



## ACRI Rail Knowledge Bank Update.



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## Bridge

*November 2017*

### Novel method for retrofitting superstructures and piers in aged steel railway bridges

Lin, W; Taniguchi, N; Yoda, T

A novel strengthening method using rubber-latex mortar, glass-fiber-reinforced polymer plates, lightweight rapid-hardening concrete, and reinforcement bars is proposed in this article. The strengthening method can be used to strengthen both steel railway bridge superstructures and piers. To confirm the effectiveness of the strengthening method, field tests on a short-span railway bridge and laboratory tests on longitudinal-lateral beam connections and steel piers were performed. According to the experimental results, the present renovation method can significantly enhance the rigidity and reduce the stress levels in bridge girders, connections, and piers, resulting in the extension of the residual service life of such structures.

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## Design

*December 2017*

### Innovative interior designs for urban freight distribution using light rail system

Kelly, J; Marino, M

High levels of pollution and congestion in urban centres are an increasing concern for local councils in the UK. Heavy goods vehicles delivering urban freight to city centres are a

leading cause of this problem. This paper discusses the concept of using light rail networks to deliver freight to city centres from surrounding businesses. Specifically, various innovative designs are considered for the interior of the metro carriage and developed into visual models using Autodesk Inventor software. A full evaluation of all the designs developed is completed, resulting in a proposed design for consideration. The conclusion reached is that the proposed interior design is viable and coincides with the future metro fleet designs and concepts.

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## Environment

*October 2017*

### Modeling the railway network design problem: a novel approach to considering carbon emissions reduction

Lin, B; Liu, C; Wang, H; Lin, R

This paper studies the dynamic linkage between economic growth, transport sector fossil fuels consumption, electricity consumption, renewable fuels consumption and CO<sub>2</sub> emissions. It aims to answer the following central questions: (i) what are the consequences of using both conventional and alternative sources on the transition to electric mobility, and on decarbonisation of the TS and how have the alternative fuels affected economic growth?

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## Freight

*January 2018*

### Booking limits and bid price based revenue management policies in rail freight transportation

Kapetanovic, M; Bojovic, N; Milenkovic, M

In this paper, the possibility and potential benefits of implementing discriminatory policies in rail freight transportation are analyzed, with the aim of revenue maximization. A regular, cyclic, single train service with fixed composition and capacity is studied. Although not acceptable in all contexts, the proposed aggressive policies demonstrated promising benefits.

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2017

## [Application of the principles of energy exchanges to the rail freight sector](#)

Jain, A; Bruckmann, D

One of the major goals of the European Union's transport policy is to increase the market share of rail freight transports. With the Internet, globalization, and just-in-time production, the future of freight transport has moved to high-value and lightweight goods. Rail freight has had difficulty entering this market. Thus, a multipronged strategy is required for improving the rail freight market in which freight is consolidated and transported in Europe by encouraging new players to enter the market. A key pillar of this strategy is the introduction of freight exchanges that are based on principles similar to those of power exchanges. The latter are already well established and operational in the energy sector. This paper describes the market and operational requirements for efficient and reliable freight exchanges in the European freight market from which the rail sector can profit.

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March 2018

## [Assessment of existing and future rail freight services and technologies for low density high value goods in Europe](#)

Zunder, T Islam, D

This research applies qualitative approach with an online survey consisting of 24 industry experts in assessing the 'existing' solutions for competitive rail freight service operation for lower density and higher value (LDHV) cargoes, plus the proposed 'future' (i.e. in 7 years' time). The results are presented in the form of a 'GAP' analysis that examined three core themes: 'wagon', 'train and hubs' and 'business quality and planning'.

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## High Speed Rail

2018

### [Travel cost: not always the most important element of social exclusion](#)

Pagliara, F; De Pompeis, V; Preston, J

Very few authors in the literature have dealt with the issue of social exclusion related to HSR systems. A Revealed Preference survey has been delivered to English users of transport systems for long distances journeys in order to investigate their perception of HSR-related social exclusion. The main result of the survey is that a relationship between

social exclusion and HSR in England is evident, especially in terms of economic and geographical exclusion.

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## Knowledge Management

*October 2017*

### Is there a systematic relationship between random parameters and process heuristics?

Balbontin, C Hensher, D Collins, A

Traditional discrete choice studies impose strong behavioral assumptions on how attributes offered in choice experiments are processed in order to reveal knowledge of preferences. It is commonly assumed that attributes are traded linearly in the parameters and additive in the attributes (LPAA), ignoring other possibilities on how specific individuals might reach a decision. A particularly interesting heuristic is Value Learning (VL), which proposes that preferences are not stable and may change when an individual is faced with sequential choices. VL is part of the family of heterogeneous process rules in which one or more rules may be invoked by individuals in making a choice, and hence is a candidate decision-making process. The question is whether there is a systematic relationship between random parameters as a representation of preference heterogeneity and one or more process heuristics.

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## Level Crossing

*October 2017*

### Expanding educational horizons: high school students creating innovative designs for safer pedestrian level crossings in the TrackSAFE education STEM

Ferris, J

In 2017 the TrackSAFE Foundation (TrackSAFE) issued a challenge to young people to use design thinking to create an innovative solution to make pedestrian level crossings safer using science, technology, engineering and mathematics (STEM) principles. Year 7 to 10 students (aged 12 to 16) from across Australia entered the inaugural TrackSAFE Education Rail Safety Competition for High Schools.

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*December 2017*

## Managing the level crossing removal program: report 2017-18:10

Auditor General

The level crossing removal program (LXRP) aims to contribute to long-term improvements to the road and rail network by easing transport congestion and delivering a safer and more efficient road network. The LXRP is two years into an eight-year program. This audit identifies risks, lessons and opportunities for improvement for future works. We examined whether the LXRP is cost-effective in terms of whether it has improved, or is expected to improve, the safety and efficiency of the state's road and rail network. The audit focused on the role of the Level Crossing Removal Authority, Public Transport Victoria, and Transport for Victoria in providing oversight and strategic focus for the LXRP.

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## Planning, Policy and Infrastructure

*November 2017*

### Do European reforms increase modal shares of railways?

Tomes, Z

The transport policy of the European Union aims to increase modal shares of railways. Its principal reform measures are vertical separation and competition entry. However, there are other possible reform strategies and it is not clear whether European reforms actually increase railway's modal shares. Based on an analysis performed on 27 European countries in the period 1995–2013, there is no evidence that vertical separation and competition entry increase modal shares of European railways. The horizontal separation of the freight and passenger division of the incumbent and subsequent privatisation of the freight division looks like a more promising strategy. There are also important structural differences between countries in Western and Eastern Europe which should be controlled for.

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*December 2017*

### Report on transport 2017

New South Wales. Audit Office

This report focuses on key observations and findings from the most recent financial statement audits of agencies in the Transport cluster. Unqualified audit opinions were issued for all agencies' financial statements. However, the report notes the agencies can improve their asset revaluation processes. The report recommends that TfNSW should implement measures to prevent loss of revenue from passengers tapping off with negative Opal cards, a range of observations in respect to service delivery and that target measures be developed on crowding for bus operators in all contract regions and publish the results. Surveys conducted by Transport indicate customer satisfaction exceeded target for all modes of public transport.

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## Public Transport

2017

### [Deep learning for subway pedestrian forecast based on node camera](#)

Mo, ZG

Seated and standing travelling imply significantly different experience for public transport users. This paper investigates with analytical modelling and numerical simulations how the optimal seat supply depends on demand and supply characteristics. The paper explores the implications of seat provision on the marginal cost of travelling as well. In crowded conditions, we distinguish two types of external costs: crowding density and seat occupancy externalities. We derive, using a realistic smart card dataset, the externality pattern of a metro line, and identify the distorting role of the occupancy externality that makes the welfare maximising fare disproportionate to the density of crowding.

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## Rail

October 2017

### [Railway suicide clusters: how common are they and what predicts them?](#)

Too, L Pirkis, J Milner, A et al

A growing number of studies have sought to detect clusters of all suicides, but few have sought to identify clusters of method-specific suicides. Data on railway suicides occurring in Victoria, Australia, between 2001 and 2012 were obtained from the National Coronial Information System. Railway suicides that occur in clusters warrant particular attention because of the ripple effect they can have for communities and the risk that they may lead to copycat acts. Railway suicide prevention strategies should consider the fact that these suicides can occur in clusters, particularly among individuals who had previous hospitalisations for mental illness or live in areas with high-frequency train services.

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*December 2017*

## Should Australia expand rail health assessments?

National Transport Commission

This discussion paper seeks information from stakeholders to support the development of a RIS to make amendments to the National Standard for Health Assessment of Rail Safety Workers.

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## Safety

*December 2017*

### Potential explosive device on a commuter train: what drives train drivers to deviate from the security procedure

Tripathi, K Borrión, H Fujiyama, T

Explosives pose a major threat to urban metro rail systems. Train drivers are therefore expected to regularly perform security procedures in response to reports of suspicious items on the train. This study was conducted to develop a multi-factorial account of deviation from one such security procedure by train drivers.

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*December 2017*

### Transport safety

Horton, G Martino, A Chiffi, C et al

The purpose of this Research Theme Analysis Report is to provide an overview of research performed (mostly) in the EU, providing a view across many projects that fall under the theme title. It provides a robust and thorough assessment of the reported results from the projects and offers perspectives from scientific and policy points of view. The Report was produced under the Transport Research & Innovation Portal (TRIP) continuation project for the European Commission's Directorate-General for Mobility and Transport (DG MOVE).

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## Station

*September 2017*

### [Framework for centralized and dynamic pedestrian management in railway stations](#)

Kabalana, B; Leurenta, F; Christoforoua, Z et al

The significant growth of pedestrian flows through stations of mass public transport has turned the two issues of passenger comfort and safety into major concerns for railway station operators. This paper brings about a framework for station management with special focus on passenger flows. The framework includes first a general understanding of station as a system with specific transfer function and ad-hoc topology and second the dynamic supervision of system performance. We also address observation requirements and the toolbox available for modelling.

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*October 2017*

### [A novel approach for the modelling of air quality dynamics in underground railway stations](#)

Walther, E Bogdan, M

Indoor air quality in subterranean train stations is a concern in many places around the globe. However, due to the specificity of each case, numerous parameters of the problem remain unknown, such as the braking discs particle emission rate, the ventilation rate of the station or the complete particle size distribution of the emitted particles. In this study the problem of modelling PM10 concentration evolution in relation with train traffic is hence addressed with a particle-mass conservation model which parameters are fitted using a



genetic algorithm. The parameters of the model allow to reproduce the dynamics and amplitude of four field data sets from the French and Swedish underground contexts and comply with realistic bounds in terms of emissions, deposition and ventilation rate.

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## Track

*December 2017*

### [A time-domain model for the study of high-frequency wheelset–track interaction](#)

Fang, W Martinez-Casas, J Bruni, S

A new ant colony algorithm is proposed in this paper in consideration of train dispatching command process based on ant colony algorithm and the shortest path analysis of trains in an emergency, according to the idea that many shortest paths should be found for train operation path. With the (k-1) shortest path found, this algorithm can be used to search the K-th shortest path to solve or mitigate the problem of reasonable path allocation in adjustment of train operation plan and avoid the lack of passing capacity in local sections.

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*December 2012*

### [Tribological aspects of wheel–rail contact: a review of wear mechanisms and effective factors on rolling contact fatigue](#)

Soleimani, H Moavenia, M

Nowadays, the railway is considered as a means of fast, aggregate and secure transportation. The issue of the rail and wheel contact is one of the most fundamental aspects in the railway system since inappropriate interactions create problems such as wear and a negative effect in the dynamic functioning of the train. In this research, we analyze one of the most important phenomenon in a railway system which is the contact of the rail and wheel. This review is done in the scope of the most fundamental deteriorating aspect of the rail and wheel system, the wear. The wear in the contact of objects along with its occurrence between the wheel and rail is also analysed.

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## Train

*2017*

## Research on K- shortest path algorithm in train operation in emergency events based on ant colony algorithm

Chen, F Zhang, Q Wang, T Zhao, HT

A new ant colony algorithm is proposed in this paper in consideration of train dispatching command process based on ant colony algorithm and the shortest path analysis of trains in an emergency, according to the idea that many shortest paths should be found for train operation path. With the (k-1) shortest path found, this algorithm can be used to search the K-th shortest path to solve or mitigate the problem of reasonable path allocation in adjustment of train operation plan and avoid the lack of passing capacity in local sections.

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For more information, visit the ACRI website at [acri.net.au](http://acri.net.au) or [click here](#) to visit the Rail Knowledge Bank page directly.

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

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