In addition to rail projects around Australia and in Hong Kong, this feature contains articles on signal standardisation, improving performance and an update from the Railway Technical Society of Australasia.

Compiled by Kirill Reztsov

Expanding Adelaide’s network

The 48th and final launch of the 1.2km elevated Onkaparinga Valley rail viaduct in South Australia was completed in late August.

The bridge is a major element of the Seaford Rail Extension Project, which involves construction of 5.7km of dual electrified track on Adelaide’s southern suburban railway line. The project is being delivered as a joint venture between Thiess and McConnell Dowell. Construction commenced in 2011 and is expected to be completed in 2013.

Engineering consultants involved in the project are Parsons Brinckerhoff, Aurecon, SKM and Hassell.

In addition to the Onkaparinga Valley viaduct, the project involves new stations and parking facilities at Seaford Meadows and Seaford, a bus interchange, a rail bridge over Old Honeypot Drive, and road bridges over the track at Goldsmith Drive, Seaford Road and Lynton Terrace.

The Onkaparinga Valley viaduct is a box girder structure, comprising 22 spans of approximately 52m each.

Once the concrete has achieved the required strength, the segment was stressed and launched out of the casting bay into the finishing bay. The segments were launched using Eberspacher equipment which lifted the box girder and pushed it out. To allow the launching to progress smoothly, the first segment had a launch nose attached, which helped support and align of the launch as segments start going over the piers. Each pier had a set of guide frames to assist with the alignment.

The rail bridge over Old Honeypot Road is a single span bridge using Super T precast beams and integrated abutments, which are made of precast piles and reinforced earth walls.

The Seaford Meadows Station is taking shape with the pedestrian overpass installed. The platforms and the pedestrian overpass are in place at Seaford Station. Both stations are expected to be completed by September.

The width of the corridor available and the site geology has dictated that slope retention is required along the majority of the southern end of the project. The adopted solution is a system of soil nailing with reinforced shotcrete facing. In total, over 50km of soil nails and 20,000m² of reinforced shotcrete facing have been installed.

Work begins on Melbourne rail link section

A 7.5km section of the Regional Rail Link between Footscray and Deer Park began in early August, following the award of a contract to an alliance comprising Balfour Beatty, Parsons Brinckerhoff and Sinclair Knight Merz in December 2011.

Thiess and Balfour Beatty are responsible for all building works, while Parsons Brinckerhoff and Sinclair Knight Merz are the designers. Also part of the alliance are Metro Trains Melbourne and V/Line, who are the accredited rail operators, and the Regional Rail Link Authority as an owner participant. There are no specified roles for the parties, and staff in the alliance is sourced from the allies on a best-for-project basis.

The scope can be broadly divided into five categories: new rail bridges, road and rail separations, upgrades to existing stations, the new West Footscray station, and the design and construction of train control systems for the metropolitan lines. New track will also be laid on the 7.5km stretch from Footscray to Deer Park.

New rail bridges include Hopkins Street, Nicholson Street, Albert Street, Victoria Street, Ashley Street and Stony Creek. There is also a planned replacement of the HV McKay footbridge. Road and rail separations comprise both the addition and removal of crossings.

Two level crossings on Anderson Road in Sunshine are to be removed, while improvements will be made to level crossings on Fitzgerald Road in Ardeer, and on Mt Derrimut Road and Robinsons Road in Deer Park. Pedestrian crossings in Footscray on Sydney Street, Adelaide Street, Young Street and Tower Street are targeted for planned upgrades.

Footscray station will receive new platforms adjacent to Irving Street, an improved station entrance and forecourts incorporating escalators, ramps, lifts and stairs. Tottenham station will receive improvements to the entrance and forecourt along with an additional 100 car parking spaces. West Footscray station is being rebuilt; this project will include the station’s ramps, lifts and stairs.

Currently the only announced work for the design and construction of train control systems for the metropolitan lines are modifications to the metropolitan signalling system from Footscray to Sunshine.

This section of the Regional Rail Link is scheduled to be completed by the middle of 2015.
Improving member services

by Katharina Gerstmann

As the only organisation catering for professionals working within the rail industry, the Railway Technical Society of Australasia (RTSA) continues to provide a wide range of services to its membership as well as aiming to support the development and growth of the industry.

The rail industry has experienced some tough times with long periods of upheaval and change, though significant investment and structural reorganisation in recent years have meant that the future of the industry is encouraging, driven by strong leadership and political support.

With economic stimulus infrastructure funding rapidly coming to an end it is important that the momentum in revitalising rail in Australia is not lost. Rail plays an important role in moving our mineral wealth to port for export as well as a significant proportion of the general and interstate freight required to support the mining industry. Rail has a market share in excess of 80% of land freight on the interstate corridors serving Perth and Darwin.

With further population growth predicted for our major cities and road congestion estimated to be costing over $21 billion a year, expansion of our urban rail networks offers the best solution to help overcome these challenges.

One of the biggest structural reforms for the industry in many years will be the establishment in January 2013 of a single national rail safety regulator, replacing the inefficient arrangement of separate state-based jurisdictions.

The RTSA is continually improving the services and activities it provides to its membership to reflect the changing dynamic of the modern rail industry and is active in delivering a strong program of events that includes monthly presentations to local chapters and study tours – both local and overseas. Our Meet the Railway People expos seek to better inform graduates of the varied and exciting career opportunities available within the rail industry.

The RTSA has also been investigating several options for engaging further with those companies in the industry that support our aims and objectives and reviewing how our prestigious range of annual awards might be expanded, possibly through sponsorship to develop stronger ongoing relationships with industry as a whole.

This year saw the launch of a distinctive new RTSA identity. The new logo is both clean and modern which surely will help the RTSA to stand out. Also this year, with the support of Engineers Australia, a great deal of time and effort has been invested in giving the society’s website a much needed facelift: the RTSA will have a new website providing a comprehensive resource to members, but one that also caters to all aspects of social media, is easily accessible and is fun to use.

As this issue goes to members, our biennial Conference on Railway Engineering (CORE 2012) is being held in Brisbane. CORE 2012 promises to follow the success of previous CORE conferences in delivering high-quality, peer-reviewed substantive papers showcasing the achievements of the Australasian rail industry.

Katharina Gerstmann is national chair of the Railway Technical Society of Australasia. Formed in 1997, the RTSA has over 1500 members in six chapters across Australia and New Zealand. A joint technical society of Engineers Australia and Institution of Professional Engineers New Zealand, the RTSA’s members are drawn from all engineering disciplines as well as rail operations, management and academia.
High-speed rail for Hong Kong

The Guangzhou-Shenzhen-Hong Kong Express Rail Link (XRL) is part of China’s 16,000km National High-speed Rail Network. It will connect Guangzhou South Station on the Mainland to the West Kowloon Terminus in Hong Kong. The aim is to reduce travel time between Hong Kong and Guangzhou to 48 minutes, and improve rail connections between Hong Kong and other major cities in China.

Construction of the project began in January 2010. Currently, over 20% is completed and construction is scheduled to conclude in 2015.

The Mainland section of the XRL will be 124km long with four stations – Guangzhou South, Humen, Shenzhen North and Futian. Between Guangzhou and Futian, trains will run above ground. The Hong Kong section is 26km in length will consist of dedicated railway tunnels.

While trains in the Mainland section will run at speeds up to 300km/h, the maximum operating speed in Hong Kong will be 200km/h with a maximum design speed of 250km/h. Tunnel boring machines (TBMs), drill-and-blast and cut-and-cover construction methods are used for different sections of the tunnels.

On the Mainland, TBMs are used to construct twin-track tunnels with 12.8m outer diameter and 11.3m inner diameter. In Hong Kong, single-track tunnels with 9m outer diameter and 8.15m inner diameter will be built to meet fire regulations.

Drill-and-blast methods are used to excavate horseshoe-shaped tunnels, with variations to incorporate air ducts or separating walls depending on location. For tunnel lining and waterproofing, movable steel forms are deployed as they can provide obstruction-free access for trucks.

In case of emergency, Shek Kong, located in the middle of other at-grade access points between Futian and West Kowloon, will serve as an emergency access point. Trains can also be stabled at Shek Kong sidings for inspection and cleaning.

The West Kowloon Terminus site area measures 11ha. The station is designed to separate the arriving and departing passenger flows. As the station will be underground, the space above can be released for public use. A glazed façade will admit natural sunlight into the station and make it possible for arriving passengers to have a view of the ridge line of Hong Kong Island.

The terminus will be connected to the Airport Express at Kowloon Station and to the West Rail Line via Austin Station.

The project also includes a diversion of the Kam Tin River in the New Territories.

This is an abridged version of John Meldrum’s report on a presentation by Fung Wai Chung for Engineers Australia’s Hong Kong Chapter in June. A senior engineer at MTR Corporation, Fung is responsible for liaison and public consultations on the Guangzhou-Shenzhen-Hong Kong Express Rail Link (Hong Kong Section).
Improving performance of railway organisations

by Andrew McCusker and Mark Ho

Effective rail systems have major societal and economic impacts on Australia’s competitiveness, liveability and infrastructure resilience. There is a pressing need to enhance the rail transport system to become a viable and sustainable transport option for both cities and regional areas. An attribute of a successful railway company is the ability to develop effective processes and clear communication to achieve high performance for customers. This is where engineers can differentiate themselves to deliver improved culture and organisational excellence.

Rail systems were initially at the forefront of technology and populated by innovative engineers who handled a broad range of issues in addition to engineering. They had to consider all aspects that went together to provide rail travel and this is an aspect that modern engineers need to consider if we wish to assist our organisations to achieve higher performance.

Higher performance is often misinterpreted as improving a certain set performance indices, in terms of cost, time or failure rate. It may refer to delivering bottom-line service with lower cost or reducing failures with a fixed budget or improved customer service.

Indeed, higher performance is more sophisticated and the above may only be one of many elements in a bigger story. Higher performance is a collective organisational goal which is set around the processes and output. As the processes are initiated, managed and facilitated within organisations, a consistent understanding of high performance as a group is pivotal to success.

Measuring high performance can be difficult, but it is possible to define a number of characteristics through which high performance may be reached:

- **Responsiveness** – Rail organisations that are continually connected to customers and staff can build the capability to respond to the changing needs of customers and society.

  - Raising performance starts with a vision, which can be a simple statement like “Put a smile on the customer’s face”, which was the challenge set for engineers at MTR in Hong Kong. Its articulation developed into a number of multilayered and interconnected processes within the organisation. Each process contributed to the realisation of the vision and the combined outcome is increased customer satisfaction.

  - The road to higher-performing organisations has its foundation in the actions of engineers within the organisation considering how things can be done better, using their understanding of the systems and people they are responsible for and advocating for better performance.

  - Higher performance is a continuous process and not a one-off endeavour. The organisation must refresh itself to adapt to the changes. For railway operation, customer demands and expectations evolve with economy, technology, culture, social demography and behaviour over time.

  - It is not enough to keep pace with all changes, but to predict and stay ahead of them. Processes, individual capabilities and skills, and technologies take time to develop and mature before they are ready to contribute to higher performance. An ongoing process must be in place to allow them to grow in the anticipation of changes in the future.

  - They should be part of the corporate culture.

  - As technologies move at lightning pace, engineers and technologists should subscribe to a continuous learning attitude to build their broad-based and interdisciplinary competence, and engage proactively in the aspiration of a high-performance organisation.

Andrew McCusker is regional director for rail at Hyder Australasia.

Standardising signals across Australia

by Steve Boshier

The rail industry is facing extreme pressure to improve the capacity of our networks quickly and effectively as the demand for more efficient and capable transport services increases.

While infrastructure seems to be the focus of solving these challenges, a modernised and standardised rail control system might be a better place to focus our efforts. Currently across Australasia each railway has its own operating rules and requirements, and varies in the level of self-sufficiency to design and manage its systems. With this comes a level of risk in terms of safety, longevity and reliability.

In an ideal world, we would see two or three rail signalling control systems that would be designed and agreed to one standard – an interoperable system which provides rail owners with a greater level of choice for equipment and design services purchasing while standardising the range of systems being installed. Standardisation would help improve the productivity and safety of railways without negatively impacting infrastructure owners and maintenance providers. Train locations could be continuously monitored and controls overridden if necessary. Railway owners would have greater choice of vendors. From a maintenance point of view, it would allow for better management of spares. Workers would not need to be trained across such a variety of equipment.

The European Train Control System (ETCS) currently being rolled out across Europe is a key benchmark of where we should be headed. Supported by at least six of the major international rail signalling companies, the system is allowing for easier travel across European borders and has enlarged the network of vendors these companies can purchase products and services from. It’s all about having a win-win situation for all, where manufacturers can be more cost-effective in producing the standardised system as they move away from low-quality bespoke design. They can pass these savings on to their customers.

RailCorp in NSW and KiwiRail in New Zealand already have contracts in place to roll out ETCS systems. For progress to continue on this front, we need to see unification as the next step. Separate organisations need to join forces and agree on a set of common standards. There is a level of capital outlay and investment required, but if timed well it can coincide with equipment lifecycle changes.

Steve Boshier is regional director for rail at Hyder Australasia.

QUT’s Master of Engineering (Railway Infrastructure) has been developed collaboratively with the rail industry as a professional development program exclusively for engineers working in railway areas.

Flexible study options can be undertaken through single continuing professional development units or the full masters program available entirely online.

Participants benefit from working on global real-world projects and expanding their industry networks through the only online postgraduate railway infrastructure engineering course of its kind.

To find out more, please visit www.qut.edu.au/study/courses/master-of-engineering-railway-infrastructure or email sf.enquiry@qut.edu.au

Andrew McCusker and Mark Ho are members of the Rail Logistics Group of the Simulation, Modelling, Analysis, Research and Teaching (SMART) Infrastructure Facility at the University of Wollongong.