



ACRI Rail Knowledge Bank update

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GROUP

New to the ACRI Rail Knowledge Bank

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Themed issue: AusRAIL PLUS 2015: *Doing it smarter: people, power and performance*, Melbourne, Victoria, Australia

Below is a random selection of conference papers. To view all papers and presentations on the home page under *Browse by Conference*, click on folder ARA\AusRAIL PLUS 2015.

IHHA Specialist Technical Sessions 2011 papers are also now added - click on folder IHHA\STS 2011.

Application of detailed theory at the rail / wheel interface – leading to smart solutions to maintain turnouts & predict derailment risk

Railway systems are facing high economic pressures for permanent optimization of operations to deliver transport services. In this economic era, choice of product is based on life cycle cost rather than standard procurement cost. The main drivers of the life cycle costs are operational & maintenance costs which exceed the procurement cost. From a supplier's perspective these drivers can be influenced in a positive way by smart design parameters.

Asset assurance and configuration management: a contemporary model to integrate asset and investment assurance

Assurance is a fundamental of asset management. Asset assurance activities give us confidence that the asset will perform as intended and helps us to understand the relationship between planned and actual asset performance and effectiveness. Asset Assurance can be applied as a set of structured and planned activities conducted throughout the asset life cycle providing progressive justified confidence that objectives are being achieved and that the asset is or will be fit for purpose.

The connected locomotive: leading IT technology

A key theme among railroad customers is creating “smarter” devices on their assets. This allows better diagnostics and prognostics, which enables better utilization and efficiency. Advances in the industrial and IT technology fields have developed concepts such as the Internet of Things (IoT), edge management, and virtualization. The Internet of Things (IoT) enables smart devices and sensors to transmit information to a final decision-maker that must deal with this data. On a locomotive, high performance sensors such as accelerometer and vibration devices can help predict failures that may occur sometime in the future.

Co-ordinated earthing for protection of railway signalling and communication systems

High-energy over-current and over-voltage transients induced by direct lightning strikes or conducted into a site via power, signalling or communication lines cause millions of dollars damage each year. No single technology or action can prevent damage for all possible mechanisms, therefore a coordinated protection approach is required.

Defining the CBTC over LTE interface: riding the wave

This paper examines the requirements that a radio data transmission network needs to meet to serve as the train-to-shore radio bearer for a Communications-Based Train Control (CBTC) system. Those requirements are first considered through a data traffic modelled, and then mapped against the capabilities of a Long Term Evolution (LTE) radio network, in order to identify the necessary configuration parameters and the network architecture.

High speed railway ballast characterisation using ground penetrating radar

This paper demonstrates how high speed (80 km/h) GPR is being used operationally in Australia to classify ballast and drainage conditions of actively used railway tracks. By providing this information on an ongoing basis, proactive rather than reactive track maintenance is possible by railway maintenance personnel.

Improved safeworking systems for turnouts

This report will detail the safeworking improvements that have been made in the rail industry, with particular focus on improving safeworking systems around turnouts and under live rail traffic. It will discuss the recently developed Mechanical Blade Anchor Lock (MBAL) system and the Hydraulic Point Throw (HPT) system which can be implemented on any rail network, Australia wide and identify the current position of the rail industry in regards to working on switches in a live corridor and the rationale in implementing these systems.

Improving rail operational performance with smart systems

This paper discusses international trends and Australian examples where improvements in efficiency and effectiveness of the three core operational systems - planning and scheduling, train control and asset management - can be achieved through the application of adaptive and close coupled systems.

Managing the health effects of rail noise

The construction and operation of railway systems generates noise which can have an adverse effect on human health. These effects range from annoyance and sleep disturbance to chronic illnesses such as hypertension and heart disease which have been associated with long term noise exposure. Effective noise management requires the integration of a number of disciplines and functions over an extended period and this presents substantial constraints to the Project Delivery Team.

A mathematical model for scheduling preventive maintenance and renewal projects of infrastructure

This paper presents a preventive maintenance and renewal scheduling problem for a multi-unit system over a finite and discretized time horizon. Given the latest possible time for carrying out the next maintenance and renewal projects after completion of the previous ones and considering several common setup costs, the introduced scheduling model tries to minimize the cost of projects by grouping them and simultaneously finding the optimal balance between maintenance and renewal.

The rectangular embedded rail system: could it work in the unique Australian rail environment?

This paper examines the key features of the “Rectangular Embedded Rail System” (known by the initials ERT) and then considers the main challenges to be addressed to the introduction of the system into Australia.

Safety improvement in railway using the Rimon system

This paper, describes the RIMON system: a device for Railway Infrastructure MONitoring and how it can benefit the railway industry. Performing the continuous rail stress monitoring, it allows rail inspection to be completed without personnel on site. Using specific sensors placed on the rail and in specific measurement points, the RIMON system can record the temperature, the rail stress and the neutral temperature in rail which means reducing the potential for rail traffic accidents, personnel cost and increased rail inspection technological investment. The paper also describes the system's mode of operation, the calibration procedure and the output results regarding the field.

[Simulation systems for signaller training and performance improvement](#)

Simulation tools have long been used for operator training and competence management on railway systems. These tools can, however, be extended to trial and assess performance improvement programmes and for change project validation. The paper will explore the advancement of simulation tools in the signalling and operations domain and demonstrate how these systems are now used in training and performance improvement.

[Variable axle load locomotive](#)

The GT42CU-ACe is a narrow gauge (1067mm), Co-Co diesel-electric locomotive mainly used in heavy haul coal and iron ore operations for which it is optimised. Starting tractive effort is 600kN, with continuous tractive effort of 460kN, corresponding to 37.5% adhesion with 20 tonne axle load. However, there are many narrow gauge lines in Australia which do not allow this axle load. The Variable Axle Load concept was therefore developed to allow the GT42CU-ACe to operate on track rated for 17 Tonnes Axle Load when required, while still providing the full adhesive advantage of 20 TAL when the track will allow.

[VicTrack's management of Dynon rail freight terminal](#)

VicTrack currently operates three core services, Telecommunications, Property and Project Delivery. The most significant rail freight asset currently owned by VicTrack is the Dynon Rail Freight Terminal (DRFT) which is an open-access, intermodal terminal located on Dynon Road, West Melbourne. VicTrack's Board has recently endorsed the implementation of a five-year business plan for DRFT¹. The plan incorporated an external study², which investigated and analysed the Victorian freight market to identify the segments where a modal shift from road to rail could be encouraged on a commercially sustainable basis. The key learnings from that study are highlighted in this paper.



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[National Interest Services supporting an informed land transport community](#)

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This email was sent by Jill Aron, ARRB Group, Vermont South, Victoria, Australia

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