era of vertical integration, with an emphasis on competing on costs. Reduce unit costs and you will be more competitive.

In today’s manufacturing world, the value chain has been unbundled. Vertical integration has all but gone. Research, logistics, marketing and sales service are outsourced to specialist organisations who don’t just compete on cost. They compete on innovation, creativity and continuous learning.

This is the services economy – or more specifically – the knowledge-based economy at the top end of the services economy.

They co-occupy this top-end sector with financial services, legal firms, IT companies, advertising firms, property services, tourism, environmental services, academia, medical research – etc, etc.

---

The services economy is therefore a great amorphous beast, spanning across virtually all sectors of the economy. The services economy is as much about manufacturing and agricultural technology, as it is about shopkeeping, cafes, accounting and government services.

It is the services economy that will provide the jobs of the future, and it is therefore the services economy we need to think about when we make decisions about this city and this State, and the transport systems we will need.

On a national basis, services already account for 75% of economic activity, 85% of employment and 20% of exports. The nature of economic activity isn't changing. It already has!

And so this is the great new challenge for tomorrow's transport system. How do you design a transport system that underpins a globally competitive services economy?

We knew how to do it for the industrial economy. We built ports and freight lines, and we developed industrial zones linked by good roads for freight trucks.

But what's needed in a services economy? Where moving knowledge around is more important than moving goods? What makes a successful services economy can be summed up in one word:

#### *Cities*

All research bears out that the Western world trend to services, which we are tracking very consistently here, is concentrating more and more economic activity in cities.

And the cities that generate innovation, create new products, and attract creative people dominate the world economy. Cities like New York, London, Tokyo and Shanghai.

The reason why cities dominate the knowledge economy is pretty straightforward when you think about it – people need other people.

Knowledge-based services companies don't just compete on cost. They more so compete and survive on their ability to innovate; to be creative; to stay in

touch with the latest developments. In other words, they need to be connected.

The idea that such firms benefit from physical proximity is called clustering – or what the economists call agglomeration. It is the notion that there are genuine economic and productivity benefits to be gained by grouping together in close proximity.

There are spatial ramifications to this, because knowledge-based services tend to cluster and organise themselves to be close to clients, collaborators and competitors.

And the range of collaboration is broadening as well. Logistics experts need lawyers and marketers. Manufacturers need researchers. IT firms need accountants. Hospitals need universities.

#### **Implications for Melbourne**

It is time to think about what all this means for Victoria, and more specifically Melbourne.

The internationally observed tendency for knowledge-based businesses to concentrate in a handful of cities is borne out in Australia, with Sydney and Melbourne dominating.

But left to its own devices, will allowing such clustering to go unchecked give us the city we want? And will any attempt to stop it imperil our future prosperity?

A divide is appearing across the world between cities that dominate these "thinking services" and so-called "client" cities. That is, cities who buy the thinking services from other cities.

It is vital we remain and grow as a seller of thinking services. We won't have enough jobs if we don't, because the "client" cities will be competing in sectors where we can't compete.

But it is what happens within a city that is important.

If we allow market and social forces free rein in light of the growth in services clusters and the unbundling of the value chain, many cities have shown that a two-tone urban form can develop. Indeed, there is much evidence to show that that is what is happening in Melbourne.

---

This involves all the high value knowledge-based jobs gravitating to a vibrant central core, with a huge “client” suburban economy highly reliant on consumption within those areas and highly vulnerable to global economic trends such as off shoring.

There is a direct link between accessibility and productivity in the services economy. And in Melbourne, the areas with poor accessibility are our most disadvantaged.

If we take steps to improve accessibility in an area, we create an environment where new economy jobs can be created – and we also help address social inequities in our city.

If we want our city to provide equity of opportunity to the jobs of tomorrow, we must also improve accessibility and connectedness right across the city.

#### **Building tomorrow’s transport system.**

So now to the transport system we need for tomorrow, starting with the all-important city centre.

Melbourne has changed remarkably – during our lifetimes and right beneath our feet. The city footprint has altered. New employment precincts have emerged and old ones have been rejuvenated. The inner city residential population has boomed with apartment living now accepted here, right at work’s doorstep – previously unthinkable.

But we need to provide the transport solutions to match and encourage this transition. And we want to ensure that all of Melbourne is connected, so that opportunities for the jobs of the future are provided to all Melburnians, not just the lucky few.

That means several things:

- ✂ Firstly, we need to devise mass transit solutions to a broader central Melbourne footprint that encompasses Docklands, Parkville, St Kilda Road and Footscray.
- ✂ Secondly, we need those mass transit solutions to connect all Melbourne’s suburbs and Victoria’s key regional cities to that broader central footprint. That way, we provide equality of opportunity to our people, but we also draw on a bigger labour market.
- ✂ Thirdly, mass transit systems. As the central city grows, it is not sustainable that private motor vehicles form the basis of our strategy for these types of trips.

There is a real opportunity here to get many people out of their cars. While CBD workers have flocked to public transport, many city fringe workers haven’t, as the public transport connections are time-consuming and cumbersome.

But let’s also think of how we create jobs closer to where people live, in a way that includes knowledge-based jobs, so that not all high value jobs are in the city centre.

#### **Conclusion**

Tomorrow’s transport system must create a networked city. A city that provides mass transit solutions connecting all Melburnians, and Victorians, to a vibrant and internationally competitive city centre.

But a system that also creates the opportunity for tomorrow’s high value services economy jobs to locate to regions in Melbourne’s vast suburbs.

We have enjoyed the legacy of those who have gone before us. What legacy are we to leave?

---

## New Ultrasonic Rail Flaw Detection – Alex Ivachev, RTI

*A presentation to the April Chapter Meeting by Alex Ivachev of Rail Technology International (RTI).*

RTI have worked over the years to create a range of rail technology products and systems, each designed to reduce the risk of broken rails using the most advanced technology possible.

Their latest rail system, the 8000SX is packed with world leading technology Smarts. This system, unlike most other rail technology systems, allows testers to see the entire picture, making the flaws more than an educated guess.

During his presentation Mr Ivachev presented the following example to show why frame resolution in rail testing is so important.

The image below reflects what most ultra sounding rail technology system would show a tester: - 1 peak sample per frame over 6 frames. Almost all systems worldwide produce fragmented images like this one, giving testers the ability to only make an educated guess at the possible rail defects that lie beneath.

Low resolution images like these only enable a human based decision, leaving much room for error.



RTI designed the 8000SX system so that testers could see the defect in a completed image, rather than segmented frames.

It was designed with the intention to improve and make flaw detection more reliable.

The RTI 8000SX system sees the full picture: - 1024 samples per frame over 6 frames, allowing testers to make informed, technological based decisions.

# Defect

Aside from their latest rail system, RTI provide a number of contract rail flaw detection services, including high sensitivity rail cleanliness testing, flaw analysis, metallurgical consulting, radiography, failure analysis, FIFO (Fly In Fly Out) testing services and ultrasonic hand testing.

*The following pages detail the slides presented by Mr Ivachev at the Chapter Meeting and provide further detail on RTI's Rail Flaw Detection system:*

MRS Brazil



Taiwan High Speed Taiwan



## Start Up Contract Challenges

- Getting qualifications to operate on ARTC network was complex and expensive
  - No national standard across ARTC
  - ARTC's National courses are only accepted in SA

## Start Up Contract Challenges

- Vehicle Accreditations
  - Requires separate tests and forms for states
- All through the startup process and now we received excellent cooperation from all ARTC staff always willing to go out of their to help.

## ARTC Contract Challenges

- Reporting Complexities
  - ARTC network is made up of over 500+ base codes - the smallest being 76m in length in the Hunter Valley
  - Challenging to understand network coding, and ensure each base code was identified and timetabled for testing, especially in NSW with 'compliance'
  - Reporting complexities for operators and back-office staff in ensuring that each base code is individually tested and reported on

## Technology and Testing Operation

- The previous contractor operated with 2 vehicles.
- One test vehicle a chase car followed to hand verify defects. A crew of 4-5 people was needed
- RTI operates with a single man operator / driver

## Single Man Operation

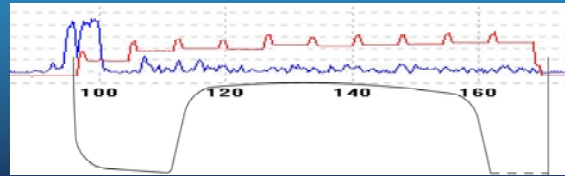
High productivity is only possible because of low operator dependence, through smarter technology.

There are many smarts within the system, two important ones are.

- Smart Cal
- High sample resolution per frame

## Smart Cal

- Maintains linear gain (distance amplitude correction) for every mm of rail height
- An absolute reference is constantly maintained, requiring no operator input for gain control during testing
- Automatically adjusts gain for temperature and transducer variations



## Traditional Systems

- One peak sample per frame, 6 frames



## RTI 8000SX System

- 1024 Samples per frame, 6 frames

**Defect**

## Recent & New Technology

- Neural Networks
- I<sup>2</sup>GPS
- New Reporting System
- ROM+ Wheel
- Railview

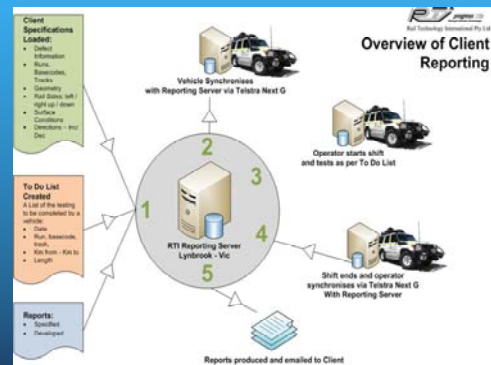
## Neural Networks

- Creating and adding neurons elevates operator reliance, minimizes operator fatigue and makes for an expert system.

## I<sup>2</sup>GPS

- Instant Interpolated Global Positioning System highly accurate, accuracy 200mm
- Available In Vehicle and Portable version
- Run to Run comparison
- Non Stop Testing

## New Reporting System



## ROM+ Wheel

- RCF Masking Transverse Defect
- Vertical Smooth Transverse Defects

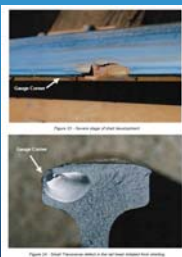
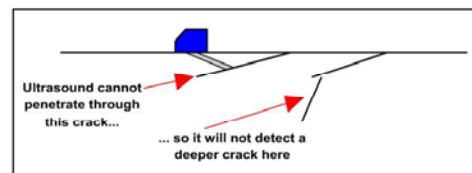


Figure 25 - Flaking of railway surface checking defects with minor spalling

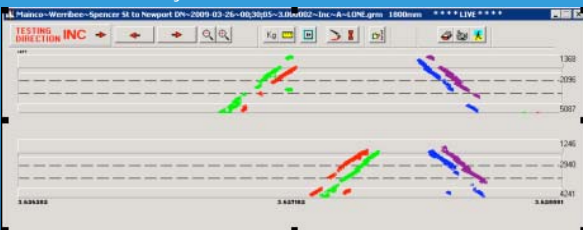
## ROM+ Wheel

RF Masking a TDROM+ Configuration

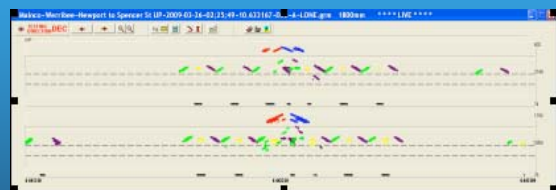


## Data Comparisons of RE

Rom+ one side only 8 transducers



## Data Comparisons of RE



## Railview

- Railview is an optical recording and recognition system based on RTI's Neural Networks. The system can operate stand a loan or be run in conjunction with an RTI 8000SX system. There are two versions of Railview:



## Railview Surface

- Records and reports on Rail Surface condition such as
- Rolling Contact Fatigue.
- It uses high-speed cameras that are capable of continuous recording of surface conditions.



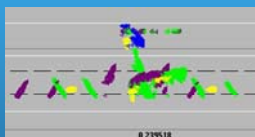
## Railview Defect

- Operates in conjunction with RTI 8000SX system.
- The 8000SX triggers images capture from cameras that are strategically placed to get the best view of in track artefacts and defects.
- The trigger is based on ultrasonic data being received by the 8000SX system.

## Railview Defect

- Images are stored with GPS,
- Odometer and time stamp.
- When a defect is viewed in the GRM a corresponding visual image is automatically displayed corresponding to the ultrasonic data.

## Railview Defect



## Future

- RTI has already changed the face of Rail Flaw Detection
- From Large cumbersome slow high operator dependent vehicles, to small agile smart rail flaw detection systems that have infinitely more power, resolution and capability than that of any system in world. This has been proven time and time again.
- Our New Future is to have unmanned systems that are towed by any platform, that gathers processes and reports defects for remedial action by internet.