



ACRI Rail Knowledge Bank update

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New to the ACRI Rail Knowledge Bank

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ACRI / CRC (legacy) Research

[Establishing baseline rail level crossing incident occurrence and behaviours using video data](#)

An investigation of video capture technology to record and categorise near-misses at level crossings in a consistent way.

[Evaluation of the aerodynamic component of empty train energy costs](#)

The project evaluates the energy consumption components associated with wagon aerodynamics in heavy haul trains and compares the potential benefits that might be possible from improvements in aerodynamic design, specifically seeking to answer the following

questions: What potential for energy savings exist from improvements in aerodynamics in empty hopper and ore wagons? What savings could be realised in typical Australian heavy haul track routes and rolling stock designs?

[Rail flash-butt welding for heavy haul applications](#)

This project investigates permutations and combinations of commonly used rail steels to provide a recommendation for the optimal welding technologies and approaches for joining each type and mixed types of steel.

[Preliminary hazard and risk estimation process for introduction of new level crossing technology: low cost risk and legal evaluation](#)

The low-cost level crossing risk and legal evaluation project was tasked with the development of an argument to support the adoption of level crossing warning devices based on new or alternative technologies. An example includes devices that utilise innovative and alternative technologies such as wireless communications, alternative methods of train detection, and solar power in order to reduce lifecycle costs associated with construction, installation, commissioning, operation and maintenance.

[State of the art in condition monitoring of rail infrastructure](#)

This research project provides a detailed review of existing technologies, emerging advancements and new technologies employed in permanent way condition monitoring. Solutions will range from low tech to high tech solutions, which will have varying degrees of suitability for different railway operations. The intended market for each solution and suitability of adapting the related technologies to other railway sectors are discussed.

[Track structures vs train dynamic and load effects review](#)

This research aims to develop a cost allocation model based on track damage caused by train forces for different train types. This model can be applied to any combination of track geometry, train configuration, axle loads, train speed, train volumes, track condition, etc. ultimately producing a track maintenance cost model based on expected train forces. A benefit from the research is that it provides railway infrastructure managers with an indication of their expected maintenance budget.

Bridge Management

[Synthetic rating system for railway bridge management](#)

This thesis developed a condition assessment and rating method to identify those bridges in a network which are in most need of repair for an effective life cycle management. The method estimates the contribution of critical factors towards bridge deterioration and uses structural analysis to overcome the subjectivity of traditional current condition assessment methods. This research was a part of the CRC project titled 'Life Cycle Management of Railway Bridges'. Efficient usage of resources and enhancing the safety and serviceability of railway bridges are the significant outcomes of using the proposed method.

Environment

[Prediction of ground vibration amplitudes due to urban railway traffic using quantitative and qualitative field data](#)

The growth of railway transport in urban areas has led to an increase in ground vibrations enhancing their negative environmental impact. Therefore it is mandatory to predict and control ground vibrations. This work presents a methodology for the determination of prediction models of ground vibration amplitudes due to railway train circulation in urban environments.

[Cost-effectiveness of reductions in greenhouse gas emissions from high-speed rail and urban transportation projects in California](#)

A rising trend in state and federal transportation finance is to invest capital dollars into projects which reduce greenhouse gas (GHG) emissions. However, a key metric for comparing

projects, the cost-effectiveness of GHG emissions reductions, is highly dependent on the cost-benefit methodology employed in the analysis. Our analysis comparing California high-speed rail and three urban transportation projects shows how four different accounting framings bring wide variations in cost per metric tonne of GHG emissions reduced.

Human Factors

[Assessing cognitive underload during train driving: a physiological approach \(CUPID\)](#)

TRL and RSSB are involved in joint research investigating the effects of very low mental workload (also known as cognitive underload) on train driver performance. This is a particularly important area of research because certain train driving scenarios involve periods of very low task demands, requiring the driver to continuously monitor and respond to repetitive stimuli in the environment, whilst at the same time maintaining a preparedness to react appropriately to infrequent critical events.

[Suicide among male road and rail drivers in Australia: a retrospective mortality study](#)

This paper aims to describe the epidemiology of suicide among males employed in driving occupations (road and rail) compared to other male occupations in Australia.

Public/Private Partnerships

[Framework for structuring public private partnerships in railways](#)

It is evident from the literature that large integrated PPPs in railway systems are not feasible due to higher commercial risks. They also suffer from implicit cross subsidization since the railway infrastructure is capital intensive, common to multiple revenue sources, and fare box revenues are generally not sufficient to recover investments. This is being addressed by various unbundling approaches in recent PPPs. The common unbundling is between infrastructure, operations, and services. The objective of this research is to explore the potential of unbundling further and to come up with a framework that helps policy makers in taking macro level decisions on PPP structuring.

[Investigating the transit-orientation of existing urban development around Melbourne trams compared to other public transport modes](#)

This study investigates the extent to which urban development around Melbourne's transit is intrinsically 'transit-oriented', by measuring indicators of transit-oriented development (TOD) for catchment land use of trams, trains and buses, including SmartBus and local bus routes, for a representative sample through inner, middle and outer Melbourne. The hypotheses tested were that the extent of transit-orientation varies with mode, and that tram is associated with sustainable patterns of urban development that is significantly higher quality than other modes, notably bus.

[The performance and potential of rail stations in and outside freeway medians: the application of a node/place model to Perth](#)

The Node/Place model developed by Bertolini has been used to analyse the land-use and transport functions of rail station precincts in several cities around the world. This paper reports on a new application of an extended node/place model to 13 rail stations in the Perth metropolitan area, identified by WA State planning policy as activity centres.

[Access, amenity, and agglomeration: what can we expect from rapid transit projects?](#)

This paper presents a new approach to ex-ante evaluation of rapid transit projects based on expected uplifts in property values around transit stations, developing a flexible approach for evaluating project benefits based on the potential for property value uplift around transit stations. The approach is applied to a case study of a light rail project in Auckland, New Zealand, its strengths and weaknesses identified, compared with more conventional approaches to project appraisal and how it can be applied to project evaluation in other cities.

Passenger

[An empirically verified passenger route selection model based on the principle of least effort for monitoring and predicting passenger walking paths through congested rail station environments](#)

This paper presents a methodology for predicting the preferred route selected by passengers during their egress. Proposed in this paper are a basic principle and a methodology for route choice based on the least effort that a passenger may consume during their travel between destinations. Using results from an empirical study at Brisbane Central rail station, we show our approach collates well with real patterns of passenger egress. Our discussion concludes with an overview of how our approach could be used by rail service providers to optimise operations and improve customer experience.

[Investigating commuter train boarding and alighting dispersal by contemporary agent based modelling techniques](#)

This paper concerns research into the use of a contemporary computer simulation to replicate the passenger dynamics of boarding and alighting suburban trains. Advances in computational methods have enabled researchers to model and animate imagined scenes in more visually compelling ways. The implications of these improvements in crowd modelling can be seen in decision-making processes concerning the design of carriage interiors and the impediments of platform furniture.

[Valuing public transport service quality using a combined rating and stated preference survey](#)

This paper presents the results of a study commissioned by the NZ Transport Agency in 2011 to look at the trade-off between price and quality for bus and train users in the three largest cities of New Zealand. The valuations were estimated through a large scale survey of 12,557 bus and rail passengers carried out between November 2012 and May 2013 on 1,082 different bus and train services. The aim of the study was to develop a method to value vehicle and stop/station quality from a passenger perspective.



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See the [Rail Knowledge Bank Charter](#) for more information on its objectives and resource

coverage.



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

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ARRB is pleased to announce our 27th ARRB Conference will be held in Melbourne, 16 - 18 November 2016. The ARRB Conference and the 37th ATRF will run parallel with one another at the same venue to create greater opportunities for delegates. Call for abstracts will open shortly!

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