ACRI Rail Knowledge Bank Update.

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Themed issue: AusRAIL PLUS 2016

November 2016

Below is a random selection of papers from AusRAIL PLUS 2016, Rail - Moving the Economy Forward, 21-23 November 2016, Adelaide, South Australia. To view all papers and presentations, select: Browse/ARA (Australasian Railway Association)/AusRAIL PLUS 2016

Advanced train control for greenfield freight rail

New freight corridors such as the Melbourne to Brisbane Inland Rail, Mount Isa to Tennant Creek and various new direct port connections are being considered and studied which will connect modern intermodal terminals with ports. Proven and cost effective train control systems will be required to ensure maximum efficiency is achieved. Advanced Train Control (ATC) solutions use communications technology and on-board systems to provide safer and more efficient rail operations. While technology selection for metropolitan and suburban networks is relatively mature, the characteristics of Australian freight lines make technology choices more challenging. This paper compares the different advanced train control technologies available and discusses them in relation to the key criteria of Australian freight networks

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Advances in tamping technology

Mechanised railway track maintenance was implemented in 1945 in order to enhance the track stability and improve the precision of the track geometry. The running speed of passenger trains has kept increasing and optimal and sustainable track geometry has been aimed for ever since. With the increase of running speed, the track design elements have resulted in transitions becoming longer and smoother and hence the precision of transitions and curves have also increased. With this change has come the need for

equipment and processes that are able to accurately maintain the track to its designed geometry. Investigations and studies have further demonstrated that even at lower speed and particularly on freight vehicles travelling on mining track networks, smoother and reliable track geometry reduces wear of the rollingstock and therefore adds an important economical factor. So, precise and smooth track geometry, to reduce risks of accidents and to reduce wear, has been and still is a major aim for the railway industry.

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Applying systems thinking to prevent collisions at rail level crossings

Rail level crossings continue to represent a significant safety issue, both in Australia and worldwide. Recently it has been suggested that behaviour and safety improvements may be achieved by modifying rail level crossing systems through a sociotechnical systems theory-based approach. This paper presents an overview of a rail level crossing system design lifecycle process that involved applying systems thinking analysis and design methods to analyse existing rail level crossing systems, and then to generate, evaluate, and refine new rail level crossing design concepts.

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Australia’s cities of tomorrow: light rail as an agent for change

Hundreds of cities around the world have adopted light rail as part of an integrated transport system. To successfully translate a city’s transport investment into liveability and a higher performing economy, a holistic view is needed that looks beyond traditional approaches to managing congestion and planning for growth. Light rail is a proven performer for small, medium and large cities.

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Future on rail – economical ecologic track maintenance

High fuel and labour cost as well as the demand for low work cost are a permanent challenge for track maintainers. Today, additionally, there is a rising demand for a reduction of ecologic impact of track work. These facts initiated a new approach in the design of the power pack of track maintenance machines. To be clean and cost efficient was the mission for a new machine drive concept, combining diesel and electric energy which is taken from the overhead wires. On track since September 2015, the new hybrid drive technology has its advantages especially in urban areas, but also for long distance

drives on electrified lines. Applied on high capacity track maintenance machines, there is not only a significant ecological and ergonomic improvement, but also long term cost savings can be achieved.

View item

Long term strategy for wayside systems – ARTC

The Wayside Strategy for Australian Rail Track Corporation Ltd. (ARTC) sets a long-term framework for information sharing and management of wayside data with customers who have signed the wayside data access agreement. The trend in the Australian rail industry is towards a condition based maintenance regime and the continuing introduction of condition monitoring wayside instruments require system tools to support the increased data, volume of analysis and use of that data. ARTC has investigated the cause, type and number of incidents on its network with a view of introducing wayside monitoring equipment that will assist in reducing the number of these incidents.

View item

Near misses in remote locations: investigating rail level crossing incidents in the Pilbara

Comparatively little is known about causes of risk-taking behaviour specific to remote locations or regions where the road traffic is dominated by long road with extremely heavy loads, such as mining and resources traffic. The Pilbara region of Western Australia is an example of a remote location with intense mining and resources traffic and, with an abundance of rail operations, numerous level crossings. Anecdotal evidence suggests that level crossing strikes and near misses are a particular safety concern in this region. Determining the causes of collisions at level crossings in this region is the focus of a mixed methodological investigation, with the aim of providing potential controls that may reduce or mitigate these occurrences.

View item

Non-ballasted track forms – a survey of global best practices

A wide range of non-ballasted track structures have been developed for transit railways throughout the world, especially on tunnelled and viaduct sections of metro and light rail systems, as well as high speed railways. The currently operating Australian rail networks have relatively small lengths of non-ballasted track within tunnelled sections, bridges and viaducts on the major metropolitan rail systems. An analysis of new and future

metropolitan projects suggests an increasing proportion of railway length involves tunnels and associated non-ballasted track systems. It is therefore imperative, that rich experience gained globally is systematically evaluated in the context of the specific requirements of Australian rail projects which need to occur in already developed areas, and often includes stringent noise and vibration performance. This paper captures a detailed survey of various slab track systems currently being used around the world and identifies best practices in the context of the typical design and performance requirements for the tunnelled section of the rail projects within Australia.

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Rolling stock fire safety – Australian practice in the global context

Approaches taken in the specification of rolling stock fire safety design solutions vary greatly around the globe. In some jurisdictions there is a preference for elevating rolling stock fire safety levels as part of the whole of rail system solution. The European Rail Agency, for example, favours the use of preventative rolling stock fire safety measures over mitigating fire safety measures applied to the rail infrastructure. Similarly, many of East and South East Asia's leading metro operators also mandate a very high level of rolling stock fire safety to ensure they deliver their intended level of fire safety across the greater rail system. This paper reviews these and other approaches taken globally for rolling stock fire safety design and comments on how these compare to that defined within Australia's latest Rail Industry Safety and Standards Board (RISSB) standard, AS 7529. The four part standard represents Australia's first ever set of national, harmonised requirements and leverages best practice from Europe, within an Australian specific performance based framework.

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Sudden death, early retirement or merely a midlife crisis: the performance of SC 47KG/M rail in ARTC'S interstate network

The general engineering approach of track load capacity rating is typically performed at the design stages (using multi-factor assumptions of the loading situations) and although the full axle load ratings of railways are often achievable with near perfect conditions, where these are not present the risks of rapid failure rates can be highly unpredictable. On established tracks the integration of heavier bulk freight is typically handled by unique operating rules (axle load and speeds) in localised areas to suit the existing track condition and configuration. This approach often becomes a compromise between original track

design intents and competing demands for efficiency by running faster and heavier trains. Although the case presented in this paper is clearly a unique situation within the ARTC interstate railway, the lessons learned and the data gathered should reinforce the fundamentals that all mixed freight railways should follow in the goal of cost efficiency via heavier and faster trains.

View item

Turnout grinding: why and how

Turnouts are a complicated and expensive part of the track infrastructure. In line with plain rail, they require grinding to manage the wheel / rail interface and minimise their whole life costs. This paper discusses the damage that can occur in turnouts when they are not maintained and highlights the cost savings that have been identified from implementing a thorough grinding strategy. The second part of the paper then discusses improved approaches that have been developed to meet this requirement, in terms of overall machine design, grinding stone optimisation and finally process development to optimise the grinding approach to maximise the productivity of the grinding operation.

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