

RTSA SA CHAPTER NEWSLETTER

September 2010



NEXT MEETING: Aluminothermic Welding – Past, Present & Future

Joint meeting with the PWI on Thursday 7th October.

Our next meeting will be a **Lunchtime Meeting** hosted by the PWI and takes place at **71 Richmond Rd, Mile End.**

The presentation will be given by **Ken Fyvie, Technical Manager at Thermit Australia.**

Ken will present on the history of aluminothermic welding from its discovery in 1898 to the modern versions of the process and its challenges.

This will be followed by Thermit's view of how this process will develop in the future given the new rail and welding technologies that are emerging.

After the presentation, **an actual weld will be performed** to demonstrate the Thermit welding process.

TECHNICAL PRESENTATION

VENUE:

Infrastructure Training Room,
Rail Commissioner
Offices (formerly
TransAdelaide).
71 Richmond Road,
Mile End.

DATE:

Thursday 7th October
2010

TIME:

11.30am

Light Refreshments to be provided after the presentation.

Parking is available in the main car park (behind the visitor's car park).



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September 2010

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CHAPTER MEETINGS 2010

Thursday 4th November

Port Adelaide Viaduct
Ms Guillermina Perelmuter, DTEI

Tuesday 30th November

RTSA Annual Dinner and AGM
Presentation by John Ryan of Adelaide Zoo
The Lion Hotel, North Adelaide
See the flyer for more details.

Publisher

This newsletter is a publication of the South Australian Chapter of the Railway Technical Society of Australasia. 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 saeditor@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 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.

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Newsletter Dispatch

Despatch of the newsletter is undertaken by Steve Torok. Contact Steve on storok@tge.com.au if you have any problems receiving this newsletter electronically or in hard copy, or to change your e-mail address.



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NEWS

Well, we were fortunate enough to have two meetings in September – the first at the Adelaide Oval and the second by 'Eminent Speaker' Andrew McNaughton at our regular venue.

It is always a real pleasure to be able to attend a meeting at the Oval and our thanks go to the IRSE and Malcolm Menadue for organising another very informative and enjoyable event. If you were unable to attend, here are some photos of the inspiring venue:



Koos Rohlandt's presentation is also included at the end of this newsletter for your quiet enjoyment.

We ended the month with Andrew McNaughton's thought-provoking 'Eminent Speaker Tour' presentation - 'Creating the 21st Century Transport System of Choice'.

Whilst in South Australia, Andrew and his wife were able to experience the very best that Adelaide and its surrounds have to offer, ably accompanied (for some of these activities) by your RTSA SA committee members.



Again, if you missed it, see the end of this newsletter for Andrew's presentation.

COMING EVENTS

AusRAIL 2010 – 23-25th November, Perth

This year AusRAIL will focus upon taking the industry forward through innovation, modernisation and technology leadership. To find out more see the website www.ausrail.com

Another Date for the Diary!

In case you missed it on Page 2, the date for this year's AGM and Annual Dinner is **Tuesday 30th November** at a new venue, **The Lion Hotel, North Adelaide**. Please put the date in your diaries now for what will be a great social event!

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CHAIRMAN'S CHATTER

OCTOBER it is, somehow, and your Committee is busy preparing for the Annual Dinner, together with piecing together the 2011 RTSA SA program.

For those fortunate to attend the Wellington CORE and the SA Chapter's recent hosting of its Keynote Speaker it has been an eventful month.

Ahead of CORE I spent a few days in New Zealand's South Island - but the plans we made months earlier happened to land us squarely in Christchurch the day after the magnitude 7.1 earthquake.

To be staying in an inner-city hotel within the cordoned-off zone manned by the Kiwi army, with water and power having just been returned, and with hardly a soul in the Central Business District was surreal to say the least.

Seeing cars flattened by fallen facades, businesses closed and buildings condemned brought home how on a whim, fate had stepped in, and people's livelihoods and legacies were being seriously impacted. This – and the many aftershocks, alarming on a ninth floor – was certainly the kind of experience which made paying my insurance a lot easier to bear.

Thankfully the quake occurred in the wee hours with its little activity otherwise the serious damage mightn't have been limited generally to just properties.

Our experience with landform is stunningly different, considering all the shared heritage and history with our cousins across the trench. Tectonically and topographically, Australia and New Zealand are poles apart – and it is this very

difference that makes for some interesting comparisons. There are notably fewer Kiwis than Victorians, with that state having a notably bigger overall area – horizontally.

Vertically NZ has a terrain challenging enough to be the equivalent of a continuous faultline-strewn Great Dividing Range. For all this, it doesn't seem to have done too badly with infrastructure, or with attitudes toward it.

- Hats-off, for example, go to the thorough and ambitious program of major corridor upgrades being undertaken in Auckland, supplementing existing motorways.
- More dipped-lids go to their very interesting proposed concepts for an Auckland City Subway, which would eliminate their a) terminating station, which is b) marooned on the margins of their CBD.
- A particular bit of doffing also goes to their willingness to engage early with the greater community about at least some unfunded future infrastructure concepts, despite the likely perceived risk of 'raising expectations'. I wrote recently of the taste engineers and technical specialists have for logic and objectivity, but an idea offering these fine qualities can still be rendered naught without any airtime, profile and finesse.

IN other news, tenders for part of the Adelaide Metro electrification have recently closed.

Daniel Martucci – Chair, RTSA SA Chapter

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Signalling Outcomes for PTS by Koos Rohlandt

- Dry Creek Mainline Upgrade and new Depot
- The Seaford Extension
- Immunisation for Electrification
- Communications System Upgrade



Government of South Australia
Department for Transport,
Energy and Infrastructure

Dry Creek Signalling Design

- Complex environment.
 - Longitudinal yard + Diesel & Electric Rolling-stock
 - Parallel to main line
- Replace existing Dry Creek mainline relay interlocking with Westrace CBI.
- Introduce additional Westrace to control the Depot Yard.
- Interlocked yard control (existing not under signal indication)
 - Introduction of new signaling equipment
 - Type Approvals, Reviews etc.



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Main Areas



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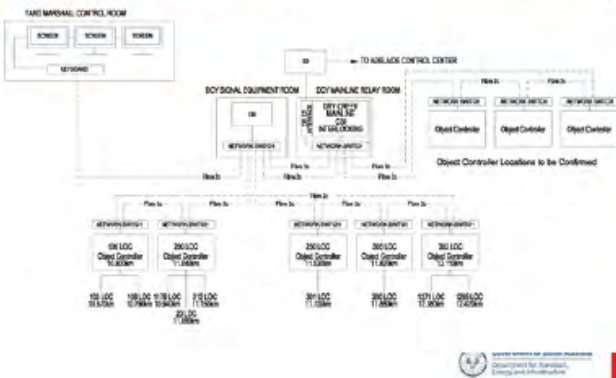
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Depot: Westrace Configuration



Seaford



Government of South Australia
Department for Transport,
Energy and Infrastructure

Seaford Extension

- 5.5 km extension from Noarlunga to Seaford, electrified - 25 kV
- Commissioning line for new EMU rolling stock
- 1.2 km bridge over the Onkaparinga River
- Mainline operating speed of 130km
- Early works have begun, major tender evaluation in progress.

Seaford Signalling

- Signal sighting consideration for higher speeds.
- Construction pit and conduit.
- CBI based interlocking.
- Continue with AWS technology.

Government of South Australia
Department for Transport,
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Seaford Corridor



Seaford Stabling Yard/Commissioning Depot



FOR TENDER PURPOSES ONLY
REV. 1.0 - 16/03/09 FOR APPROVAL



Approach to Seaford Station



IMMUNISATION - ESSENTIAL REQUIREMENT & OBJECTIVES

Ensure that the Signalling System for the Adelaide Metropolitan Passenger Rail Network is adequately protected against the effects of the 25 kV overhead Electrification system.

The objectives for Immunisation of the Signalling System are to:

- Ensure that the signalling equipment continues to operate normally in the presence of traction currents.
- Ensure that interference from the traction system does not cause the Signalling System to affect the safe operation of trains.
- Minimise the dangers from electric shock.



The Immunisation Task

- Earthing and bonding: Most critical.
- Safety barriers/screens
- Signals:
 - Alterations to existing
 - Constraints on positioning For new or relocated signals
- Points Mechanisms: All points control and detection circuits must use AC immune relays.
- Level crossings: Barrier and pedestrian gate motors shall be immune to AC interference.
- Impedance Bonds: Provide low impedance to traction return currents and a high impedance to track circuit currents.
- Line circuits :To protect against potentially dangerous touch potentials and to prevent induced voltages under traction fault conditions from exceeding 430V AC and falsely operating an AC Immune relay, line circuits shall be restricted to 2km in length.

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The Immunisation Task

• Train Detection Systems:

Due to the effects of traction interference, train detection systems must be selected to ensure immunity from both false operation and damage that may be caused by the currents that are induced by the overhead electric traction system.

- Isolation of traction system from interlocking equipment
- Double rail track circuits
- Single rail track circuits
- Protection against dangerous potentials
- Transition between single rail and double rail track circuit territory
- Track circuits abutting non-electrified territory
- Track circuits abutting non track-circuited territory
- Sidings
- Parallel non-electrified lines
- DC track circuits
- T1.21 track circuits
- Track circuit interrupters



The Immunisation Task

- SSI: inherently safe to operate in the vicinity of AC electrified areas.

• Precautions need to be taken to reduce the effect of interference to the line signal and also to protect equipment from damage by induced currents.

- Surge Arresters: Provided to protect against damaging electrical potentials that may be transmitted through the traction system.
- Lineside equipment housings: only one earth system provided to protect against potentially unsafe touch potentials.
- Power supplies: Separate supplies shall be installed for external and internal circuits with isolating transformers used.
- Earth leakage detection: To be provided for all circuits susceptible to Earth faults.



Communication Systems Copper Communication Cabling System

- Supports both the Signalling and Passenger Information systems.
- The scope of the 'Electrification Project' is to ensure the services that are currently supported on the copper cable system, work in a 25KV 'electrified' railway environment.
- Additionally any communication system is required to support a new Electrical Substation SCADA system that will be used to remotely monitor substation parameters.

New Infrastructure Primary Communications Path

To achieve 'electrification' objectives, the copper cable system has to be replaced with a Fibre Optic Network (FON). The current expectation is that the primary communications path will be implemented by suspension of the fibre optic cable system from the electrification masts. This method is known as:

ADSS (All Di-Electric Self Supporting)

ONTRACK in New Zealand
ADSS Implementation



New Infrastructure Back-Up Communications Path

The back-up path will be provided by:

- a) A Microwave Radio System
- OR
- b) Fibre swaps with other organisations, dependent on Service Level Agreements



New Infrastructure Cable Distribution & Equipment Housing

The optic fibre cable system will need to be distributed to provide access to end users, there will be various distribution frames, patch panels and fibre optic breakout trays (FOBOTS) to achieve this.



Example Fibre Distribution Equipment



Example Housing



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RAIL – Creating the 21st Century Transport System of Choice

**Professor Andrew McNaughton
RTSA 'Eminent Speaker Tour 2010'**

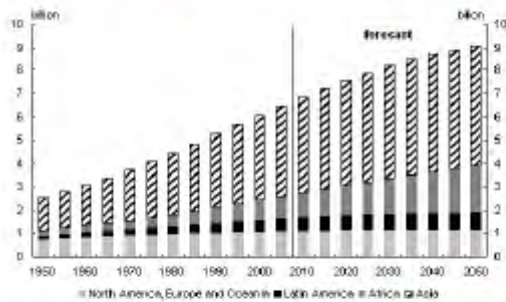
Andrew McNaughton

Rail – A 19th Century System!



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World Population Is Growing



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Living in Large Cities...



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...Richer, Older, More Demanding



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Impact of Climate Change



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A Complete Future Railway ...

- "Whole journey"
- On-time and utterly reliable
- Goes to where customers want to go
- Available when they want to use it
- Energy efficient and environmentally friendly
- Affordable to users and governments
- Expanding

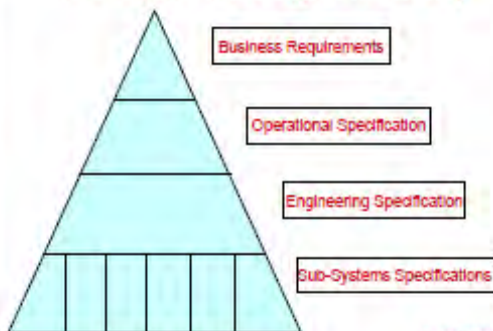
Andrew McKeough

Networks Shaped By History



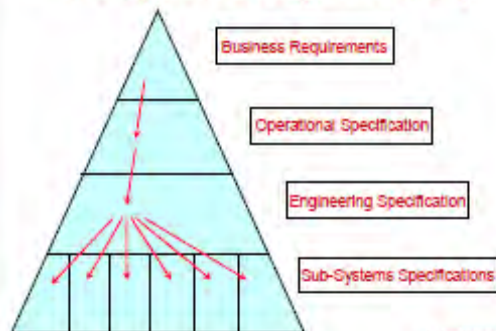
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The System Design Hierarchy



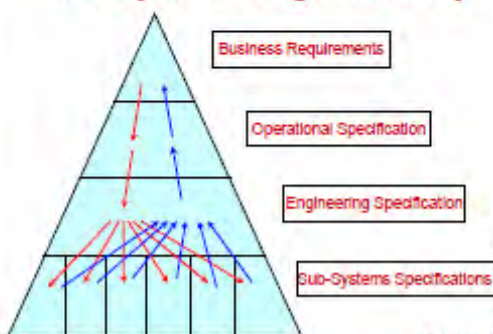
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The System Design Hierarchy



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The System Design Hierarchy



Andrew McKeough

Heavy Haul



Andrew McKeough

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Heavy Haul



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Long Distance



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Regional Inter City



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Intermodal Freight



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Door to Door Certainty



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Urban / Regional "Heavy Rail"



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The Flexible Friend



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GB Increasing Vehicle Weights



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Electrification



Andrew McNaughton

Lighter Trains



Andrew McNaughton

Lightweight Tri-City Metro USA



Andrew McNaughton

Virtuous Impact of Lighter Trains



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Virtuous Impact of Lighter Trains



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Trailblazing Tram Train Concept



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From Regional Centres...



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...To Outlying Districts



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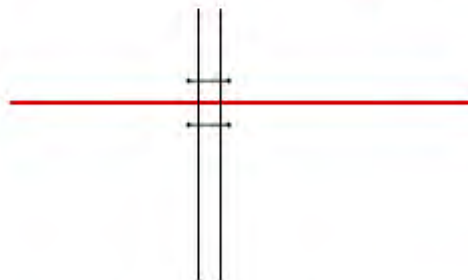
Tram Train Advantages...

- Reduced journey times
- Works with existing railway
- Extra stations at minimal cost
- Diversion into town centres when finances permit
- Dual power – no need for total electrification
- Much lower infrastructure maintenance and inspection costs
- Very high "24/7" availability
- Lower energy demand
- Freight / other passenger services still operable
- Simple signalling and level crossing controls

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Level Crossings Become Opportunities



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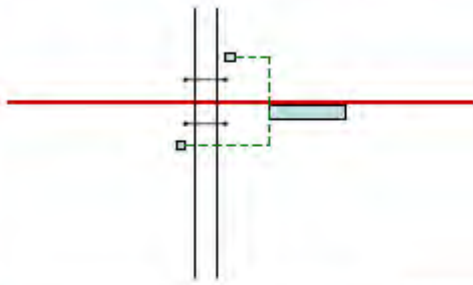
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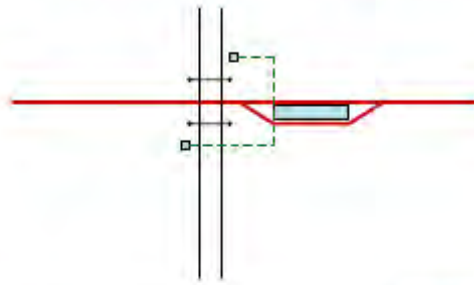
Level Crossings Become Opportunities



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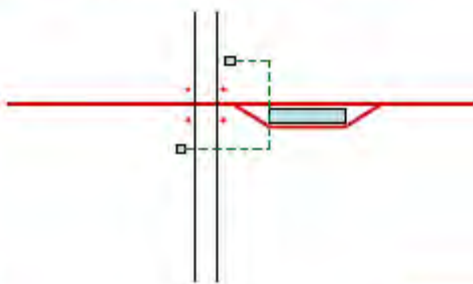
Level Crossings Become Opportunities



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Level Crossings Become Opportunities



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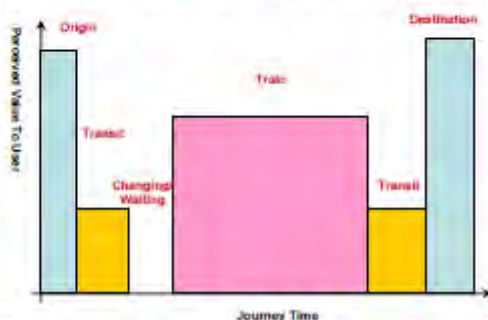
Stations Are Our Weakest Link!



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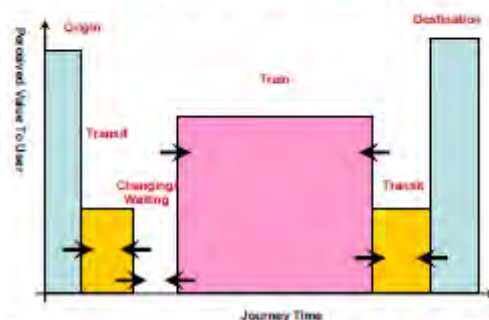
Value of a Rail Journey



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Value of a Rail Journey



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Andrew McHughes

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Leiden Station - Holland



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Fast Bus and Tram Interchange



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Easy Taxi Drop-off and Car Parking



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And bicycles...!



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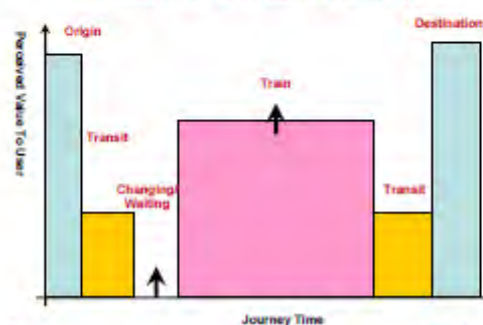
High Frequency Service



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Andrew McKeaghton

Value of a Rail Journey



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Light and Welcoming



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Useful Shops and Eating Places



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Swiss Modular Small Station



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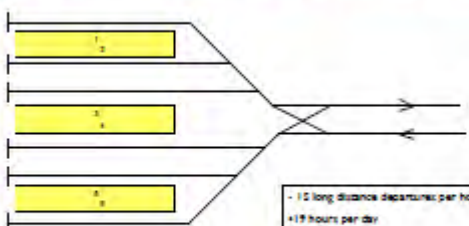
Whole Journey Ticketing



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Lean Infrastructure: Tokyo Central Station

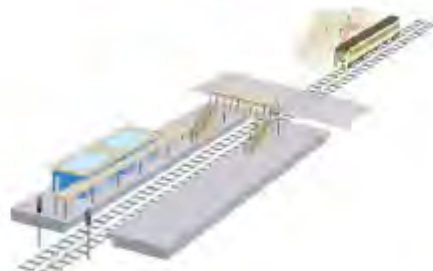


- 12 long distance departures per hour
- 17 hours per day
- 4 platform faces
- 5 point ends

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A Standard Infrastructure



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Modular Plastic Bridge



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Modular Level Crossings



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Obstruction Detection



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Automatic Train Operation



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Automated Traffic Management



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Standard Modular Turnouts



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And Standard Techniques



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Replacing Pure Muscle Power



18

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With Mechanised Support



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Mobile Maintenance Factory



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Allowing Factory Quality Work



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Train-Based Asset Examination



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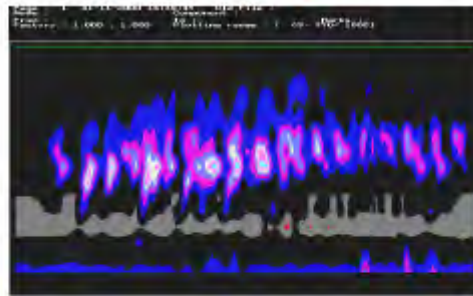
Rail Condition



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Pattern Recognition



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Digital Video Recognition



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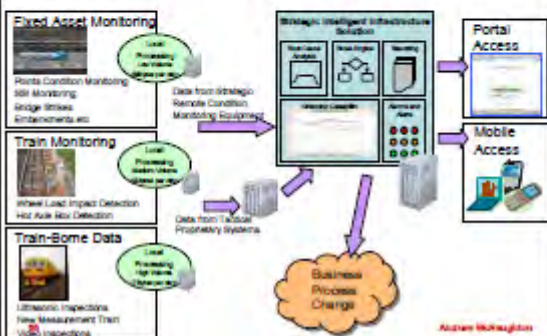
Link To Asset Register



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Information Integration



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Track Geometry on Service Train



- 2003-2005 Pilot Project for unattended track geometry measurement off service train

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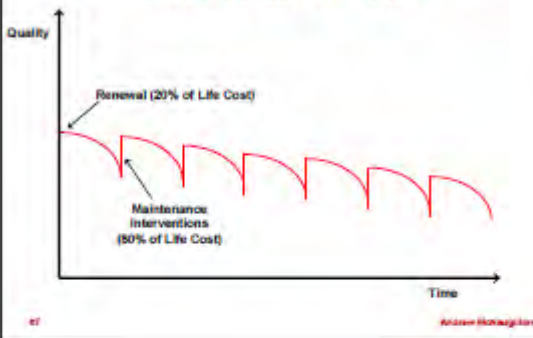


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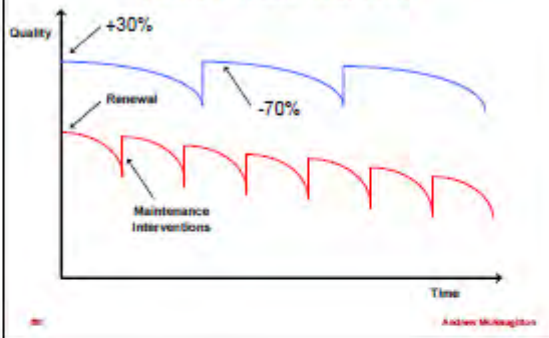


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Austrian Railways 10 Year Study Track Whole Life Cost



Improve Initial Quality Halve Whole Life Cost



Rethink The Basic Components



Conventional Ballasted Track?



Recycled Plastic Waste Sleepers



Human-Centred Engineering



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Physical Workload



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Attention & Fatigue



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Communication & Decision Making



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Competence & Supervision



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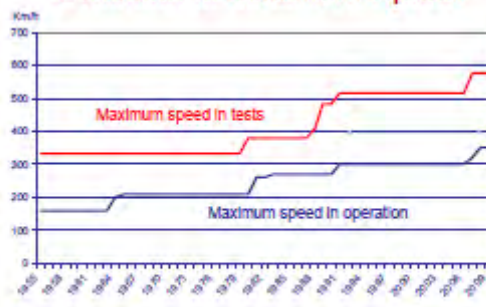
High Speed Rail



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Evolution of Maximum Speed



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Speed...

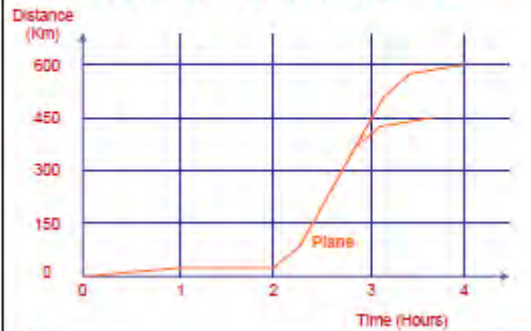
"There is more to life than increasing its speed"

– Mahatma Gandhi



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Door To Door Journey Time



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The 6000th Boeing 737...



Andrew McKeough/RTSA

Door to Door Journey Time



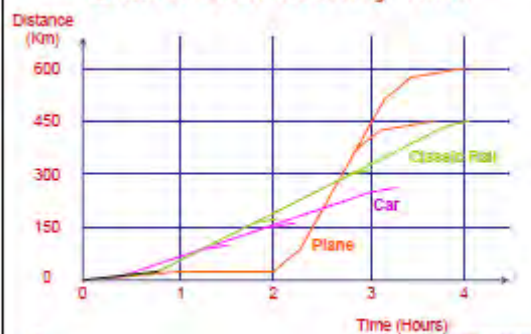
Andrew McKeough/RTSA

The Intercity Express



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Door to Door Journey Time



Andrew McKeough/RTSA

The Railway Technical Society of Australasia (RTSA)

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Classic Rail Can Be Upgraded ...



18

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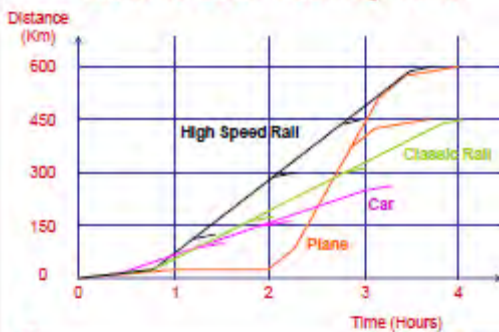
... But At Huge Cost and Disruption



18

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Door to Door Journey Time



18

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Rail vs Car Example



- W Midlands to Manchester is 120km
- Road journey time 1.5hr
- Rail journey time 1.5hr
- Rail market share 4%
- Need to halve the rail journey time to achieve mode shift
- We need 320+kph

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Speed is not enough...

"L'enfers c'est les autres"

– Jean Paul Sartre



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Every Italian's Dream



18

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Ferrari High Speed Train



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Very High Capacity Trains

- Aeroplane:
 - c150 seats
- Coach:
 - c50 seats
- Classic train:
 - c500 seats
- HS train:
 - c550 x 2 =
 - 1100 seats



82

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A Jumbo Jet Every 60 Seconds



83

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84

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Stations for High Passenger Flows



85

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The Station Conundrum



86

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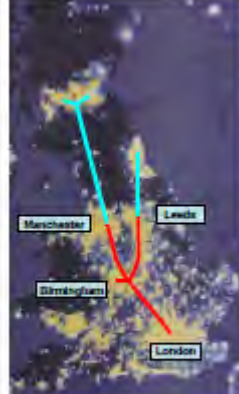
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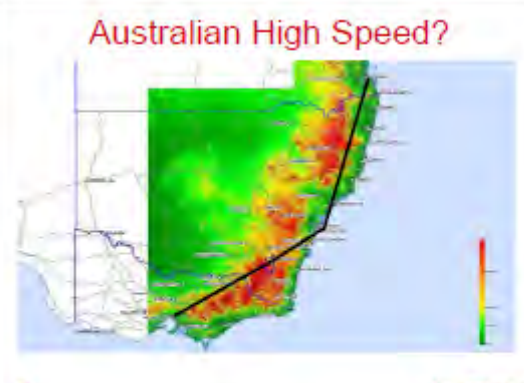
HS2 Initial Network



- London to
 - Birmingham 1-24 to 0-49
 - Manchester 2-08 to 1-15
 - Leeds 2-15 to 1-20
- Birmingham to
 - Manchester 1-34 to 0-40
 - Leeds 2-00 to 1-00
- 335km for £30bn
- 20 years to plan and build

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Australian High Speed?



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Australian High Speed Opportunity?



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RAIL – Creating the 21st Century Transport System of Choice

RTSA Tour: Adelaide September 2010

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