Sweden: High-Speed & Future Growth
With articles from Crister Fritzson at SJ, Stefan Engdahl from Trafikverket, Björn Westerberg from ASTOC and Sweden’s Minister for Infrastructure, Anna Johansson

Level Crossing Safety
Tackling misuse: articles from Infrabel, Irish Rail and the British Transport Police

Rolling Stock Developments
Trenitalia’s Frecciarossa 1000, the Roll2Rail project, the NGT LINK high-speed feeder train and Bombardier’s Wheel/Rail-Interface Study
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As locomotive modernisation experts, ZTR Control Systems is constantly innovating to make sure SmartStart® and all its products and services provide exceptional returns to the global railways. ZTR focuses on many key areas of locomotive modernisation including: starting technologies, fuel management solutions, locomotive control systems, connectivity and diagnostics, information management, modernisation services, project management and consulting. With a successful modernisation program, railways can significantly extend the operating life of their locomotives, providing a highly compelling option compared to buying new locomotives.

Let’s get personal for a moment, how did you get involved with the company and what do you like about the industry?

My modelling contract doesn’t pay enough (Scott grins wryly). Seriously, I started at ZTR as an engineering coop student and after completing my schooling, I pursued a career in executive management, returning to the company in 2003. As for the industry, it’s highly complex and sophisticated and that may not be obvious from the outside. Technology is critical and innovative, problem-solving solutions are embraced. The railroads are passionate about what they do, the services they provide, and the equipment they use. There’s a real sense of common purpose amongst the railroads and suppliers to deliver the most efficient and reliable transportation services possible, and to continuously improve the rail network.

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Sweden’s high-speed risk?

A strong Swedish profile kicks off this issue of European Railway Review and developing a high-speed rail future for the country is a hot topic right now. The Swedish government has identified that its rail sector needs to focus on the future so, after many years of discussions and investigations, plus admitting to decades of neglected maintenance, it seems that a successful, and fast rail future, could be in sight for the Scandinavian country – but will there be any risks?

SJ – the Swedish passenger train operator – is positive about a high-speed future and welcomes the plans, but understands that a number of important conditions must be in place. “...we see a risk that the investment will not achieve the desired impact unless everything is done correctly,” explains Crister Fritzson, CEO of SJ, in his article on page 19 in this issue, in which he also puts forward his views that the system will need to be exceptionally robust – referring to punctuality, the restoration capacity and length of delays – all elements that are crucial for success. He continues: “…My approach and remarks are obviously far from sufficient for the Swedish high-speed rail venture, but I strongly believe they are necessary prerequisites for success, and for the development of a viable and sustainable high-speed rail system.”

Over on page 23, Trafikverket’s Director of Market and Planning Stefan Engdahl, explains that there are “many challenges ahead” to reach the goal of high-speed rail being in operation by 2035. He covers how it is not only new technology and a new construction standard that will be needed, but new rolling stock will also be required.

To plan, design and construct a high-speed network that will dramatically reduce journey times between its cities, Sweden will need to take risks – but surely they will be risks worth taking so that its people, its economy and the Scandinavian region as a whole can reap its benefits.

Keeping with the Swedish theme, European Railway Review is delighted to have Swedish Minister of Infrastructure Anna Johansson contributing the Foreword to this issue in which she points out that one of her priorities is to concentrate on making the country’s railways work better for commuters and goods. As she explains on page 9, a huge investment of SEK 1.24 billion will help to deliver the ambitions and that “a well-developed rail sector plays a fundamental role in Sweden’s infrastructure plan and will have positive effects for Sweden’s wealth, continued growth and increased employment”.

European Railway Review are also pleased to once again be a media partner for Elmia Nordic Rail, and we showcase what the event has in store this year starting on page 31 in this issue.

Elsewhere in this issue, you’ll find our Rolling Stock Developments Supplement (page 39) with articles from Bombardier, Trenitalia, UNIFE and the German Aerospace Centre, and in our Level Crossing Safety Supplement (page 63) Infrabel and Irish Rail showcase how they are working to achieve a reduction in level crossing accidents, plus Becky Warren from the British Transport Police highlights how the UK is policing and tackling level crossing misuse.

Furthermore, and in collaboration with our sister-magazine Euromove, we are looking forward to welcoming delegates to London on 24 November 2015 for our Real-Time Passenger Information conference – this year co-located with the Smart Ticketing & Payments conference. If you’re interested in passenger information technology or in charge of delivering ticketing schemes, then these conferences are just for you. Learn more about them by visiting www.rtpiconference.com and www.smartticketingconference.com and we look forward to seeing you there!

As always, if you would like to contribute to a future issue of European Railway Review with an end-user article or an informative news item, please do not hesitate to contact me via the email address below. Please also bookmark our website – www.europeanrailwayreview.com – where you can find details of past, current and future issues, daily industry news updates, exclusive online-only articles, plus conference and event details. Don’t forget you can also join our groups on LinkedIn, Twitter and Facebook – details are on page 7.

Craig Waters
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It’s in how we electrify, automate and digitalize transport infrastructures that we’re setting the benchmark for tomorrow’s mobility – today.
To deliver on these ambitions we have to act on several fronts in the years ahead. First of all though, we have to accept that decades of neglected maintenance have created an urgent need for increased investments. Trains not running on time have obvious societal costs, which makes this an urgent challenge. Hence, in 2015 we allocate an extra SEK 620 million and then SEK 1.24 billion in the years to come. This will be hugely important, not least for Swedish industries that are dependent on a world class infrastructure to remain competitive and to increase our European and global exports. At the same time commuters need to be able to rely on trains running on time. It is a simple logic that when means of transport are reliable, more people will be prepared to take up a new job or education within commuting distance. All this will have positive effects for job creation and innovation in Sweden.

A modern and well-functioning rail sector also makes environmental sense. After all, we are talking about the greenest means of transport on the market today. The Swedish Government prioritise actions that increase the number of goods transported by rail, rather than goods being transported with trucks. This being said, we also need to pave the way for new solutions when it comes to alternative fuels. There will always be stretches where road haulage is the only alternative. Different transport modes are not necessarily in competition with each other, but will always have to complement each other. We cannot sit back and relax; the way forward is to make transportation as a whole more environmentally-friendly and efficient. The railway will continue to play an important part in this work.

In addition to environmental sustainability, the Swedish Government focuses on economic and social sustainability. Economic sustainability concerns stable state finances and wise investments in the national economical perspective. When it comes to social sustainability there is a lot that remains to be done. In more or less all transport sectors we see unscrupulous actors using loopholes, letter box companies and atypical forms of employment, to compete with lower salaries and working conditions. This is not the way forward and whether we discuss aviation, shipping or rail markets, this government’s message is clear – competition has to be fair, based on quality and efficiency, and guarantee decent labour conditions.

It should be clear to everyone that a well-functioning rail national sector also requires good cooperation within the EU, globally and with our Nordic neighbours. Together we need to move forward on issues such as better interoperability, multimodality, passenger rights, traffic safety and fair competition.

In the coming months I hope we will be able to reach an agreement between EU Member States and the European Parliament on the Fourth Rail Package. It would bring several benefits, facilitating trains and rolling stock to cross regional and national borders in a more efficient manner, and allowing companies to compete on national markets. I believe that any agreement on this important piece of rail reform will have to be based on market opening of national rail markets and better competition on the one hand, and satisfactory possibilities for authorities to provide public rail transport on the other. Market opening should never stand in the way for decisions taken in the public interest. At the same time, all member states will benefit from increased rail services across borders.

A well-developed rail sector plays a fundamental role in Sweden’s infrastructure plan and will have positive effects for Sweden’s wealth, continued growth and increased employment. Thus, I will, in my role as Minister for Infrastructure, continue to strive forward to reach our objectives: create more jobs, increase exports and cut emissions.
Speakers will include:

- David Lynch, CIO, FirstGroup Plc
- Jenni Borg, Head of Smart & Integrated Ticketing, Department for Transport
- Matthew Hudson, Head of Business Development, Transport for London
- Robert Montgomery, Managing Director, Stagecoach UK Bus
- John Henkel, Acting Director of Transport, West Yorkshire Combined Authority
- Richard Allan, Commercial Director, Northern Rail
- Erik Kolbjørnsen, Product Manager – Tickets, Ruter
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- E-Ticketing for Seamless Mobility
- Assessing Open Ticketing Standards
- Combining Ticketing with Real-Time Information
- Smart Ticketing for Modal Shift
- Optimum Fare Collection Strategy
- Smart Ticketing and Smart Cities: New Directions for UK Local Transport

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Finnish Transport Agency

David Sidebottom,
Passenger Team Director,
Transport Focus

Jason Durk,
Head of Customer Information:
National Rail Enquiries,
Association of Train Operating Companies (ATOC)

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What core products/solutions can Laird offer the railway transportation industry?

Laird is a leader in providing wireless remote control solutions that help protect and connect the user to the user’s environment.

Our rail solutions portfolio supports the various standards requirements, the variety of locomotives available, and the varying technical requirements of our customers. These include the electro-hydraulic interface to the loco control system or solutions with an electronic interface. As we do this for locos operating almost anywhere in the world, you can imagine that there is a huge variety when it comes to the different interfaces and details for the different locos our systems have to interface with. For older locomotives the interface to loco control system is typically done with relays and modern locos typically use serial interfaces such as CANbus. The same applies for the Human Interface, i.e. the operator control unit; we offer a variety of options for layouts, controls, number schemes, and language labelling. Our global engineering capabilities enable us to provide this high level of customisation.

As a trusted partner of several locomotive OEMs in close partnership with their engineering and sales teams we have developed standard interfaces to suit their requirements making the integration of our radio remote controls on their locomotives very easy, allowing them to save costs in design and production. One important factor for the OEMs is a partner that is able to supply products meeting all European operational, design and safety standards related to rolling stock. Laird Controls Europe GmbH has been a forerunner in developing products meeting those standards.

We are simultaneously working closely with loco retrofitting companies upgrading older locomotives with state-of-the-art technology including RCL. Beside our systems we provide consulting and engineering work to ensure that all relevant safety requirements are met. The integrated safety features in our systems make it easy for the retrofitting company to proof the safety case. This minimises their engineering resulting in lower hardware and certification costs.

What has been Laird’s biggest success to date?

Laird enjoys a strong embedded base in rail yards throughout the world. It’s this strength that carries our solution viability to not only other rail organisations but other industries as well. Our success has not been a single event; it is the fact that despite strong competition we managed to be the leading supplier in terms of technology, safety standards and installed base of rail radio remote control solutions for greater than 40 years which we accomplished through hard work and skilled, experienced people. In Europe, many rail operators, large industrial customers with their own fleets and loco manufacturers, have chosen us as their trusted supplier.

Are there any regions or countries that Laird is looking to secure future business in?

We are working on new business opportunities in several countries. While we cannot divulge any details, we can say that in addition to continuing to grow the business in North America and Europe, we are in discussions with customers in other parts of the world. As customers realise the benefits of our solutions, the adoption of our technology grows and presents new opportunities. A good example is China which is starting to look at radio remote control solutions for its huge fleet of locomotives. In Europe, we have many unserved countries where there is good potential for growth. Often the adoption of our technology depends on the safety conscience and safety standards in the respective markets. As the legislation in many countries is responding to demands for increased health and safety, we are well positioned to take advantage of this trend.

What sets Laird apart from its competitors and what are the long-term aims and goals of the company?

We enjoy long-term experience in this market, possess strong engineering capabilities and capacity in this field of radio remote control solutions. Laird’s systems are approved and operating in several countries. We have a rich portfolio of systems solutions designed to meet the needs of different locomotive types. Over the decades we have built up a wealth of in-depth knowledge of the intricate operating of locomotives that is absolutely crucial to provide control systems that work and are safe and reliable.

When it comes to our long-term goals and building on our vast knowledge of rail operations, we will provide solutions that enhance safety and increase efficiency of our customers operations by providing predictive analytics and actionable data. We have already begun with some customers in the USA and are looking to expand this in the near future to other regions of the world.

www.lairdtech.com/Kingerski
**Consortium win Spanish high-speed rail control contract**

A consortium between Bombardier, Alstom and Indra has won the contract to supply signalling systems and maintenance services for the new high-speed section of the Madrid–Lisbon railway corridor in Spain’s Extremadura region. The project, awarded by Spain’s Administrator of Railway Infrastructure (ADIF), has a total value of approximately €164 million (Bombardier €77 million, Alstom €62 million, Indra €25 million).

The Bombardier-led consortium will deliver the design, procurement, installation, testing and commissioning of the signalling and communication systems. This includes installing ERTMS Level 2 on the 164km-long Plasencia–Cáceres and Cáceres–Badajoz sections of the line. The project also includes a 20-year maintenance regime to commence at the end of phase one of the signalling system delivery. Bombardier will implement its proven, radio-based BOMBARDIER INTERFLO 450 ERTMS Level 2 solution for the entire line. Alstom is responsible for the electronic interlocking system and will supply the reliable and proven Smartlock 300 solution, and Indra will implement the Spanish automatic train protection (ASFA) system.

**Tender open for Voralpen Express rolling stock**

Südostbahn AG (SOB), the Swiss rail operator, has announced the opening of tender to procure new rolling stock for the Voralpen Express and SOB regional rail services.

SOB currently operates the 125km-long Voralpen Express service which runs hourly services between Lucerne and St. Gallen in Switzerland. SOB has begun the tender process to procure six vehicles for the Express service and five vehicles for SOB regional rail services.

The new vehicles will enter service in 2019 with SOB requesting energy efficiency, optimised chassis solutions for the sustainable conservation of the tracks, cross-linked command and control systems and maintenance agreement. The closing date for bids is 23 December 2015.

**£750m Birmingham New Street opens to public**

After five years and at a cost of £750 million, Birmingham New Street Station opened its doors to the public on Sunday 20 September 2015.

During the five-year redevelopment programme, the station underwent a complete rebuild while trains continued to run as normal for the daily 170,000 passengers. The station now houses a new atrium over a large concourse which is said to be five times that of London Euston.

In addition, the transport hub also provides 43 shops at concourse level and a 450,000ft² Grand Central shopping complex. The development is expected to provide more than 1,000 jobs and attract more than 50 million visitors a year.

The reopened station will provide 15 new lifts and 36 escalators for access to every platform, increased passenger capacity on the concourse, touch-screen passenger information, a new ticket office and improved safety and security systems. There will also be 66 smartcard-enabled ticket gates. This means passengers will be able to travel seamlessly between regional rail, bus and tram services, as part of a scheme introduced over the coming months and during 2016.

Mark Carne, Chief Executive of Network Rail, said: “Birmingham New Street sits right at the heart of our rail network and the transformation which has taken place here is nothing short of stunning. The station is now bigger, brighter and better able to meet the needs of the growing number of people who use it each day. As Britain’s second city, Birmingham deserves a station of this calibre and, along with Grand Central, the investment we have made will help support the local economy and regenerate large parts of city centre. Rebuilding one of the busiest stations in the country without impacting on passengers’ journeys has been a major challenge, but I’m extremely proud to say that Network Rail and our partners on this project have done just that. That’s a significant achievement for everyone who has helped build this fantastic new station of which they, and all of Birmingham, can be very proud indeed.”

www.newstreetnewstart.co.uk
www.networkrail.co.uk

**More than £1m improvement plan for Harrogate Station**

Construction work is underway at Harrogate Station in the UK, bringing a host of improvements worth £1.2 million to customers using the busy North Yorkshire hub. Northern Rail, which manages the station, is introducing new and improved facilities after listening to feedback from staff, customers and local businesses.

The work is being done in two phases, costing a total of £1.2 million, and is expected to finish in early-2016.

Phase one has already started and includes new toilet facilities, upgrades to the existing waiting room on platform one, and various improvements to the station concourse area, which will also benefit from a new floor, wall and ceiling finishes as well as lighting upgrades, automatic doors and improvements to the interior decor.

In phase two, a new, heated waiting shelter will be built on platform three for customers who wait there for trains towards Leeds.

The improvements have been funded by the National Station Improvement Programme in partnership with Network Rail and the Department for Transport (DfT).

www.northernrail.org
ETCS Level 2 order for Siemens from Infrabel

In a consortium together with the Cofely-Fabricom (GDF SUEZ) infrastructure development company, Siemens is to equip more than 2,200 track kilometres of the Belgian railway network with ETCS Level 2.

The order was placed by Infrabel, the Belgian railway infrastructure operator, and is worth about €510 million. ETCS constitutes an essential component for the merging of European railway traffic. It is designed to replace the more than 20 national automatic train protection (ATP) systems on the European continent and enhance network safety and capacity. The project is scheduled for completion by the end of 2025. The contract includes installation of the ATP system and the electronic interlocking equipment.

“This order underscores our leading position in the field of automatic train protection systems,” commented Jochen Eickholt, Head of the Mobility Division at Siemens.

The ETCS Level 2 uses the railway-specific GSM-R mobile radio system to ensure a permanent two-way radio connection between the vehicle and trackside. This not only makes continuous speed monitoring possible, it also means that new movement authorities can immediately be transmitted to the vehicle and all relevant information is displayed to the driver in the driver’s cab.

RAIL.ONE implements new corporate structure

The corporate reorganisation of RAIL.ONE GmbH – international sleeper manufacturer and systems provider of innovative railway track systems – has reached a new milestone. RAIL.ONE depends on entrepreneurial adaptability to be sustainably successful in its core business. With the target of adapting the group even more successfully to customer orientation, growth and innovative strengths, the company has implemented a new organisational structure. The German Division has been separated into two entities which took effect on 1 August 2015.

The company RAIL.ONE GmbH is today responsible for the German market, at the same time also the entrepreneurial and technological homeland of the corporate group. Under direction of Verena Moosburger, focus here is clearly on fine-tuned customer orientation: “Consistent orientation of our activities towards the needs of our customers, as well as an open-minded and closely-knit cooperative culture with a focus on future-proof technological developments, are essential elements for our sustainable success in Germany.”

All international activities, business development, central holding functions, and group-wide management of technologies and innovations will be the responsibility of the company PCM RAIL.ONE AG, under direction of Jochen Riepl. Furthermore, there is a high mood of excitement and a fresh start with regard to the further development of the group its new structure.

“We are confident that this bold move marks our launch into a new phase. Our focus on even further professionalisation of our special skills as a group, will support our position as an internationally valued business partner. With new products and services, we will further convince our customers of our truly unique portfolio,” said Jochen Riepl, CEO of PCM RAIL.ONE AG.

Despite organisational and legal separation, both corporate entities will operate under the same roof at group headquarters in Neumarkt, Germany. In December of 2015, both companies will relocate to their new offices in Neumarkt’s new signature complex ‘NeuerMarkt’. On more than 2,000m² of future-oriented office space, the group will be hard at work on realisation of their ambitious goals.

DB and UNIFE sign MoU on IRIS

At Deutsche Bahn (DB) AG Headquarters in Berlin in August 2015, UNIFE, the European Rail Industry Association, represented by UNIFE Chairman Lutz Bertling and UNIFE Director-General Philippe Citroën, signed a Memorandum of Understanding (MoU) for Cooperation with DB, represented by Dr Volker Kefer, Member of the DB Management Board for Infrastructure, Services and Technology on the advancement of the International Railway Industry Standard (IRIS).

The MoU’s objective is to promote mutually beneficial cooperation between the signatories on quality standards in the rail sector. Such cooperation is expected to focus on increasing the exchange of knowledge and experience in a bilateral context on product quality, which is defined as product-related fulfilment of customer requirements. The activities outlined in this MoU endeavour to create a favourable context for the development of the rail sector worldwide and, especially, in Germany.

Lutz Bertling, Chairman of UNIFE, commented: “Deutsche Bahn is one of the largest and most influential railway undertakings in Europe and the world – to see their commitment to the further development of the IRIS standard and, thus, towards the continued improvement of quality in the rail equipment supply chain is commendable and a major endorsement for IRIS. IRIS looks forward to continued fruitful cooperation with Deutsche Bahn on quality.”

Also during the ceremony, Volker Kefer, Member of the DB Management Board for Infrastructure, Services and Technology, stated: “The cooperation with UNIFE as our trusted partner will strengthen the rail sector and increase quality. The focus on product-related fulfilment of customer requirements within IRIS is an opportunity for business in a global economy. DB expects significant long-term improvements as a result of both parties’ expertise and cooperativeness.”

Mark Manley, Chairman of the IRIS Steering Committee, added, “This is an excellent step towards a rail industry standard which fully meets our customers’ expectations. We look forward to signing IRIS MoUs with additional key stakeholders in the very near future.”

IRIS complements the internationally recognised ISO 9001 quality standard introducing rail specific requirements and is modelled on similar quality standards already in place in the aerospace and automotive industries. IRIS aims to improve the quality and the reliability of the rail products, to implement and further develop a global system for the evaluation of companies supplying the rail sector, and to instil a culture of quality throughout the sector.

With almost 1,200 companies IRIS-certified worldwide, the standard is now an international seal of quality, increasingly recognised by rail operators and manufacturers alike. The IRIS scheme was developed by UNIFE members and the IRIS Management Centre is managed by UNIFE.

www.iris-rail.org
www.unife.org

www.siemens.com

www.railone.com
Hitachi’s new train manufacturing facility opens

UK train manufacturing has returned to the North East following the opening of Hitachi’s new £82 million facility in Newton Aycliffe, County Durham. The new train manufacturing facility, Hitachi’s first in Europe, was recently opened by Prime Minister David Cameron, Chancellor of the Exchequer George Osborne and Transport Secretary Patrick McLoughlin MP alongside Hitachi Ltd Chairman and CEO, Hiroaki Nakanishi.

The opening follows the government’s decision to award the £5.7 billion Intercity Express (IET) contract to Hitachi for the East Coast Main Line and Great Western Main Line. In addition, the site will manufacture 70 AT200 commuter trains for Scotland.

Prime Minister David Cameron said: “This massive investment from Hitachi shows confidence in the strength of Britain’s growing economy. This new train facility will not only provide good jobs for working people but will build the next generation of intercity trains, improving travel for commuters and families, as well as strengthening the infrastructure we need to help the UK grow.”

Transport Secretary Patrick McLoughlin MP said: “The state-of-the-art IET trains that will be manufactured here will transform rail travel for countless passengers between London, the north east and south west. Not only will these trains allow us to operate more services, with more seats, and faster journeys, the improvements will also bring great opportunities for growth, generating hundreds of jobs in the local area and thousands across the country within the supply chain.”

www.hitachirail-eu.com

Britain’s new ‘workshop on wheels’ fleet set to transform railway maintenance

The first of a new fleet of state-of-the-art engineering trains (pictured) which will revolutionise the way Network Rail’s ‘orange army’ carry out maintenance and repair work has recently entered service.

The mobile maintenance trains (MMTs) will make working on the railway quicker, safer and more efficient as well as less disruptive for passengers and freight. Based at locations around the country, the eight MMTs will provide a ‘workshop on wheels’ for engineers and track workers as they carry out repairs, renewals and upgrades to Britain’s 20,000-mile rail network.

Each train will have a workshop, two built-in 2t cranes to move heavy equipment, multiple power points (400V, 110V, hydraulic and pneumatic) and will be able to carry all the tools and supplies the engineers could need. But the MMT’s key feature is the large, extendable work area that allows access to the track below, provides cover, floodlighting and – crucially – protection from passing trains. As a result, the MMTs will reduce the amount of disruption engineering work usually causes as they may be able to work on a section of track without having to close the railway next to it. This will limit disruption during the day when engineers carry out repairs, while allowing better use of the railway at night for freight trains carrying everything from high street goods and mail, to cars for export and coal for power stations.

The mobile maintenance trains (MMTs) will carry out repairs more quickly and efficiently, reducing the need for costly and disruptive closures of the tracks. They’ll also keep our people safe, warm and dry and better able to focus on getting the job done.”

The MMTs have been manufactured by renowned railway construction and engineering experts Robel, in Freilassing, Germany and will be delivered to Network Rail over the next 12 months. The fleet will be operated and maintained by Colas Rail under a three-year deal.

Further Reading:
Neal Lawson, Network Rail’s Maintenance Director, said: “Many tasks on the railway can only be carried out when the railway is closed to traffic – but with passenger numbers growing and demand for freight increasing at record levels, the need to keep the railway open round-the-clock is greater than ever before. These new trains mean our frontline staff can complete a wide range of maintenance and repairs more quickly and efficiently, reducing the need for costly and disruptive closures of the tracks. They’ll also keep our people safe, warm and dry and better able to focus on getting the job done.”

www.networkrail.co.uk

New deal for better East Midlands passenger journeys

Rail passengers in the East Midlands, UK, will benefit from better journeys, extra services, and cheaper fares, thanks to a new deal recently announced by Rail Minister Claire Perry.

The deal will see East Midlands Trains – which already has a strong track record for performance – not only continue to run services between London, the East Midlands and parts of the North of England until March 2018, but will also deliver a host of improvements for passengers, backed by £13 million of investment.

Rail Minister Claire Perry said: “This is a great deal for East Midlands Trains customers, and will mean significantly better journeys for passengers travelling around the region. This is another example of the work we’re doing to transform the UK’s railways as part of our long-term economic plan, with more than £38 billion being spent on the network between 2014 and 2019.”

Along with extra services and cheaper fares, some of the improvements will include: 15 more automatic ticket machines installed across the network; better customer information with a new mobile app; more passenger information screens at key stations; and £1 million invested in improving accessibility at stations, along with 29 new accessible help points at unstaffed stations, linked to a 24-hour customer contact centre.

East Midlands Trains is also upgrading onboard Wi-Fi on London services to 4G, with the aim that this will be free to all passengers when the next fully-competitive franchise starts from 2018.

www.gov.uk/dft
The Amphenol Rail Compound

Amphenol Air LB intended to anticipate the objectives of standardisation, of securing railway passengers and of rationalisation of procurement by developing one unique material: the extremely innovative A.R.C. (Amphenol Rail Compound) (pictured).

It meets the requirements of the highest national and international exigencies as references in terms of fire, smoke and toxicity: EN45545-2 : April 2013 R22 HL3; DIN5510 Cat. S3; NFf16-101/102 Cat. A112 F2 Ex.3; UN11170 1-2-3 LR4; NFPA130. It also complies with the current REACH and RoHS rules, taking into account potential future obsolescence (materials under surveillance). The A.R.C. has been conceived for applications in very cold environments (-60°C / -76°F permanently). It is intended to be applied to Amphenol Air LB whole range of terminal blocks (BJC, BJL and BJT) in order to offer to the RMT constructors and operators multi-standard products suitable for integration in multi-standard equipments.

In collaboration with an approved ‘Certifier’ laboratory of reference and recognised by major RMT actors, Amphenol Air LB has drafted, developed, tested and qualified the A.R.C. www.amphenol-airlb.fr

UN COP21 climate change conference: rail is a key part of the solution

As government officials and other stakeholders from around the world gear up for the United Nations COP21 climate change conference (30 November to 11 December 2015, Paris), the European rail sector is keen on playing a decisive role in the strategy for tackling climate change. As worldwide transport is mostly fuelled by fossil fuels, rail is the back bone of sustainable transport and should therefore increase its share vis-à-vis more polluting transport modes. This was the main message put forward by UNIFE and Transdev Group at a Rail Forum Europe dinner held in Brussels on 14 September 2015.

Henri Poupard-Lafarge, Member of the UNIFE Presiding Board and President of Alstom Transport, highlighted that climate targets will not be reached without significant efforts on transport and presented the rail industry approach to sustainable mobility, commenting: “We look forward to COP21 later this year as rail can play a substantial role in combatting climate change, provided the legal framework sets the right incentives. The European rail industry is up to the challenge. At Alstom we are committed to improving the energy efficiency of all our products by 20% by 2020, and are investing heavily in innovation to reach that target”.

Jean-Marc Janaillac, CEO of Transdev Group, pointed out that modal shift to rail would be key to make transport more sustainable and referred to the current EU legislation on this matter. He said: “Last week, the European Parliament adopted its report on the Transport White Paper. It stressed that the swift adoption of the Fourth Railway Package should ensure competitive tendering for public service contracts and a high level of quality and efficiency of rail services. This high level of quality and efficiency is critical for railways to become more attractive and thereby contribute to COP21 climate objectives”.

Wim Van de Camp, Member of RFE and of the European Parliament’s TRAN Committee, asked the rail sector to come up with a credible estimation of external costs for all modes and pointed out that the promotion of rail should go beyond sustainability, commenting that: “Flexibility and reliability are essential to make rail more attractive.”

Libor Lochman, Executive Director of CER, stressed the uneven legislative framework for the different transport modes, stating: “Rail is already indirectly part of the Emission Trading Scheme, whereas we do not see a similar treatment for other modes, such as aviation and maritime.”

Philippe Citroën, Director General of UNIFE, outlined the rail industry’s strong commitment in view of the COP21 conference: “In order to promote that rail has a major role to play in the fight against climate change, UNIFE will be engaged in several initiatives during COP21, such as the Paris Process for Mobility and Climate (PPMC) together with the Partnership on Sustainable Low Carbon Transport (SLOCAT) as well as the Transport Day on 6 December 2015”.

RFE President and Chairwoman of the European Parliament’s TRAN Committee Michael Cramer thanked the participants and concluded the debates: “Climate change is a global issue and the transport sector has been the bad pupil until now. Tonight’s presentations and discussions showed that the rail sector con indeed provide concrete answers to revert this trend, provided that a fair legislative framework is put in place”.

Rail Forum Europe will hold its next dinner event on 20 October 2015 in Brussels. On this occasion, the MEPs will address issues related to the Juncker investment plan and financing in the rail sector.

www.rail-forum.eu

Train operator launches live departure board at Manchester Airport

First TransPennine Express has unveiled the first advertising campaign to offer live train times on digital screens at Manchester Airport in the UK which enables arriving passengers to view their next train to a wide range of destinations. It also reminds travellers that First TransPennine Express services are a quicker and more cost-effective way to get to and from the airport than using cars or taxis. Featuring First TransPennine Express’ fun, colourful brand characters, the campaign appears on Eye Airports’ lightbox and digital six-screen advertising sites, which are seen by passengers as they walk from their flight to the baggage reclaim hall.

Once at baggage reclaim, ADXBA’s unique Unity platform provides up-to-the-minute information from the national rail database on the digital arrivals gallery screens. The programme has been designed to allow enough time for passengers to walk to the station and catch the train after collecting their bags.

The screens also prompt passengers to save time by downloading the First TransPennine Express app to buy tickets and check train times from their mobile device while waiting for their bags.

Caroline Anchor, Head of Marketing at First TransPennine Express, said: “We aim to find ways to make travel easier for our customers and we are pleased to do this by providing travellers at Manchester Airport with useful and timely information.”

www.tpexpress.co.uk
ORR releases new data on government financial support to the UK rail industry

The UK’s Office of Rail and Road (ORR) has recently published new statistics highlighting year-on-year levels of government financial support to the UK rail industry (1985-1986 to 2014-2015).

The latest data for 2014-2015 shows the rail industry received £4.8 billion of government support – this is 9% less than the previous year. This change reflects an increase in net payments from train operating companies to government.

Also, for a fifth successive year, the government has, in total, received more money back from train operating companies as part of their franchise agreements than it paid in subsidies. In 2014-2015, the government received £802 million, up from £40 million in 2013-2014.

The majority of government support was in direct rail support, which is the grant payment to Network Rail. This was £3.8 billion in 2014-2015, an increase of £349 million on the previous year. Network Rail uses this money to maintain and improve the network.


Additional Régio lis on order for the Midi-Pyrénées region

Alstom will supply eight additional Régio lis (Coradia Polyvalent) to the Midi-Pyrénées region for a total of approximately €46 million, following an initial order for 25 Régio lis placed by the region in 2009.

The Régio lis (pictured) are made up of four cars and have 50% more doors than their regional counterparts, facilitating passenger flow. Upon request by the Midi-Pyrénées region, these trains have been fitted with specific equipment such as passenger counting systems, dedicated storage space for bicycles and luggage, and front-panel displays showing the destinations.

The first Régio lis of the Midi-Pyrénées region entered commercial service in July 2014 on the lines that link Toulouse with Latour-de-Carol and Mazamet.

Régio lis is part of Alstom’s Coradia range. With its modular architecture, it can be adapted to the requirements of every organising authority as well as to different types of use: suburban, regional and intercity. It is available in three lengths (56m, 72m and 110m) and offers optimal passenger comfort, whatever the length of the journey.

Régio lis is both ecological and economical thanks to its low energy consumption, its respect for the latest emissions norms when in operation and its reduced maintenance costs. Equipped with ERTMS technology, Régio lis is the first regional train in France to conform to all European standards.

To date, 226 Coradia Polyvalent trains have been ordered as part of the contract awarded to Alstom by SNCF in October 2009, of which 192 Régio lis by 12 French regions and 34 Coradia Liners by the French state, the organising authority for France’s Trains d’Equilibre du Territoire (TET) or intercity trains. Three million kilometres have already been covered by Régio lis in commercial service.

www.alstom.com

New public space and entrance at London Bridge Station

A new public space will take shape outside the UK’s London Bridge as part of the Thameslink Programme’s massive rebuilding of the station. Computer-generated images have been released to show what the new Tooley Street entrance to the station will look like in 2018 (pictured). Construction work on the site, to the north of the station, is set to begin at Easter 2016.

Thameslink Programme Director Simon Blanchflower said: “As well as rebuilding the railway through London Bridge, we are also creating a new focal point for Southwark and linking the communities north and south of the line. A new pedestrian walking route will be opened up with plenty of space for new retailers and cafes and the new public space alongside Tooley Street will be a fitting entrance to one of London’s busiest railway stations.”

The new concourse Network Rail is creating at London Bridge will be the size of the pitch at Wembley and stretch the full width of the railway, from Tooley Street to St Thomas Street. London Bridge is currently used by 56 million people every year, and the new station is designed to be used by more than 90 million people, as well as providing a destination in its own right.

www.networkrail.co.uk

Elmia Nordic Rail 2015
Date: 6-8 October 2015
Location: Jönköping, Sweden
w: www.elmia.se/en/nordicrail

6th Multirail Open Day 2015
Date: 27-28 October 2015
Location: Darmstadt, Germany
w: http://www.schensproces.com/Bahtag15/en

Real Time Passenger Information 2015 co-located with Smart Ticketing & Payments 2015
Date: 24 November 2015
Location: London, UK
Tel: +44 (0) 1959 563 311
e: sgooding@russellpublishing.com
w: www.trticconference.com
w: www.smartticketingconference.com

AusRAIL 2015
Date: 24-26 November 2015
Location: Melbourne, Australia
e: info@informa.com.au
w: www.susrail.com

Eurasia Rail 2016
Date: 3-5 March 2016
Location: Istanbul, Turkey
e: contact@eurasiarail.eu
w: www.eurasiarail.eu

If you have a diary event you wish to publicise, send details to Martine Shirtcliff at: mshirtcliff@russellpublishing.com
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To begin with, we are positive about the entire high-speed rail venture and consider it a major step towards lowering CO₂ emissions for passenger services; because that is what high-speed rail lines do, through connecting cities and bringing them closer to each other.

The mission is multi-faceted. The aim of the negotiation mission is to expand public transport services, improve accessibility and stimulate housing construction in Sweden’s three major cities: Stockholm, Gothenburg and Malmö. At the same time, infrastructure investments across Sweden will enable the construction of some 100,000 new homes.

Effectively, the negotiation also entails the co-financing of infrastructure projects, in which multiple parties will be actively involved. The negotiators have the task to investigate and evaluate ways of financing. It could, for instance, be entirely financed by the Swedish government, but also relevant municipalities and county councils, as well as users and private investors, have been mentioned; at least in the opinion of the negotiation group. The government’s negotiators will therefore travel around Sweden in the autumn to meet municipalities, regions and county administrative boards.

Technically speaking, Sweden plan to develop its first high-speed rail line, with speeds of up to 320km/h, as soon as possible. Trains must be able to run from Stockholm to Gothenburg in 2 hours, and to Malmö in 2 hours 30 minutes. The stated aim is that the high-speed rail lines will be completed by 2035.

The high-speed rail venture is a huge project for Sweden and an important investment for the country, but particularly for SJ. The negotiation group’s analysis and choices will be crucial to the investment’s delivery of all possible and essential effects.

SJ has performed two internal tasks: we have reviewed and assessed the entire market to achieve an overview of the key conditions, and we have worked through a business case for SJ which includes a calculation of how passenger volumes may change. This process has led to several conclusions.

The high-speed rail system’s conditions for offering something really positive with radically increased train travel in Sweden requires a holistic approach and a clear and common vision that is shared by all stakeholders and players. A number of important conditions must also be in place.

However, we see a risk that the investment will not achieve the desired impact unless everything is done correctly. The essential conditions that we at SJ have identified are radically shortened travel times and a system with an exceptional robustness.
Endpoint travel times must be 2 hours for Stockholm–Gothenburg, and 2 hours 30 minutes for Stockholm–Malmö.

Robustness is crucial. Total confidence in high-speed train services is crucial to achieving the success we are aiming for.

The financing solutions will obviously be crucial to SJ and any others that decide to take on the challenge of operating high-speed trains on a commercial basis in Sweden. The prerequisites must not also exclude conventional rail-lines and other types of trains.

In terms of travel time, we have assumed that the planned line will be constructed for speeds of up to 320km/h. However, speed is not the only important issue for this line. As far as possible, the line must be connected to the destinations, otherwise we will face a situation with mixed lines which seriously endangers the robustness.

According to the current plan for the high-speed rail system, the high-speed lines join the existing main line on the way into Stockholm, Gothenburg and Malmö. We will, effectively, have a high-speed rail system with a ‘mixed line’ – and those lines currently have, and will continue to have, very high capacity utilisation. A punctuality level of 95% for high-speed rail services requires operational prioritisation that creates the right conditions. We are presently concerned that the final part of the route has been planned so that trains will run on the conventional rail line, and these very endpoints are exactly where today’s most serious bottlenecks occur. If the robustness of the high-speed system fails, lack of confidence in the high-speed rail system may prove difficult for us. We would like to know whether it is possible to prioritise differently in order to build a high-speed rail line closer to Stockholm, for example.

However, the robustness of the future line may still be the most important issue. Routing and track quality are only the first steps towards a well-functioning high-speed rail system. However, robustness is critical for passengers deciding to travel by train. Robustness refers to punctuality, restoration capacity and length of delays. All three dimensions are affected by how services are planned and by operational prioritisation.

Another aspect affecting robustness is how the government agency with responsibility for Swedish infrastructure – the Swedish Transport Administration (Trafikverket) – will decide how the new lines are to be operated. One scenario is that the infrastructure owner decides to reduce capacity for high-speed trains with endpoint services to maximise opportunities for regional services. While regional services are obviously important, the high-speed rail line will free-up space on the existing conventional main line. Our firm opinion is that if the chosen solution does not meet the needs of endpoint services, the travel volume may not increase sufficiently to enable commercial viable business.

International experience shows that well-functioning high-speed rail systems require punctuality. The Swedish infrastructure owner has set a punctuality target of 95% for the high-speed rail line. That is positive. A punctuality level of 95% is sufficiently high, but this punctuality must apply to the entire high-speed rail system, meaning all the way into Stockholm, Gothenburg and Malmö, respectively – that is what matters to passengers.

Since we are still in the early stages of the process, is there any reason to revise the entire route to see whether anything more can be done?

Another challenge is the type of service that will operate the line –
meaning the speed of the trains. International experience shows that systems with only high-speed trains are highly punctual, whereas systems with mixed services are significantly less punctual. A few European countries serve as less effective models and examples. In counties where the level of punctuality is less than 80%, which is lower than our inter-city rail services at present, this low figure is due to mixing services on the lines. Operating trains that run at speeds of 250km/h and 320km/h on the same line may be feasible, but when speeds drop to 200km/h, the difference is so great that robustness is affected.

The development and success of the railway has not been linear. In the 1980s, air travel captured market share from rail transport. Since the 1990s, rail transport has gradually recaptured market share from air travel. In the 2000s, passenger kilometres increased significantly. The increase is partly related to investments in faster, more modern vehicles, but also to SJ’s transition from a public utility to a commercial company with a modern business model and, not least, dynamic pricing.

This development is positive from a sustainability perspective, in that travel is moving away from less sustainable modes of transport to trains, which have a limited environmental impact and provide an unbeatable means of travel in terms of safety.

It is high time to invest in the future. Infrastructure requires continued investment in general, and rail in particular, since only track-bound services can effectively solve our growing need for mass transport, not least in Sweden’s three growth regions around Stockholm, Gothenburg and Malmö.

In Europe, high-speed lines have been developed, or are being planned, for trains travelling at speeds of 250km/h or more. France was first, and we can see that high-speed trains can replace air travel for journeys of up to 600km. When travel times fall below the two-hour mark, air travel can be replaced entirely, although in many cases, various modes of transport are working in unison. And, in Japan, the market share of high-speed rail is a full 30%.

In total, we can now in Europe travel on some 6,650km of rail, with an additional 250km in the foreseeable future, giving us a European high-speed network that stretches from Birmingham in the northwest to London, Paris, Lyon and Montpellier, Bologna, Florence, Turin, Rome and Naples in the southeast. And from Madrid in the southwest to Malaga, Seville, Barcelona, Perpignan, Brussels, Rotterdam, Hannover, Mannheim, Stuttgart, Frankfurt, Leipzig, Hamburg, Berlin, and Krakow in the northeast. A scenario whereby all of these are connected, with Sweden playing its part and taking responsibility for the Scandinavian section of the trans-European high-speed network, is fully realistic.

Now, Sweden needs to make the correct assessments and plans and roll-out the high-speed lines correctly. My approach and remarks are obviously far from sufficient for the Swedish high-speed rail venture, but I strongly believe they are necessary prerequisites for success, and for the development of a viable and sustainable high-speed rail system.

Crister Fritzson has been the Chief Executive Officer and President of SJ AB since 2012, and is also Chairman of the Association of Swedish Train Operating Companies, plus Board Member of Systembolaget AB – the Swedish state alcohol monopoly in Sweden. Prior to SJ, Crister was the CEO and President of the Teracom Group.

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Travel times will be significantly shortened – which is one of the explicit gains of this initiative. The end goal is to make it possible to travel between Stockholm and Gothenburg in two hours, and between Stockholm and Malmö in two and a half hours. At the same time, capacity on the existing main lines will be freed-up for freight transportation.

The new high-speed railway requires new technology and a new construction standard, which allows a maximum speed of 320km/h. There are many challenges ahead. In addition to the new technology in regard to the construction, a new type of vehicle will be required; one which can drive at such a high-speed while still maintaining comfort and operational reliability.

Parts of these new railways are already well underway in terms of planning, such as the Gothenburg–Borås route and the ‘Eastern Link’ between Järna and Linköping. The Swedish Transport Administration is also currently investigating alternative routes between Linköping–Borås and Jönköping–Malmö. Later in the autumn, the Swedish Transport Administration will present its collective assessment of social effects and benefits, and hand this over to the National Negotiation on Housing and Infrastructure which has been commissioned to provide a final proposal to the government regarding routes, stations and funding.

It will not be possible to construct the high-speed railway in the same manner that the existing railway was built. The curves cannot be as sharp, and it requires a different structural strength. One alternative could be to build parts of the railway on raised bridges to reduce the barrier effect, but this is something that has only been done in Japan.
and China so far. These countries have chosen this option primarily because it is cheaper; the method entails that soil consolidation is only required beneath the bridge abutments and not the entire railway embankment. Building the railway on raised bridges also reduces the need for fencing and special solutions for road crossings.

The collective investment also entails an increase in housing construction in the three metropolitan regions of Stockholm, Gothenburg and Malmö, improved public transport in the cities, better bike paths and a new link to Denmark. It will significantly increase accessibility and make it easier to travel between different cities for housing, studies and work. Investigating a future high-speed railway in Sweden is not a new task for the Swedish Transport Administration. The former Swedish Rail Administration received the first such commission from the government in 1993: Create a rough outline for a future high-speed network.

In the first half of the 1990s, the Swedish Rail Administration was involved in an adaptation of the Southern Main Line that would allow trains to drive at 200km/h. They negotiated with land owners and municipalities about replacing level crossings with bridges. At the time, the talk of a high-speed railway was only seen as disruptive to that planning process.

But now a broad investigation base is available, and knowledge has been obtained from France, Germany, Spain, Italy and Japan, among other sources. These countries built their high-speed railways for different purposes, and they have also had to deal with different challenges during the planning and construction stages – Japan has to give significantly more thought to earthquakes than Sweden does, for example.

The existing main lines are currently being used for mixed traffic. Long-distance trains share the line with regional, commuter and freight trains. The capacity is limited, and the system is all too sensitive to disruptions. After studying a number of alternative solutions, the Swedish Transport Administration has chosen to continue planning a more or less separate system for high-speed trains. This means that it will be possible to use the existing lines for regional, commuter and freight transport more effectively, aiming for a higher level of punctuality.

The new separate high-speed railway will be used for express regional trains and high-speed trains travelling at the maximum speed possible on the track. The traffic prognoses produced by the Swedish Transport Administration are based on two and, in the long-term, three departures per hour towards Gothenburg and Malmö throughout most of the day. This is fewer departures than today, but as the new trains will be more than twice as long as the current trains, they will not need to make as many trips.

There is an intense investigatory and fact-collecting effort underway in 2015. The Swedish Transport Administration is conducting a long line of investigations of technical and socioeconomic aspects on behalf of the National Negotiation on Housing and Infrastructure. In 2016, the current fact collection phase will enter into a negotiating phase, which will be led by the negotiators assigned by the government. They will negotiate a final proposal with municipalities and regions, which is to be completed in the autumn of 2017. The business sector and other stakeholders will also have the opportunity to influence the outcome.

Everyone benefits from Sweden’s investment in a modern railway network. Since the entire railway system is integrated, the new high-speed
speed railways will relieve the system and improve its capacity. Efficient travel and transport options are beneficial to the labour market and growth in the whole country. The ongoing investigatory work has already shown that the positive impact of the new high-speed railways will not be limited to long-distance journeys. The regional train traffic will also be improved. One clear example is the travel time between Gothenburg and Borås, which will be cut in half, down to 30 minutes. That route is currently the third largest commuter route in Sweden, with journeys going in both directions as many of the commuters work in Gothenburg, while both the university and the centre of the fashion and textile industry are located in Borås. Plans are currently underway for this route, and one important question is where to place the station in Borås?

Once negotiations have been completed in 2017, agreements will have been made between the state, regions, municipalities and businesses. These agreements will provide answers regarding who is funding what – both in terms of infrastructure in the metropolitan areas and the new high-speed railways, how the expansion of these high-speed railways will be executed and where the housing will be constructed. The works will then proceed into new phases of planning, design and construction. And in 20 years, we can all reap the benefits.

**SWEDEN**

**Stefan Engdahl** is Director of Market and Planning at the Swedish Transport Administration (Trafikverket), with overhead responsibility for long-term planning of the transport system for road, rail, shipping and aviation. He is also Chairman of The Swedish Construction Clients – an association for professional construction clients who develop properties and build for long-term ownership and management. Other assignments include as Vice Chairman of IQS, an association working for progress within construction of society and as a Member of The Royal Swedish Academy of Engineering Sciences (IVA). Stefan holds an MSc as well as a Lic Sc in Civil Engineering.

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Whilst track laying and the manufacture of maintenance machines has been, and still is, MATISA's core activity, there are many other areas around this speciality to complete a range of activities one is to expect from the pioneer we are in this field.

Let’s say it straight – the machinery we are providing is no more than a tool for the specialised contractors or rail networks to maintain the tracks in a safe and economic way, enabling train traffic to run punctual, safe and smooth.

To that end, the investment the future owner of such equipment is conceding has to prove reliable and sustainable. This means MATISA products have to meet the highest quality and precision a state-of-the-art technology can provide.

With more than 70 years of expertise in this industry, MATISA has proven to be the perfect and trustable supplier meeting these specific requirements.

Once a machine is reaching a certain age or amount of work, whichever comes first, new investment would have to be considered to keep up-to-date precision, output and technology for the ever-increasing demand and expectation. But MATISA proposes a quite interesting alternative at this stage.

A recent project with the Swedish contractor INFRANORD, led MATISA to assess their B 50 plain line and B 66 universal tampers and to propose an extensive overhaul of these respectively 15 and 20 year-old machines. Through a thorough renovation concept these two products have not only been refurbished but more importantly along standard material renovation they have been upgraded to the latest technology in terms of PLC, computers and additional up-to-date equipment.

A couple of months to bring a good old, but reliable, machine up to the latest technology and standards – that’s all it takes for MATISA to significantly increase the lifespan of an initial investment to a rewarding financial return and a safety orientated goal.

www.matisa.ch

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La passion du rail
Quality, capacity and competitiveness

Never before has there been so much talk about the railroad in Sweden, writes Björn Westerberg, CEO of the Association of Swedish Train Operating Companies (ASTOC). Train services have been developed and adapted for a market with high standards and are an important part of society. Unfortunately, it is the flaws of the railway’s facilities that are in focus. Instead of visions and new developments, there are talks about the ‘maintenance mountain’ and infrastructure debt.

Sweden, and our environment, continues to evolve. Economies globalise, populations grow, urbanisation increases and digitalisation moves faster. The development of the Swedish society has led to fewer and larger regions, increased commuting between and within the major regions and a vital export industry with an increased flow of goods from large parts of the country. The service society has increased the need for skilled labour and acceptable conditions for work, study, and culture. Sweden is one of the most deregulated railway markets in Europe and the European Commission is striving to promote the Swedish system as a role model for the Fourth Railway Package. The next step in the development of the Swedish society requires a sustainable, rapid, comfortable and efficient transport system.

Sweden needs to strengthen its identity as part of a leading European development region, at the forefront of innovation and modernity. To keep up with the development and to strengthen Sweden’s competitiveness, we are forced to change. A major challenge...
will be to achieve both a more efficient use of resources and to become more flow-efficient. How we develop our transportation system will be crucial to how well we succeed in meeting future challenges and opportunities of the country.

The most recent National Plan for the transport system was labelled as a historic investment in infrastructure. But in the planning process to proceed with the National Plan, the Transport Administration started off from the current situation and just extrapolated forward in time.

The plan therefore lacks clear policies for how rail will be able to help create the future society we want to live in. The risk is great that the future railway in Sweden is unable to deliver the traffic that the society will demand. Sweden is one of the most deregulated railway markets in Europe and the European Commission is striving to promote the Swedish system as a role model.

In the short-term, we must increase the railway’s quality in terms of the railway infrastructure, improved punctuality, improved traffic information, more efficient and faster maintenance operations and not implementing ERTMS until the system is fully developed.

We also need to increase the competitiveness of the railway by avoiding competition restrictions and cost increases (increased track access charges), discourage unhealthy competition from truck traffic, create business and balanced contract terms and enhance the image of the railroad as well as creating an improved organisation of the railway sector.

Capacity-wise, we need to improve the rail infrastructure where the need is greatest, removing bottlenecks, ensuring efficient logistics chains for industry as well as building the new high-speed lines with a focus on end-point travel.

High-speed lines will be good for Sweden and the environment. There is a broad political majority to build new high-speed lines between Stockholm and Gothenburg/Malmö. To maximise the socio-economic profitability of the new high-speed lines, it is important that there are clearly articulated objectives of the investment. ASTOC agrees with the government that primary investment objective is to connect major cities by significantly reducing the travel time between Stockholm and Gothenburg and between Stockholm and Malmö. The initiative will promote increased travel by rail and can thereby contribute to lower carbon dioxide emissions from traffic. The focus on high-speed lines has the potential to be really positive for all stakeholders, but this requires a comprehensive approach with a clear target for the entire high-speed system. ASTOC sets out a number of requirements for the new lines.

First of all, to choose separate systems and avoid regional traffic on high-speed tracks – this is because the end-to-end travel time is of the utmost importance to increase travel and thus being able to transfer passengers from air to rail and better to be able to achieve both climate and transport policy objectives. The travel time will determine whether travellers choose high-speed rail over airlines or the car. To achieve a high market share, the travelling time must be 50% of car travelling time.
and 30 minutes faster than taking a flight, including connecting journeys between urban centres.

Furthermore, the maximum travel time between Stockholm and Gothenburg must be no more than 2 hours and the maximum travel time between Stockholm and Malmö must be 2 hours and 30 minutes. Also, train paths must withstand up to 12 return trips per hour on all routes and a need for low velocity difference between trains operating on the tracks by setting the minimum speed of 250km/h.

The high-speed project has been ‘inherited’ and transferred and now includes two previously started projects – the Eastern Link and Mölnlycke-Bollebygd. They are both largely designed as regional tracks connecting airports. This entails a great risk of a negative impact on punctuality and capacity available for travel between the major cities. The design of these projects need to be reviewed and adjusted based on a clearer vision for a Swedish high-speed systems.

Then there’s high punctuality and robustness – to achieve at least 95% punctuality of the entire system between the cities. The few disturbances that may occur must be as short as possible as not to upset the confidence and the trust of the train services as a credible alternative to flying or travelling by car.

Also, possible changing times at stations between trains and between trains and buses/trams should not exceed 10 minutes. To achieve this, effective interchanges should be sought. Furthermore, all stations must be designed so that trains can stop at the same time, plus additional tracks should also be planned.

ASTOC requires building the new high-speed tracks all the way to the city centres of Stockholm, Gothenburg and Malmö, with clear priority rules during disturbances and at the connection points to the existing lines. It is important to establish a ceiling on capacity utilisation so that there is room for recovery after a possible disturbance and each line needs to be completed at a similar time so that high-speed services can run all the way from the start of the first line.

There should also be reasonable commercial conditions including track access charges that are optimised to generate increased traffic and revenue growth that enables operators to make the multi-billion investment in trains that needs to be done.

Let us now join forces in the work of the next National Plan to create a new phase of growth for the railways. With the right measures and means we can double freight traffic and triple passenger services by 2050 – so let’s start the work to build the society we want to live in.
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Network online with your industry peers

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Members and non-members are welcome to join the discussions
BORDLINE® Traction solutions. Proven technology designed for Nordic countries.

Leading rail operators worldwide rely on ABB’s well-proven state-of-the-art traction systems. In the Nordic market, ABB is present with a comprehensive traction portfolio designed for extreme climatic challenges and customized to specific needs of local public transport, intercity and high-speed transport. In close collaboration with rail vehicle builders, refurbisher, and rail operators, we develop innovative and robust traction chain components with exceptional power density and optimum energy efficiency. Interested in optimizing your daily operation and improving the competitiveness of your fleet? Visit our experts at the ABB booth #B06:40 at Elmia Nordic Rail. www.abb.com/railway
Welcome to European Railway Review’s Show Preview of:

Elmia Nordic Rail
MEETING-PLACE | CONFERENCE | RAILWAY FAIR

European Railway Review is pleased to support the following Elmia Nordic Rail 2015 exhibitors. Please make note of their event stand numbers which we recommend visiting to see their latest products and solutions and speak with expert representatives.

- voestalpine Stand B04:98
- Siemens Stand B02:40
- icomera Stand B03:70
- LEONHARD WEISS CONSTRUCTION COMPANY Stand B04:101
- SCHIEDE&BACHMANN Stand B05:30
- PROVER Stand B03:70
- ABB Stand B06:40
- DC Stand B03:70
- GHH-BONATRANS GROUP Stand B04:58
- BOMBARDIER Stand B02:50
Infrastructure investments in the Nordic region are increasing – both in number and size. Over two years, the Förbifart Stockholm bypass alone will see more than 20 billion Swedish kronor being spent on contracts. Altogether the project encompasses some 50 contracts worth between 300 million and 3 billion kronor. This makes Förbifart Stockholm a historically large infrastructure project in Sweden, and one of the biggest in Europe at the present time.

However, Förbifart Stockholm is far from the only infrastructure project in the Nordic region. Norway is facing massive road investments, while its railway sector needs restructuring. Denmark has the Fehmarn Belt Fixed Link, and in Sweden construction of some stretches of the future high-speed line is under way. So clearly the Nordic countries are facing historically large infrastructure investments, and there is almost a trillion Swedish kronor in the national transport plans relating to investments in railways, roads, bridges, intermodal terminals, technology and maintenance.

Never before has a Nordic railway fair been so important as it is now. Every day we hear reports of how unfit for purpose the Swedish railways are, while more and more passengers are choosing public transport and the need for sustainable transport is rising.

"This is a delicate dilemma, and I’m not claiming that we’ll solve it during Elmia Future Transport, Elmia Nordic Rail and Elmia Nordic Road – but a quick look at the conference programme does suggest we will make some progress," says Jörgen.

Elmia Nordic Rail is organised parallel to Elmia Future Transport and Elmia Nordic Road, and are held every other year and welcome around 5,000 visitors from across Northern Europe. "These really are three intensive days where the visitor has a unique opportunity to see what’s on the market, meet and talk about solutions with suppliers, while also replenishing their knowledge at one of our seminars," says Jörgen.

Elmia Nordic Rail not only shows the latest products and innovations. The fair also hosts several conferences where experts, industry players and politicians discuss the most important issues in the field of infrastructure.

On each day there is a key seminar focusing on a topical issue. The seminar on 6 October is entitled Tramways in the Nordic Countries and looks at the opportunities in this segment in Norway, Sweden, Denmark and Finland. This is a highly topical subject for Sweden. "We lag behind the other Nordic nations, partly because the framework for financing is so unclear. For us it’s always about special negotiations for regions and municipalities, and every project is a unique result of lobbying, negotiations and discussions. There’s simply no direct route to take," says PG Andersson, Vice President at Trivector Traffic, a consulting firm in sustainable transportation.

Historically, Sweden has been a forerunner in tramways as a public transport network in the main cities, certainly in the early 20th century at least. However, increased road traffic, the changeover to driving on the right, old carriages and modernisation were obstacles that gradually put an end to tramways in many cities. Now only Norrköping and the Stockholm and Gothenburg regions have tramways.

However, the many benefits of tramways make them a new winner

Elmia Nordic Rail is organised in parallel to Elmia Future Transport and Elmia Nordic Road

SHOW PREVIEW

Elmia Nordic Rail – the most important railway fair in the Nordic region. It brings together decision-makers, experts and industry players to set the agenda for the infrastructure of the future. "Here you can meet ‘everyone’ in the railway industry in one place," says Jörgen Nyström, Business Manager for Elmia Nordic Rail.
for the future. Comfort, capacity and a smart use of city space are some of them, while others include reliable operation and opportunities for new combinations with other rail-bound modes of transport. Discussions are under way in at least seven Swedish cities to extend or build new tramway networks, and some of these discussions have been ongoing for several years.

The Tramways in the Nordic Countries seminar will discuss future strategies with a panel of representatives from Norway, Denmark and Finland, and Trivector Traffic of Sweden. Since Sweden’s Nordic neighbours have taken the lead in the region when it comes to tramways, PG Andersson says there is a lot to talk about, but also a lot to learn: “You might easily wonder why we in Sweden have been talking about trams for 10–15 years, while Denmark has four funded tram projects opening in the next 10 years. A lot of it is of course because financing and subsidies are regarded and dealt with differently in other countries.”

Another hot topic on the conference programme for the three transport fairs is the question of the European Commission’s Fourth Railway Package, which primarily contains proposals for the deregulation and opening of the European railway market.

“Our seminars demonstrate the breadth and innovative power in Nordic infrastructure,” says Jörgen. “On the Tuesday we will focus on tramways in the Nordic region, and the day after the industry will be

Scheidt & Bachmann: railway signalling – innovation for a mobile world

Safe and efficient global mobility is today one of the most important operational factors. To fulfil these demands in the European and Scandinavian markets, infrastructure owners and operators need competent partners. Scheidt & Bachmann is one of the most successful manufacturers of signalling systems, operations and signalling simulators and train management systems with a firm base in Scandinavia and more than 130 years of experience.

Based on network capable- and computer controlled systems, Scheidt & Bachmann provides complete and reliable control systems. The main products are:

- Electronic interlocking system ZSB 2000
- Electronic level crossing system BUES 2000
- Operations and signalling simulator BEST
- Train management system TRAVIS

Scheidt & Bachmann’s solutions are flexible and cost optimised technology platforms, realised on a standard hardware basis and networked to a centralised control- and supervision concept. For our interlocking and level crossing systems, Scheidt & Bachmann focuses on a complete scope of supply – from system control platforms to individual signalling field elements (such as signals, acoustic warning devices, axle counters, barrier drives and obstacle detectors). All are produced in-house and communicate via standard TCP/IP, RASTA or CAN-Bus interfaces, which also control and supervise communication between individual installations.

There are currently more than 100 ZSB 2000 and 4,000 BUES 2000 systems in operation in more than 15 countries, which shows the flexibility and competence of Scheidt & Bachmann signalling systems. Scheidt & Bachmann has a strong BUES 2000 base in Denmark and Norway and SIL2 depot interlocking systems installed throughout Denmark, Sweden and Finland. The ongoing simulator project in Sweden puts also BEST on the Scandinavian map. Based on this experience, Scheidt & Bachmann is a strong and reliable partner for the current signalling development in the Scandinavian countries.

Deutsche Bahn AG granted the award “Supplier of the year” twice to Scheidt & Bachmann (2006 and 2014).

Visit Scheidt & Bachmann at Elmia Nordic Rail 2015 on Stand B05:38 www.scheidt-bachmann.se
discussing the future of Nordic transport. We have never had as many seminars in English as we have this year. There is great international interest in our seminars. Logistics solutions and transport systems are also being given a more prominent place on the political agenda, which means there is a tremendous amount to discuss – especially between the Nordic and Baltic nations, where co-operations and experiences are laying a new foundation for business and development.”

There is also Elmia Nordic Rail Matchmaking, where this year the Swedish Transport Administration is specifically looking for suppliers and partners abroad. “The entire Nordic railway industry comes together at the fair, and our Matchmaking scheme is a great way of going into even more detail about possible business in the future,” says Jörgen.

Infrastructure investments in the Nordic region relate to new construction as well as maintenance. In Sweden the government recommends earmarking 620 million Swedish kronor in 2015 for railway

Icomera’s vision of The Connected Journey

Icomera is one of Sweden’s fastest growing technology companies. Positioned right in the middle of the global trends of connectivity and mobility, its technology has been delivering on-board Internet for public transport vehicles since 2001 – connecting millions of passengers to their work and social networks and on-board equipment back to base.

At Nordic Rail 2015, Icomera will showcase its vision of ‘The Connected Journey’ – a revolution in transport powered by a new generation of digital infrastructure. Supported by Icomera’s high-performance wireless Internet connectivity, and a range of services that run seamlessly through this connectivity, The Connected Journey has many benefits for transport operators and the wider public, ultimately improving the on-board experience and attracting new passengers.

Saeed Bashirian, Vice President of Sales, heads Icomera’s activities in EMEA countries: “The latest figures from Ericsson show global mobile data consumption has increased by 55% over the past 12 months. Internet is expected everywhere. We are experiencing this trend first-hand, having doubled data delivery to our customers in the same period.”

Icomera’s rapid growth is not just based on general data usage trends, but also security and operational efficiency. Bashirian adds: “We have CCTV apps that improve passenger safety; remote monitoring apps that reduce maintenance costs; eco-driving apps which save on fuel – an ecosystem of third-party apps and solutions that cover all aspects of The Connected Journey. All of these examples can operate on the same platform as part of a single solution allowing us to deliver a return on investment against a wide range of business cases with a system that’s open, easy to upgrade and future-proof.”

Icomera has produced a short film to illustrate The Connected Journey which is available to view on its website (see below).

Visit Icomera at Elmia Nordic Rail on Stand B03:70
www.icomera.com

Visitors and delegates can meet and do business with key industry suppliers at Elmia Nordic Rail 2015
maintenance. For the period 2016–2018 the figure is 1.24 billion kronor annually. An increasing need for transportation is making these investments necessary. The Fehmarn Belt Tunnel in Denmark and the Förbifart Stockholm bypass in Sweden are two gigantic projects designed to help meet these needs.

“It is therefore no exaggeration to say that there’s a lot happening in infrastructure in the Nordic region,” says Jörgen. “This is also something that we at Elmia Future Transport, Elmia Nordic Rail and Elmia Nordic Road are clearly noticing when we talk to exhibitors, visitors and the many speakers who feature in the conference programme. If you want to meet the right people, Elmia in Jönköping is the place to do it.”

Denmark alone has invested 150 billion Danish kroner in infrastructure and transport in recent years. The main project is the Fehmarn Belt Fixed Link, which will reduce distances between city regions in Sweden, Denmark and Germany.

“It is a project of strategic importance to all European countries,” says Michael Svane, Director of Transport at the Confederation of Danish Industry, and now also on the Programme Council for Elmia Nordic Rail, Elmia Nordic Road and Elmia Future Transport. “The Fehmarn Belt will secure the future for the central transport corridor between Scandinavia and Europe, partly by reducing time considerably for businesses and citizens alike. Elmia is a unique meeting-place for decision-makers. I look forward to bringing my Danish and European experience in transport and infrastructure policy to the table.”

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From the Alps to Scandinavia

ABB’s traction converter BORDLINE CC750 for Electrical Multiple Units

With more than 1,000 traction systems sold in the Nordic region over the last eight years, ABB Traction considers the region to be one of its key markets. In the segment of traction systems for Electrical Multiple Units, ABB can be considered as the local market leader. Furthermore, with recent orders for high-speed trains (SJ X2000) and light-rail vehicles (Århus), the company are also on the way to take on a leading position in these segments.

ABB Traction’s success in the Nordic countries is no coincidence. To be successful in any market, the first condition is to have the right product portfolio for that specific market. The Nordic market is one of the most demanding in terms of best performance under harsh weather conditions, ecological aspects, and comfort requirements. These requirements can be found in the highly diverse Swiss market where ABB Traction has a leading position in all rail segments. With the Alps as a test-ground to introduce innovative solutions and optimise systems, Switzerland can perfectly simulate harsh Nordic conditions. Crossing the Alps means to climb steep grades up to 2,250m-above sea level – arriving 45 minutes later in the lowlands of Tirano (Italy); in one ride, systems are tested under extreme and changing conditions – from alpine winter to a Mediterranean climate in less than one hour. This experience and know-how is the base for the development of compatible traction solutions for the Nordic countries.

The ABB group traditionally has a strong base in the Nordic countries with more than 17,000 employees in the region, enabling ABB to offer local service and support – reflecting the group’s long-term strategy and commitment to support their customers along the entire lifecycle of their fleet.

Thanks to their strong partners and advanced ABB technology designed and tested for the requirements of the Nordic region, ABB has assumed a key role in the Nordic traction market within only a few years.

Visit ABB at Elmia Nordic Rail 2015 on Stand B06:40
www.abb.com/railway

Elmia Nordic Rail 2015 will open its doors on 6 October 2015
Norwegian trade and industry is now also represented on the Elmia Nordic Rail Programme Council, in the shape of Are Kjensli, Director of NHO Logistics and Transport. Norway is facing some historically large infrastructure investments, including a major restructuring of the national railway organisation. “This is fully in line with our wishes for a reorganisation of the railway sector, and a move away from outdated old approaches that are not compatible with the future. We will also open the door to competition both in passenger transport and at the terminals, all in the best interests of customers,” says Are.

Moreover, the Norwegian government is planning an investment of 130 billion Norwegian kroner to upgrade parts of the road network. Are continues: “This is good, although not enough in the longer-term since the Norwegian Public Roads Administration is also responsible for other construction projects. Altogether, NHO is calling for an investment of 530 billion Norwegian kroner for roads and 250 billion for railways, a total of 780 billion kroner, for the next plan period.”

The southern corridor from Oslo to the Fehmarn Belt via Gothenburg, Malmö and Copenhagen is crucial to communications between the Nordic countries. Are says: “At present it takes 6 hours and 30 minutes to drive a freight train from Oslo to Gothenburg, but just 3 hours and 30 minutes to drive a truck. There is

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voestalpine rails and turnout systems at Elmia Nordic Rail

High-tech rail producer voestalpine Schienen is again opening a window to the future of customer benefit. Under the theme ‘good is good, but better carries it’, the company will showcase at Elmia Nordic Rail the latest fruits of its target-oriented track solution approach:

1. The presently best available rail for loaded mixed traffic tracks: the heat treated hypereutectoid steel grade 400 UHC® HSH® combines an extraordinary hardness with a resistance toward rolling contact fatigue and corrugation not known from any other commercially produced premium rail. Thus, as claimed by voestalpine, operational availability can be doubled on mixed traffic tracks and maintenance cost is halved – even in comparison with basic heat treated rail steels.

2. The new grooved rail HSH® GM-CL – a heat treated rail steel grade with reduced carbon content. Its unique chemical composition in combination with an adjusted heat treatment process makes deposit welding in track as simple as for standard grades, while the hardness corresponds with that of conventional premium grooved rails.

3. Innovations in welding technology: an area which voestalpine Schienen will work on in future even more intensively than already up to now, aiming to generate maximum customer benefit in the rail system.

The voestalpine VAE group, the global market leader for turnout system solutions, offers products and services for all kinds of applications and transportation segments. The combination of turnouts, signalling solutions and services around the whole product lifecycle maximise track availability and make rail infrastructure providers more successful and competitive in the operation of their networks. More than 40 locations as part of our global networks maximise customer proximity, guarantee knowledge of local demand and enable us to provide best practice solutions.

Visit voestalpine at Elmia Nordic Rail 2015 on Stand B04:98
www.voestalpine.com
great potential for rail transport on this route, because 2,500 trucks cross the Svinseund sound between Norway and Sweden every day.”

So what does increased investment in infrastructure mean to Nordic trade and industry? Are continues: “It’s of the utmost importance to the competitiveness of Nordic industry, and of our three countries as trading nations. As aforementioned, the most important transport corridors must be linked together within the EU and Europe. Examples are the Gothenburg–Oslo route and the Fehmarn Belt Fixed Link.”

Elmia Nordic Road and Elminia Future Transport are held alongside the Elmicia Nordic Rail fair. Elmica Nordic Road replaces and builds on the old Vägmärkesdagen road event, which was organised by the Swedish Transport Administration. Elmica Nordic Road encompasses services and products in areas such as road infrastructure, social and urban planning, safety, road tolls and charging systems, road technology, research and development, as well as operation, maintenance and servicing. The fair focuses on business and knowledge for companies involved in maintaining old and building new roads.

“There has never been a fair in the Nordic region focusing exclusively on new construction and maintenance of the road network – until now. So altogether, our three fairs cover the most important aspects of Nordic infrastructure,” Jörgen explains.

Elminia Future Transport is the overriding fair during the three days, and an important forum for discussing challenges and opportunities for the entire transport and logistics chain. The focus is not only on railways, but also road, air and water transport.

Elminia Future Transport is the natural meeting-place for anyone interested in future transport solutions and their infrastructure.

Jörgen concludes: “Elmica is where you can meet the industry, make valuable contacts and lay the foundation for new business. The fairs are of crucial importance to future infrastructure.”

Elmica Nordic Rail in 2013: Figures

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ZTR Control Systems is breaking new ground in the European market by advancing the locomotive modernisation of Europe’s fleets with its Intelligent Starting Technology™. This technology improves locomotive performance through easier, more reliable starts and increased fuel savings. One of these products is SmartStart®, the most trusted AESS in the industry and the bestselling ZTR product in Europe (pictured). It has a ROI of less than 12 months and can save $25,000 of fuel per year, per locomotive. Intelligent Starting Technology™ enhances reliability, saves money and reduces emissions. For companies looking to comply with the emission reduction targets set by the European Parliament, investment in ZTR Intelligent Starting Technology™ is the smart business solution.

ZTR also offers flexible options for locomotive modernisation, from improvements in locomotive reliability and tractive effort, to full control systems like the NEXSYS™ III-i that provides the greatest performance value for an investment in modernisation. Additionally, ZTR offers added services in diagnostic reporting, communication, information management, and technical support to provide locomotive modernisation that is effortless from end-to-end. With thousands of installations worldwide and advanced support services, ZTR innovative solutions improve the efficiency and performance of customers’ equipment. Locomotive modernisation with ZTR gives ageing locomotive fleets another 20 years and ushers them into a new era of modern performance.

ZTR will be attending Elminia Nordic Rail on 7-8 October 2015 to showcase its solutions for the European rail industry. If you are interested in learning more, please contact Natalie Smith at nsmith@ztr.com or visit www.ztr.com.

European Railway Review is pleased to be Media Partner for Elminia Nordic Rail 2015.

Date: 6-8 October 2015
Location: Jönköping, Sweden
Website: www.elminia.se/nordicrail
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Rolling Stock Developments

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KONI develops, manufactures and sells worldwide specialty high quality hydraulic shock absorbers and systems for street and racing cars, busses, trucks, trailers, railway rolling stock, defense and industrial applications.

In railway technology the demands for even higher standards for safety, durability, performance and passenger-comfort are universal. That is why we strive to be the leading solution provider for the global rail industry. Operating on all continents, KONI dampers are supplied to the world markets through a vast number of local distributors. Providing added value to you means that we are connected to your markets and therefore your needs. We deliver anywhere, anytime, worldwide.
The Wheel/Rail-Interface Study

Rail operators and infrastructure owners are aware that maintenance of wheels and rails are big cost drivers. For European Railway Review, Jani Dede, Uwe Reimann and Marc Reimann from Bombardier Transportation GmbH, explain a process that has been investigated which studies the wheel/rail-interface in detail to develop an optimised wheel/rail-combination that can be adapted to a railway network. The examination is called the ‘Wheel/Rail-Interface Study’ (WRIS).

For as long as the railway has existed, engineers have been involved in creating wheel and rail profiles and researched their combinations. Over time, most of the rail profiles have become standardised\textsuperscript{1,2}, whereas the wheel profiles have become less so\textsuperscript{3}. The shape of a wheel profile is normally defined by either the operator, the vehicle manufacturer, institutions like universities, external contractors, or by history. Once a wheel/rail-combination is established on a network, it will often remain untouched.

When problems occur, such as increased wear on wheels and rails or noise emissions that disturb residents, the first step is often to eliminate the symptoms rather than to treat the source of the problem. The typical response is to remove these symptoms by installing stationary and/or mobile friction modification systems instead of establishing the root cause of the problem by analysing the wheel/rail-interface.

Operators often have worries that a change to the wheel/rail-combination on their network will cause a chain of changes in the whole system that they cannot foresee. If the operator does not have the knowledge in this field, often the message is simple: ‘never change a running system’.

These concerns can’t be denied. Changing the wheel/rail-combination can have a huge impact on the running behaviour and the stability of the vehicle, can change the wear of wheels and rails, can cause noise emissions, can change overhaul intervals, can increase costs and even jeopardise the homologation when the calculation of safety against derailment changes. In summary, a change to the wheel/rail-combination can cause the complete system to deteriorate; however, with the appropriate changes it is also possible to improve it considerably.

There is large potential for improvement to current networks and the operators have started to open up their minds to this topic, not least because they know that maintenance of wheels and rails are big cost drivers.

Against this background, the dynamics department of Bombardier Transportation GmbH (BT) in Siegen (Germany) has created a process that studies the wheel/rail-interface in detail to develop an optimised wheel/rail-combination adapted to the customer’s network. This examination is called the ‘Wheel/Rail-Interface Study’ (WRIS). Additional figures related to the WRIS can be found in reference point 4 of this article.

Steps of the WRIS

**Background**

Wear emerges from relative speeds between two surfaces, called...
slippage. When the slippage within the wheel/rail-contact is small, the material removal on the wheel and the rail is also small. Wear will be minimised if the wheels of a railway vehicle can roll without resistance on the rails.

When driving through a curve there is the known conflict of different running distances of the inner and outer wheel. For independent (single) wheels this is not a problem as they can roll free without longitudinal slippage. However, wheelsets have the axle as the coupling element between the left and right wheel.

To make a free rolling wheelset possible without any longitudinal slippage, both wheels need to run with different rolling radii in a curve. The outer wheel rolling radius has to be bigger than the inner one. This difference is called the rolling radii difference \( \Delta r \).

While the vehicle is in motion, the leading wheelset is normally pushed to the outside of the curve due to the acting centrifugal force. The wheel flange of the outer wheel therefore comes closer to the rail, whereas the inner wheel flange diverges from the rail. This movement can be used to develop a wheel profile that can provide the required rolling radii difference for a resistance-free rolling of the wheelset.

As track networks naturally include many different curve radii, what is the maximum rolling radii difference that should be chosen? This value is only optimal for one specific curve radius – meaning excessive \( \Delta r \) for wider curves and insufficient \( \Delta r \) for narrower curves – therefore it is necessary to determine the maximum rolling radii difference that is best with regard to wear for the whole network. In order to achieve this, the curve radii distribution on the customer's track network has to be analysed.

Analysis of the customer's track network

To create a curve radii distribution, the customer has to provide details of their network. The minimum requirements are the curve radii, along with their lengths, and the lengths of the straight track sections. Additionally, information about the transition curves and their lengths should be provided.

Development expertise and strong partner network

Whether metro or passenger trains, rail transport in Scandinavia is growing steadily. ContiTech Railway Engineering also has its sights on the expanding needs of this growth market. With its long-standing competence in materials and development, the company presents sustainable product solutions of the future under the ‘Engineering Next Level’ banner.

In Hanover, Germany, the company operates the world’s only accredited testing lab for air spring systems for rail vehicles (pictured), thus underscoring its quality standards. Twelve important rail industry testing procedures have DIN EN ISO/IEC 17025 certification. With ISO 9001, TS 16949 and IRIS certification, the testing lab has been meeting the most exacting requirements for years.

ContiTech Air Spring Systems is not just a partner to the leading original equipment manufacturers, but also offers air spring systems for the after-sales market. In this regard, the company stands out for its excellent quality and high level of safety, as it produces exclusively in accordance with the specifications of the OEMs. So, the customer gets only original quality, on which it can rely.

With a global partner network, ContiTech also ensures fast service and an optimum train availability rate for its customers. The company benefits from global networking in 37 countries worldwide.

“Through our international partners, we can guarantee our customers high quality and availability, as well as the ability to make long-term plans and rapid implementation,” reports Andreas Hall, Sales Manager at ContiTech Railway Engineering. “They enable ContiTech to take action quickly all around the world.”

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differences. Figure 1 (page 42) is an example of the result of this analysis. The graph shows how the wear varies with the rolling radii difference. In this example, the optimum profile has a maximum rolling radius difference of about 6mm.

Development of a wheel profile

After calculating the optimal rolling radii difference for the customer’s track network with respect to wear, it is possible to develop the wheel profile to achieve a wheel/rail-profile combination that guarantees the optimal rolling radii difference. This process is always to develop a wheel profile for a given rail profile.

The rail profiles of the customer’s track network have to be analysed. In all relevant curve radii classes, rail profiles are measured and thus the wear state is determined. Afterwards, in cooperation with the customer, a rail profile has to be chosen for which the wheel profile should be developed. Depending on the condition of the rails it has to be decided if the wheel profile should be generated with respect to a new rail, a defined worn rail or intermediate condition. If vehicles are restricted to only run on certain lines, it is also possible to generate different optimal wheel profiles for different lines.

During the wheel profile development, different criteria are taken into account. The basic requirement is a single-point-contact between rail and wheel over the whole lateral displacement of the wheel. In all conditions, a two-point-contact has to be avoided. This will prevent the high wear caused by slippage of the flange. The contact-point-distribution has to be homogeneously spread over the complete tread to avoid hollow wear.

The specific pressure in the contact point should be consistent across the wheel profile. It should not be too high and should not have any high peaks to avoid rolling contact fatigue (RCF) which leads to cracks and resulting in the chipping-off of material of the wheels and rails.

The contact-patch, especially in the area of the root flange, must not be too big. A large contact patch in this area results in high spin creepage, causing high wear.

The conicity of the wheel/rail-profile combinations has to be checked in relation to the running stability of the vehicle. The conicity of

Figure 2: Heavily worn rail
a new wheel/rail-profile combination should be in the range of the existing one.

With the above assessment criteria and by means of a tool developed by BT, a set of wheel profiles will be generated for a given rail profile. These wheel profiles satisfy each the aforementioned requirements to differing extents.

The number of generated wheel profiles generated by the process can be extended. This results in a variety of different wheel profiles, each having different characteristics regarding rolling radii difference, conicity, specific pressure and contact-point-distribution.

Now, from all generated wheel profiles, the best wheel profile can be chosen based upon the previously mentioned requirements. With this chosen wheel profile, the new wheel/rail-profile combination can be analysed with respect to the actual wear behaviour.

Validation of the wear model

Being able to analyse the wear distribution of a new wheel/rail-combination on a specific track network requires validation of the wear model itself with the current wheel/rail-interface.

The wear model is a multi-body simulation model (MBS-model) of a vehicle in combination with a simulated track and a defined wheel profile. The simulated track is created based upon the curve distribution determined in the track network analysis. The rail profile may vary depending on the curve radii in the simulated track. This allows the measured rail profiles to be integrated into the simulation.

These MBS-models are then used to perform wear calculations in which the contour of wheel and/or rail is updated following each integration step according to the contact situation. The profiles wear during simulation, which leads to different profile contours at different mileages. These contours are then compared to those of real measurements that were recorded with the same mileage. The validation not only analyses the wear itself through measurable parameters like flange thickness or loss of radius, but also looks at the developing profile shape.

The input parameters of the simulation, for example wheel/rail friction, traction force or loading condition, are changed until the simulated wear matches the measured wear at all mileages. In addition, these input parameters can be changed along the length of the simulated track. This allows for the simulation of varying running conditions, such as wet and dry rails. Braking and traction processes can be varied as well.

As soon as the wear model is validated, all parameters relevant for innovation is key

KONI invests heavily in innovation. It is one of our core qualities required to continue to produce highly qualified shock absorbers – particularly in the railway market. KONI believes innovation is the ultimate way to keep improving the world through technology and to continue being a market leader when it comes to railway solutions. The families ‘05’ and ‘06’ dampers are an example of KONI’s innovative capacity, as well as the Frequency Selective Damping (FSD) technique which can be fitted on these dampers.

Market trends
The 05/06 dampers provide an answer to a clear market trend. Due to the higher base speed of trains, yaw dampers are required to give an improved performance at short stroke. This improved performance can be achieved through a higher stiffness of the dampers. In addition, we are always looking for weight savings and methods to reduce the wear on train wheels and tracks.

Solution
The design of 05/06 dampers features several improvements compared to traditional dampers. Due to the increased working area in the cylinder tube the dampers have an enhanced damper stiffness. This makes them perfectly suitable for yaw damper applications. A significant weight reduction has been realised by reducing the internal working pressures, allowing smaller piston diameter and thinner cylinder walls.

The 05/06 dampers can be very easily fitted with FSD technology. FSD automatically adjusts the damping force to the frequency of the movement. In practice, this contributes to less wear on rails and wheels.

Innovation process
Innovation is developed according to a value-based product development process, leading to an approved and efficiently produced product by following a structured methodology of a new idea.

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Figure 3: Worn and new wheel

Figure 4: Initial and optimised wheel profile

Figure 5: Comparison – rolling radii difference

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the wear development are fixed. These inputs are used for the wear simulations with the new wheel/rail-combination.

Wear prediction
After validating the wear model it is possible to give an accurate prediction of the estimated wear on wheels and rails and the estimated mileage of the wheels with the new wheel/rail-interface. This process is not only applicable to existing vehicles, but can also be used for new vehicles during the design-development and bid phase where the input is available.

Further analyses can be performed with the validated model. For example, it is possible to define the correct mileage for reprofiling based on different geometrical parameters, such as the flange height and thickness. Additionally, the benefits of flange lubrication and/or tread friction modifiers on a time- and/or position-based approach can be investigated.

The aim of this investigation is always to find the right measures for maximising the mileage, increasing the maintenance intervals and therefore reducing the overall costs.

The WRIS in service
During the examination of the vehicles and the track network of a BT customer, high wear was found on the wheels as well as on the rails. After a relatively short time, the rails were heavily worn at the flange face. Figure 2 on page 43 shows evidence of the high grinding of the rails.

In Figure 3 on page 44, a worn rail profile with high flange face wear is compared to a new rail profile. The evaluation of the wheel measurements showed a flange wear rate between 0.3mm and 0.5mm per 1,000km. The analysis of the wheel/rail-combination has determined that two-point contact is the main cause of the high flange and rail wear.
The customer had to replace the rails with new ones on this curvy track section. This allowed BT to propose a new rail profile with another inclination and a slightly larger track gauge. After the evaluation of the track network data, an optimal rolling radii difference of 7mm was calculated. From the automatically generated wheel profiles, the profile shown in Figure 4 on page 44 was chosen.

The rate of increase of the rolling radii difference over the lateral displacement for the selected wheel/rail-combination is relatively high; hence the conicity is higher than with the old wheel profile. The conicity has, in this case, only a minor relevance because the vehicle is only running up to 70km/h and exhibits good damping behaviour; therefore there is a very low risk of stability problems. The old wheel/rail-combination develops nearly no rolling radii difference and therefore no conicity.

The optimised wheel/rail-combination can develop a rolling radii difference greater than 7mm (Figure 5 on page 44). However, this area will not be reached because the contact angle there is so high that no stable state can be achieved. The wheelset will only develop higher rolling radii differences for a short time and then leave this unstable state can be achieved. The wheelset will only develop higher rolling radii differences for a short time and then leave this unstable state and return to the old wheel/rail-combination.

The wheel/rail-combination gives a low specific pressure up to the designed rolling radius difference of 7mm; therefore the occurrence of RCF is relatively improbable.

The contact point distribution (Figure 6 on page 45) of the old combination shows that over the complete lateral displacement of the wheelset the contact point stays constantly on the top of the rail until sufficient lateral movement results in a two-point contact at the tread and flange. For the optimised wheel/rail-combination, the contact patch is uniformly distributed across the wheel and rail profiles without any two-point contact. This is achieved across the complete lateral displacement leading to a smooth wear distribution over the whole tread.

After validating the wear model, it could be shown in simulations that the optimised wheel/rail-pair in combination with flange lubrication can increase the mileage significantly.

After the implementation of the proposed actions, the rail profiles at different locations and the wheel profiles at different mileage were measured to determine the profile progression. With this information, some measurable geometrical data, like the wheel flange thickness, were evaluated. The wear of the rail at the gauge face could be reduced from 3mm per year to 0.2mm per year. The flange wear at the wheels could be reduced from 0.3mm-0.5mm per 1,000km to 0.02mm-0.04mm per 1,000km. This reduces wear at about a factor of 15.

Conclusion
The presented WRIS shows that the development of a useful wheel/rail-combination is very complex. It is necessary to regard many different parameters, dependences and influences. With help of the appropriate know-how in this topic, however, it is possible to find economically beneficial solutions for operators.

References
In an interview for European Railway Review, expansion, innovation and keeping customers satisfied are elements that Dr. Raimund Abele, CEO of GHH-BONATRANS Group, explains to be essential for the manufacturer and supplier of wheelsets in their vision to competently serve the railway industry now and in the future.

What core products/services can GHH-BONATRANS Group offer the European railway market, and where are your manufacturing facilities located?
We are the premium manufacturer and supplier of railway wheelsets and parts thereof (wheels, axles, tyres, centres, etc.) for high-speed trains, EMU/DMUs, trams, metro cars, locomotives and freight wagons. We deliver them assembled or loose to OEM, railway and network operators, maintenance shops and leasing companies in every single European country and for railway markets worldwide. We also assist our customers in traffic data collection and analysis and help them to increase service lifetime and decrease life cycle costs, plus we refurbish complete running gears and generate customer value through professional maintenance services.

Our biggest plant, and the only source of black wheels and axles, is located in Bohumin, Czech Republic. Our oldest plant is located in Oberhausen in the Ruhr-Region, and our newest facility is in Aurangabad, India.

What has been GHH-BONATRANS biggest success to date?
From January 2014, the Group has played a new role in the railway industry. In less than 18 months, we completed the integration process of GHH and BONATRANS. The homologation and the supply of the wheelsets for the Aeroexpress for Moscow in record time and the complexity management of this give a strong example of our new-found internal strength. Group success in light-rail projects in Turkey and China, our leading position in new European high-speed and multiple units projects (such as ICx), and our professional and fast start-up in India are what makes us proud and gives us the confidence to follow our visions.

Is GHH-BONATRANS Group looking to secure business in countries or regions that it has yet to work in?
By 2020 we plan to double revenues in non-European markets. We currently deliver to over 80 countries on five continents but there is room for further growth in North America, India, China, Australia, Turkey and the Middle East. Our main market remains Europe and we intend to keep increasing our market share and strengthen market presence. In Germany our efforts will be in the service business, but also Scandinavia and Southern Europe can expect a dedicated customer concept.

Why did you choose to localise in India?
The need for mobility in India is enormous; in the last 10 years the number of cities above three million inhabitants doubled. Mass transportation is a must for sustainable development and survival of these ‘super-cities’. The Indian government’s decision to hugely invest in rolling stock and infrastructure is of course welcome, and we want to support and benefit from this market challenge by making millions of Indians move much safer, more comfortably, and faster on our wheels.

In such a big market of its own, we can only be successful with local presence of production and service. In fact, we will have the first wheels leaving our new factory by the end of 2015.

What sets GHH-BONATRANS Group apart from its competitors?
Innovation remains the key factor for long-term success in our industry. The capacities of the Group in research, design and product development and testing/qualification are leading in our industry in volume, size and quality. We have more than 1,000 wheel-types and several hundreds of axle-types in our portfolio – all developed in-house in close cooperation with our customers. We launch approximately 100 new products annually. With superior quality, proven product reliability and on-time delivery, our existing customers are satisfied and we are set on conquering new territories. Our special mix of high-end engineering with low and lean cost approaches makes the Group the most competitive supplier in the industry.

Have you any such recent innovations to mention?
In the field of material-based research and development, our latest upgraded material for wheels ‘BONASTAR’ will benefit our customers with approximately 30% longer life in mileage terms compared to wheels made of standard EN grades. In the area of heat treatment, we advanced induction hardening to offer axles with resistance against crack propagation, significantly increasing its service intervals.

How will GHH-BONATRANS Group’s values help to secure future business?
‘Safe, Reliable, Comfortable, Economical’ are our long-term approaches to wheelsets and parts thereof, and equally suits the expectations of all our customers. We have the capabilities and passion to generate constant customer satisfaction. GHH-BONATRANS is entirely committed to increasing our competences and to serve our customers’ needs now and in the future.
The Frecciarossa 1000 is the new high-speed train from Gruppo FS Italiane subsidiary Trenitalia which began operating on 14 June 2015. The new ETR1000 fleet comprises 50 trains which were ordered in 2010 further to an international tender won by the Temporary Business Group consisting of AnsaldoBreda and Bombardier, with cooperation from Bertone with regard to design. Marco Caposciutti from Trenitalia’s Technical Department outlines the train’s technical details and overall features.

These ETR1000 trains began travelling throughout Italy under the brand Frecciarossa – a name that has represented excellent and top quality high-speed services from Gruppo FS Italiane. These new trains are capable of travelling on eight extraterritorial networks (France, Belgium, Germany, Spain, Austria, Switzerland, Holland and Belgium) and thereby ensure that Trenitalia can access and also compete on the European high-speed market as soon as European regulations allow this.

**Main technical features**

This is a bi-directional train with block composition comprising eight vehicles with an overall length of 202m. It has a distributed traction system with 16 engines, two per vehicle. It can reach a top commercial speed of 360km/h on 25 kVca lines and 300km/h on 3kVcc lines.

From an architectural viewpoint, this train is symmetrical and divided into two independent semi-trains.

Continuous traction power is 9.8 MW under a 50 Hz 25 kVca chain conveyor; four independent converters supply 16 three-phase asynchronous traction engines. Electric and mechanical systems for power under 15kVca 16.7 Hz and 1.5kVdc chain conveyor are entailed.

The ETR1000 train has two bogies per vehicle (Jacobs bogies are not used here, as is the case in other high-speed trains), which have been designed and built for a speed of 360km/h.

This train has special devices to improve passenger comfort such as, for example, pneumatic secondary suspension with air springs and active lateral suspension to ensure excellent stability, thereby permitting the case to be centred with respect to bogies on approaching curves.
Pantographs are built-in and have a low aerodynamic profile when resting to reduce noise and aerodynamic resistance.

The control car is for one driver only and the control panel is located in the centre. Special ergonomic studies were carried out to ensure the best possible comfort for the train driver.

The ETR1000 control cab structure and shape were also designed and tested in a wind tunnel to thereby find the solutions offering the lowest possible aerodynamic resistance.

Interoperability
The ETR1000 is a fully-interoperable train and complies with TSI (Technical Standards for Interoperability) establishing the requirements with which a train must comply to operate on other networks. More specifically, mechanical, electrical and signalling parts must be built or prepared to operate on eight extraterritorial railway networks; control cabs and technical areas (for example electric panels) have been designed and built in a modular manner to thereby ensure that additional equipment can be added to comply with technological systems in other countries under ‘plug and play’ logic. This train also complies with TSI regarding Passengers with Reduced Mobility (PRM): car number three has two PRM seats and a mobile platform to allow passengers in wheelchairs to board without the need for any further equipment, such as hoists. Car three has an accessible toilet for wheelchair users, plus its layout ensures that people with reduced mobility can easily reach the bistro car.

Train diagnostics
The ETR1000 train guarantees high standards in terms of reliability, availability and maintenance (RAM). In order to fulfil these objectives, an on-board/off-board diagnostics system continuously monitors sub-systems and equipment.
When any problems arise, the system sends relative information to various recipients depending on the problem: on-board staff (drivers and crew) for rapid intervention, Trenitalia maintenance and vendor staff to plan maintenance as soon as possible and the Ops Room to manage train speed and any limits. Furthermore, predictive diagnostics ensure that trains comply with CBM (Condition Based Maintenance) policy: the objective is to replace mechanical parts or carry out regular interventions immediately prior to a fault.

Interior layout

Every detail entailed in the Frecciarossa 1000 has been designed to ensure the best possible comfort and quality: all spaces are adequately usable; wide corridors; ergonomic seats; sound-proofing; LED lighting; air conditioning; access for people with reduced mobility; on-board monitors; electricity sockets for PCs; plus Wi-Fi connection.

Table 1: Main technical features of the Frecciarossa 1000

<table>
<thead>
<tr>
<th>Composition</th>
<th>Block and bi-directional comprising eight vehicles</th>
</tr>
</thead>
<tbody>
<tr>
<td>Length</td>
<td>202m (in compliance with TSI)</td>
</tr>
<tr>
<td>Traction system</td>
<td>Distributed power with 16 traction engines (2 per vehicle)</td>
</tr>
<tr>
<td>Top speed</td>
<td>25kVca lines 3kVcc lines</td>
</tr>
<tr>
<td></td>
<td>360km/h</td>
</tr>
<tr>
<td>Seats divided into four service levels</td>
<td>455 + 2 PRM</td>
</tr>
<tr>
<td>Executive</td>
<td>10</td>
</tr>
<tr>
<td>Business</td>
<td>69 + 2 PRM</td>
</tr>
<tr>
<td>Premium</td>
<td>76</td>
</tr>
<tr>
<td>Standard</td>
<td>300</td>
</tr>
<tr>
<td>Possibility of coupling with multiple command</td>
<td>Two trains</td>
</tr>
<tr>
<td>Interoperability</td>
<td>Eight possible options for extraterritorial networks and in compliance with TSI</td>
</tr>
</tbody>
</table>

The Frecciarossa 1000 offers passengers 455 seats plus two for passengers with reduced mobility located in eight carriages – elegant and refined environments designed by Bertone and a choice of four different service levels (Executive, Business, Premium and Standard), a meeting room in Executive class and the chance to opt for face-to-face coaches in Business, Premium and Standard levels.

Safety

The Frecciarossa 1000 also ensures the highest possible safety standards, as it comprises the most evolved speed control technological system available – ERTMS/ETCS – to avoid the possibility of human error, which monitor journeys second-by-second and automatically come into operation when needed. On-board signalling equipment integrates various national systems with those unified at the European level, thereby ensuring the best possible safety in every country. The materials adopted, distribution and conformation of interior spaces and excellent accessibility through 32 doors also ensure the best possible safety.
Respect for the environment

The Frecciarossa 1000 is the first high-speed train in the world to have received Environmental Product Declaration (EPD), as it is able to limit CO₂ emissions per passenger to 28 grams. This result derives from its extremely low aerodynamic resistance, excellent mass/power ratio and consequent energy savings. This train also ensures top-level performances in terms of noise and vibration reduction and the materials selected are 85% recyclable and 95% renewable.

Commercial services

ETR1000 trains have received AMIS (‘Autorizzazione Messa In Servizio’ – authorisation to operate) at a top commercial speed of 300km/h on the 25kVca HS/HC network and 250km/h on the 3kVcc network.

As these trains provide services similar to those offered by ETR500 trains, as of 14 June 2015 a number of ETR1000s operate eight connections on the Naples–Rome–Milan–Turin line that were previously made by ETR500 trains and at the same times. These new trains travel as far as Turin and stop at the Rho Fiera Station in Milan dedicated to Expo 2015, thereby offering numerous domestic and international passengers going to the Expo the chance to travel on the new Trenitalia train.

Once delivery of the new ETR1000 trains has been completed (50 trains in all), shifts and therefore schedules carried out by these will be increased. This increase will occur every 3-4 months on average.

Tests will be carried out over the next few months to verify the possibility of travelling at 300km/h using two coupled trains to thereby obtain compositions that can be separated at an intermediate station for services to two different final destinations and also ensure high-capacity connections: two coupled trains can offer around 900 seats on a train measuring 400m in overall length.

These ETR1000 trains improve the Long Haul Passenger Division fleet and thereby create the conditions for a general increase in the quality of rolling stock and overall service level. In fact, once all the ETR1000 trains have been delivered, they will cover Frecciarossa services along the Salerno–Naples–Rome–Florence–Bologna–Milan–Turin line currently provided by ETR500 trains; the latter will be used for Frecciargento services while ETR480 trains will be used for Frecciabianca services and the trains currently operating under this brand will be used for the Universal Service.

This scaled-use of rolling stock linked to the ETR1000 trains becoming operational will benefit all passenger services. The entire industrial system will have the task of maintaining the high quality to which our customers have become accustomed over time, thereby illustrating that we have the flexibility required to fulfil demand from the market.

Tests at speeds exceeding 300km/h

Alongside the initial trains operating a commercial service as of 14 June, tests were started on Frecciarossa 1000 trains at speeds exceeding 300km/h. These tests aim to certify the train’s performance at 360km/h and are carried out using two trains expressly dedicated to this activity comprising the appropriate measuring equipment. Operational tests will entail these trains running at a top speed of 350km/h (therefore with dynamic tests at a speed of up to 385km/h). Certification for a speed of 360km/h will be provided by Gruppo FS Italiane’s certification subsidiary Italcertifer as VIS (‘Verificatore Indipendente di Sicurezza’ – Independent Safety Verifier).

Marco Caposciutti has been the Technical Director of Trenitalia (FS Italiane Group) since 2012. Headquartered in Florence, Marco oversees Maintenance (with direct control of nine plants) Engineering, Safety Management, and Project Management for purchasing new rolling stock. He coordinates 3,800 employees and he directly reports to Trenitalia’s CEO. Prior to this position, Marco held executive positions in Trenitalia with responsibility for Frecciarossa train services and being responsible for maintenance in the Freight Division. Marco started his career at Trenitalia in 1993 as an Engineer in the Technical Department; before this, he gained experience in an iron and steel factory as an engineer dedicated to maintenance. Marco is also Chairman of the Organising Committee of the WCRR (World Congress of Railway Research) which will be held in Milan in 2016. Marco holds a B.S. degree in Electric Engineering from Pisa University, Italy (1990).

Table 2: Vehicle type and main equipment

<table>
<thead>
<tr>
<th>Vehicle type</th>
<th>Main equipment</th>
</tr>
</thead>
<tbody>
<tr>
<td>DM</td>
<td>Control cars, traction converters, brake rheostat</td>
</tr>
<tr>
<td>TT</td>
<td>Transformer, 3kVdc pantograph</td>
</tr>
<tr>
<td>M</td>
<td>Converter, brake rheostat</td>
</tr>
<tr>
<td>T</td>
<td>25kVca pantograph, batteries</td>
</tr>
</tbody>
</table>

The interior of Business Class on-board the Frecciarossa 1000

Credit: Creatività e Broadcasting – FS Italiane
Schenck Process's track-based systems reliably measure the safety-relevant load status of trains and reliably detect force impacts, which might be triggered by defective wheels. Precise measurement and calibrated weighing? We provide the basis for calculations in relation to internal check weighing and legal-for-trade weighing for individual wagons and train sets. Quiet, comfortable and low-wear rolling stock is the result of intensive development work. Schenck Process supports vehicle manufacturers and maintenance workshops with reliable measurements in the context of bogie testing and corner load measurement. [www.schenckprocess.com](http://www.schenckprocess.com)

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**6th MULTIRAIL® Open Days**  
October 27-28, 2015 in Darmstadt, Germany
NGT LINK: A double-deck train concept for rapid inter-regional transportation

With the aim of making tomorrow’s trains faster, more comfortable and more efficient, the Next Generation Train (NGT) research project has now entered its third phase. This family of cutting-edge train concepts has been under ongoing development since 2007, with the ultra-high-speed NGT HST (formerly NGT HGV) leading the way since the project’s inception. With the beginning of the second phase of the NGT project in 2011, a new concept joined the family: NGT LINK. Since the last overview of the NGT project was featured in European Railway Review in 2012, development on the NGT LINK has progressed in detail. Here, the German Aerospace Center’s Joachim Winter, Project Manager and David Krüger, Research Associate, give an overview on aspects ranging from propulsion and power supply to aerodynamics and passenger flow.

NGT LINK (above rendering pictured) is a high-speed feeder train which is designed to complement the service offered by NGT HST. While the ultra-high-speed NGT HST stops at major cities and covers international long-distance routes at a top speed of 400km/h, NGT LINK serves the surrounding medium-sized cities at 230km/h and feeds travellers to the NGT HST service.

Like NGT HST, NGT LINK is a double-decker train which combines many of the technologies that future railways will need in order to keep pace with society’s evolving needs. However, whereas NGT HST is designed from a blank sheet with new, purpose-built infrastructure in mind, NGT LINK is designed to make use of the technology developed for NGT HST while maintaining compatibility with existing infrastructure. For instance, this means that where NGT HST maximises space and minimises dwell times by having passengers board and disembark on both levels simultaneously, NGT LINK is equipped with stairs, allowing it to stop at conventional stations lacking the Next Generation Station’s bi-level platforms.

Among the marquee technologies fitted to NGT LINK are its...
lightweight car bodies and its flexible hybrid power supply system. Supporting these technologies is a raft of subtle details that together comprise a complete package for fast, efficient and comfortable intercity and inter-regional transportation. According to simulations, NGT LINK has achieved the goal of using only half the per-capita energy of its reference train, the German ICE TD. The lightweight car bodies and the hybrid powertrain are helped here by an efficient seating plan and the cars’ double-deck design.

NGT LINK’s car bodies are designed to marry lightweight design with ease of assembly and manufacturing. Especially for trains with shorter distances between stops, mass reduction is one means of significantly reducing energy consumption, so the concept employs a dedicated lightweight design strategy for all structural components of the body shell. For the body, a method developed at the DLR’s department of Lightweight and Hybrid Design Methods was applied to ensure the lightest possible design. After determination of the basic dimensions of the car body, such as length, width, wheelbase and door placement, the geometry is put through a topology optimisation, which produces a numerically optimised, load-path oriented structure based on the relevant loads such as weight, payload and maximum static loads according to EN 12663. The mechanical design of the NGT LINK aluminum space frame, the shape of which is derived from the preceding optimisation, ensures that the parts count is kept as low as possible while still adhering to the results of the optimisation. The car body consists of an aluminium frame built out of CNC-bent round tubes and CNC-laser-cut rectangular profiles, with a load-bearing outer skin of aluminium sandwich panels with polymer foam cores. The tubes and profiles are cut and bent in a way which allows both to be continuous through intersections with each other, resulting in a lightweight construction similar to a differential design but with fewer parts.

Because NGT LINK is designed to operate on existing lower capacity lines, it needs to be compatible with a wide range of current infrastructure. The reference route chosen for the evaluation of the concept leads from Stuttgart over Ulm to Oberstdorf, on the edge of the Alps in the south of Germany. This route is only electrified from Stuttgart to Ulm, so in order to travel the entire length of the route NGT LINK requires a trivalent hybrid drivetrain. On conventionally electrified lines, NGT LINK extends its asymmetrical, telescoping current collector, while on NGT HST routes it can pick-up energy wirelessly like the NGT HST. On non-electrified routes, NGT LINK can draw power from its on-board batteries.

The wireless power supply is a technology shared with NGT HST and functions on the basis of inductive power transmission. In this system, primary coils mounted between the rails send energy to the secondary coils mounted in the belly of the train. This sophisticated system precisely locates the train and only energises coils as the train passes over them, ensuring safety and minimising energy losses. This system is, in essence, similar to those used for wirelessly charging cars and by some inductively powered streetcars. The demands placed upon it are, however, more rigorous due to the requirements for railway vehicles with the corresponding power demand. It needs to function through a wide range of conditions, since the train is not only moving past the primary coils at anything up to 230km/h, but the distance from the belly of the train to the track surface can vary from 80mm to almost 300mm – based on wheel wear and suspension travel. In addition, the system must be capable of transmitting over 3MW continuously in order to power NGT LINK and its systems. The benefits of the system are not limited to the elimination of wear; with no pantograph exposed to the wind, NGT LINK has removed a significant source of noise, giving it the potential to be quieter than comparable, conventionally electrified trains. Wind tunnel tests1 on the pantograph used on the German ICE 1 showed an aerodynamic drag amounting to 126kW at 250km/h; wireless power transmission completely avoids this, resulting in further energy savings. With no moving or wearing parts and no vulnerable catenary, the availability of the wireless power system is also expected to be significantly better than conventional designs, and communications signals can also be piggybacked on the power system, providing an additional mode of communication and train control.

Much like the current collector used on the 500 Series Shinkansen, NGT LINK’s current collector telescopes vertically in order to save space and reduce noise. However, its unique asymmetrical design derives from the need for it to be installed in the double-deck area of a car without imposing on the upper centre aisle or exceeding the G2 loading gauge. When not in use, the NGT LINK current collector telescopes down into its ready position, then swivels 90 degrees until the pan is parallel to

Figure 1: The aluminium space frame construction of an NGT LINK car. The topology optimisation model, from which the mechanical structure is derived, is visible in the background, top left.
the length of the car. It can then be lowered further into its storage bay next to the aisle on the upper floor. Storage bay doors then close over the current collector, restoring the smooth outer skin of the train and preventing noise, which conventional pantographs produce – even when not in use. The strut and pan of the NGT LINK current collector have elliptical cross-sections and surface features which are designed to trip the boundary layer in order to reduce noise and drag.

In addition to the wireless power supply and the asymmetrical current collector, a series of batteries allow NGT LINK to run on non-electrified lines such as what exists on the way from Ulm to Oberstdorf. This uphill route covers a distance of 127 km, necessitating almost 900 kWh of energy for a fast driving style. This translates to 19.8 tonnes of lithium-based batteries, assuming a conservative state of charge strategy. These are distributed throughout the train, with nine tonnes in each end car and a further 360 kg in all others. Concentrating the battery mass in the end cars renders these less susceptible to crosswinds, while batteries in the middle cars aid the scalability of the train in cases where cars are either added to or removed from the formation. Ongoing research is looking into reducing the battery mass by charging at stations on otherwise non-electrified lines, as well as on stretches with high power demand such as hills and sections where trains accelerate.

With each car possessing its own on-board power supply, all cars can also shunt themselves instead of requiring external traction, and the batteries allow NGT LINK to recuperate its kinetic energy when running on non-electrified lines. Indeed, even on electrified lines there are advantages to storing recuperated energy on-board, since this circumvents both efficiency losses in transmission and the costs due to low compensation for energy returned to the grid.

NGT LINK has a series of motors driving each one of its 32 wheels independently, providing a total tractive power of 2.5 MW. This electrical power, plus the additional approximately 20% required for ancillary components, is drawn from one of the three sources listed previously. NGT LINK is designed for high flexibility; equipped with the appropriate power electronics and with these three power sources to choose from, NGT LINK can be used on virtually all G2 compatible routes.

Trains today are increasingly confronted with a world in which resources are becoming scarcer, strict emissions regulations are constantly tightening, and expectations of mobility and comfort are continually increasing. To maintain a competitive edge over other modes of transportation and to provide responsible, attractive mobility to as many people as possible, trains will need to adapt in ways that require a complete rethinking of many aspects that are taken for granted today. NGT LINK aims to unify bold applications of diverse technologies and unconventional ideas in order to make travel faster and more comfortable – all while setting new standards for energy efficiency and emissions.

References

Developing the rolling stock of the future

A modal shift to rail is crucial in achieving a reduction in greenhouse gas emissions, relieving urban congestion and providing increased mobility. In order to successfully meet this growing demand for efficient and green mobility, the railway sector needs to progress in terms of quality of service, energy and life cycle costs, interoperability, capacity, noise reduction and must also further develop its carbon emission advantages. Roll2Rail – one of the so-called ‘lighthouse projects’ of Shift2Rail – will tackle these challenges in order to advance towards the rolling stock of the future. Eulalia Peris and Javier Goikoetxea, Roll2Rail Project Coordinator and Technical Leader respectively, explain further.

The European Union has committed to supporting the railway sector by investing in research that endeavours to revolutionise current railway technologies in order to boost the use of rail transport and drive the competitiveness of the rail sector versus other means of transport. To this end, in 2014, the EU officially launched the Shift2Rail public private partnership which focuses on building the railway system of tomorrow. Shift2Rail is the first European initiative to deliver focussed, market-driven research by accelerating the integration of new advanced technologies into innovative rail products, meeting the key objectives of the EU 2020 Strategy and the EU Transport policy.

While the start of Shift2Rail research activities in 2016 is moving ever closer, Roll2Rail is setting the foundations for many of the technologies that will be continued within Shift2Rail’s Innovation Programme 1: ‘Cost-efficient and reliable trains, including high capacity trains and high-speed trains’. It is planned that Roll2Rail will transition into Shift2Rail when the joint undertaking is fully operational in 2016. The start of this preliminary work on the future core research activities of Shift2Rail is a major milestone for the European rail industry, which is currently facing strong competition from outside Europe. It could be said that the start of Roll2Rail, as well as that of the other Shift2Rail lighthouse projects, represents the actual beginning of the research and innovation work of Shift2Rail.

Roll2Rail, or, to give its full title, ‘New Dependable Rolling Stock for a more Sustainable, Intelligent and Comfortable Rail Transport in Europe’, aims to develop key technologies that will overcome hurdles to innovation.
The only way you can have Thermo King Rail HVAC is to let us customize a unit to your unique specifications. Our engineers continuously develop prototypes so we’re in top form to design precisely the innovative solution you need. And we’ve been doing this for over 75 years ...

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**Schenck Process Railtec – paving the way for increased safety**

Global demand for mobility and transport is growing all the time, driven by both passenger transport and freight transport. Detailed planning is carried out to make sure transport is affordable and above all safe, and to enable condition-based maintenance.

**Derailment protection**

The Schenck Process track-based systems measure the safety-relevant load status of a train and also detect force impacts which might be triggered by defective wheels. The measurement of noise emissions in compliance with standards helps rail companies to reduce disturbance in densely populated areas while identifying critical vehicle statuses in conjunction with measurements from defective wheels. The online measurement of vertical and lateral forces in loaded train sets helps to prevent derailment.

**Trade & Trust**

The Trade & Trust product range includes systems for the dynamic and static weighing of coupled train sets for internal check weighing as well as solutions that deliver legal-for-trade weight data as the basis for calculating the weight of individual wagons and train sets.

**Workshop test equipment**

Quiet, comfortable and low-wear rolling stock is the result of intensive development work by the vehicle constructor and day-to-day work in the maintenance workshops. Schenck Process supports both with reliable, standards-compliant measurement technology for bogie testing and corner load measurement of rail car and locomotive bodies.

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**WP2**

Looking into a new generation of train communication systems; in particular, this WP will develop new wireless technologies applied to train control functionalities.

**WP3**

Working on the reduction of vehicle weight by investigating car body solutions based on lightweight composite materials.

**WP4**

Focusing on innovation in the field of running gear; in particular, this WP aims at quantifying the life cycle cost impact of existing and new running gear technologies.

**WP5**

Aims to break down barriers for innovation in brakes by investigating and proposing future requirements for the process of homologation and harmonisation of brakes.

**WP6**

Working on attractive and innovative environments for passengers; the aim of this WP is to develop standardised methodologies for assessing attractiveness and comfort from the passengers’ point-of-view.

**WP7**

Researching the implementation of novel and more efficient noise mitigation measures, specifically regarding the development of methodologies for noise source separation techniques.

**WP8**

Looking into the quantification of energy baselines by developing an energy calculation methodology.

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**6th MULTIRAIL Open Days**

The 6th MULTIRAIL Open Days will take place on 27-28 October 2015 at the Schenck Process Headquarters in Darmstadt, Germany. The event offers international experts a panel for networking at the highest level and will highlight the industry’s key trends through presentations and discussion groups. This year’s MULTIRAIL Open Days will be headlined by: Technology, Innovation and Digitisation.

Find out more about the event and register under the following link: schenckprocess.com/Bahntag15/en

www.schenckprocess.com

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**References**

1. www.roll2rail.eu
2. www.shift2rail.org

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**Eulalia Peris** graduated in Sound and Image Telecommunications Engineering in 2006 and obtained a PhD in Environmental Acoustics in 2013. She joined UNIFE in January 2015 as a Technical Affairs Manager and is currently the Coordinator of two EU-funded projects; Roll2Rail and REFRESICO. Previous to this, Eulalia worked at the University of Salford, UK, where she was involved in two research projects funded by the Department for Environment Food and Rural Affairs of the UK (Defra) and one FP7 EU-funded project in the field of railway noise and vibration.

**Javier Goikoetxea** joined CAF in 1997, where he is Technical Coordinator at the Technology Division. He has large experience in managing national and international research projects, like FP7 MERLIN and Roll2Rail. It is also noteworthy to mention his role in the Shift2Rail initiative since his origins as Leader of the TCMS topics. Within CAF, Javier participated in the development of key projects for the company like the SIBI Tilting System and the COSMOS TCMS. In addition, he is the Chairman of UNIFE’s TCMS Topical Group and frequently participates in congresses and conferences as Chairman or Speaker.
Ensuring a safe rail and road tunnel between Denmark and Germany

Safety for end-users is an integral part of any project, not least the project of building the 18.2km-long Fehmarnbelt Fixed Link between Fehmarn in Germany and Lolland in Denmark. It encompasses every aspect of the tunnel project. Apart from ensuring that all specific railway and general safety demands are met, there is also the challenge of adhering to high German, Danish and EU safety standards. Johnny Restrup-Sørensen, Contract Director for Railway at Femern A/S, explains how the demands actually help to achieve the goal of building a modern and very safe tunnel.

The fixed link will be the largest immersed combined rail and road tunnel in the world. It will also be among the world’s most modern and safe tunnels. Safety is always a high priority issue in railway systems and it’s well-known that rail is considered one of the most safe modes of transportation. Hence it is evident that safety is also an extremely important factor in such a long subsea railway link.

Safety has been incorporated into the project in detail – from the very first drawings when the treaty on the fixed link was signed by Denmark and Germany in 2008 – and up to the present day where bids for the tunnel from international consortia are being evaluated by the client, Femern A/S.

Safety influences all aspects of the tunnel from civil works requirements to the descent and curvature of the tunnel, emergency power supply, emergency exits, ventilation, fire extinguishing equipment, signalling systems, lighting, tunnel surveillance as well as rescue plans and safety personnel.

All relevant safety standards and regulations are met. This means complying with EU, Danish and German standards and regulations. These are apart from national standards and regulations, namely the EU Common Safety Methods (CSM), the National Reference Value (NRV), the EU Interoperability and safety directive, EU Eurocodes and the EU Tunnel Safety Directive.

The fact that the rail and road tube tubes are adjacent and connected by some 360 emergency exits opens up the possibility to apply a number of efficient safety-improving solutions; especially as they are designed to accommodate rescue operations and to allow the quick evacuation of train passengers.

The overall risk analyses performed by Femern A/S’ risk specialists
TUNNEL SAFETY

shows that the actual risk of a serious accident happening in either the rail or road tunnel is lower than on open land.

General safety concept
The tunnel consists of five tubes: two for trains, two for cars – with dual, single direction carriageways and an emergency lane in each – and a separate tube or gallery between the road tubes which serves as an emergency and service corridor.

The basic idea concerning safety is to prevent any serious accidents happening at all. And if any do occur, to have comprehensive emergency systems and services able to respond quickly to any conceivable situation.

The safety concept rests on the following four pillars:
1. Minimising the number of accidents – through their prevention and avoidance of potentially hazardous situations.
2. Reducing the consequences of accidents and near-miss incidents as much as possible.
3. The provision of escape routes – it must be easy for anyone inside the tunnel to reach a point of safety.
4. Provision of effective emergency service access.

Rail and road interaction
The railway part of the tunnel consists of two tunnel tubes that will each carry traffic in one direction. For its design, the EU technical specifications of interoperability (TSI), European standards and national safety requirements are applied. These – for example the TSI Safety Railway Tunnels (SRT) – combined with codes of practice contain the mandatory safety requirements for railway tunnels.

The railway line is designed for mixed traffic with a maximum speed of 200km/h. The maximum operational speed of freight trains is set to 140km/h. Freight trains up to 1,050m-long are planned to be allowed and passenger trains are expected to be 400m-long. Most of the time in normal operation there will only be one train at the time in a tube.

The road part consists of two tubes each with one way traffic on double lanes and a full emergency lane. For its design, European standards – namely the EU road tunnel safety directive – as well as national safety requirements are applied.

Between the two road tubes there is a service gallery that also

Connecting north and south Europe
The railway line on the Fixed Link will be part of the Trans-European railway network connecting Scandinavia with mainland Europe. It is an important part of the Scandinavian-Mediterranean corridor (ScanMed) and one of EU’s nine priority network corridors. When completed, Denmark and Femern A/S will have delivered a piece of infrastructure that contributes to the EU vision on interoperability on the railway network. When the tunnel opens, the railway will shorten the journey by train between Hamburg and Copenhagen from the current 4 hours 30 minutes to just 2 hours 30 minutes. The link has obtained EU support and will be built with state guaranteed loans and be paid by fees from end-users.
serves as an evacuation tube. Apart from specific rail and road tunnel demands, there are a number of demands for the tunnel construction in general. For example, structural collapse due to ships sinking, corrosion, structural failure, fire and explosions has been addressed through the structural design. EU Eurocodes are followed but in line with the specific rail and road standards and regulations.

Connected tubes eases evacuation and rescue
All five tunnel tubes are connected with emergency exits and the road tubes can be used for rapid evacuation and rescue in case of a railway accident. This feature increases safety in the sense that access in an out of the railway tunnel is easy and a lot less restricted than in many other tunnels around the world.

The same tunnel concept is seen in the Danish-Swedish Øresund tunnel. The Øresund tunnel has denser train traffic than the future fixed link and there has not been any train accidents or evacuations during the 15 years the link has been in service. Femern A/S uses the good experiences from this successful fixed rail and road link. Many experts that were involved in the Øresund project are now working on the Fehmarn Belt Fixed Link tunnel.

Femern A/S has designated the emergency lane of the road tube adjacent to the inner rail tube to be the railway safe area as, from both rail tubes, it can be reached quick and easy via escape routes on the walkways on both sides of the train and the emergency exit doors. The European requirements demands emergency exits to be located at least every 500m; in the Femern Tunnel they will be placed every 100m – therefore increasing safety even more. By doing so, there will be no more than 50m to the nearest emergency exit at any point.

In the event of a rail tube incident the first action is actually for the train driver to attempt to drive the train clear of the tunnel such that the incident can be more easily controlled. If this is not possible and the train is stationary in the tunnel, then first responders and emergency services will enter by either road tube and cross into the incident tube through the emergency exits.

Traffic will be stopped and controlled in both road and rail tubes in case of a serious incident. Evacuation of passengers will then be conducted and assisted by train personnel. When escaping passengers have reached the road tube, dedicated rescue buses will bring them out of the tunnel.

Rescue and emergency services in Denmark and Germany are working together on a safety and emergency concept for the tunnel, assisted and coordinated by Femern A/S. This will ensure rapid, coordinated response from both ends if an incident occurs.

Incident prevention measures
To reduce the probability of incidents happening inside the tunnel, safety requirements have been adopted for the rail tunnel in compliance with EU and national regulations and rules.

Derailment protection
The risk of derailment is minimised since there are no switches or crossovers in the tunnel. If a derailment should occur, elevated emergency walkways in the tunnel will act as an effective derailment protection barrier, preventing a derailed train to overturn. This is one reason that the railway in the tunnel is calculated to be safer than a corresponding section of railway on open land.

Derailment detection
A derailment detection system will be installed ahead of each tunnel portal – on both the German and the Danish side – in order to prevent an already derailed train from continuing into the tunnel. Derailment containment provisions will be provided in the tunnel tubes and outside the tubes at a distance of (minimum) 515m from the tunnel portals.

Hot axle box detection system
A hot axle box detection system will be
installed ahead of the portals to minimise the risk of a train with overheated axles and wheels entering the tunnel.

**Intruder monitoring**

Intruder monitoring will be installed outside tunnel entrances to ensure no unauthorised access to the tunnel.

The ventilation system in the tunnel also plays an important role in controlling the environment in the tubes to ensure safe and tenable conditions during rescue and evacuation in case of an incident. Depending on the needs, the system can be both automatically controlled by the SCADA system and manually activated and controlled by LCC Operators.

**Monitoring, control and signalling**

The Fixed Link will be equipped with the European Rail Traffic Management System (ERTMS) consisting of the European Train Control System (ETCS) and the railway telecommunication system GSM-R. The railway traffic in the tunnel will be monitored and controlled from a Train Traffic Control Centre (TCC) situated in Copenhagen, whereas the road tunnel and the tunnel in general will be monitored from a Link Control Centre (LCC) near the tunnel entrance on the Danish side of the Fehmarn Belt. In the LCC, the technical installations for both the railway and road tunnel are being monitored and controlled via a SCADA system. The TCC and LCC are interconnected.

Denmark is implementing a replacement of the entire signalling system to the common European signalling system, ERTMS, which includes the train control system ETCS Level 2. Specifically for the tunnel, ERTMS will ease and thus improve operational safety. Queuing-up of trains behind a stranded train can, for example, be controlled and prevent further passenger trains getting stuck in the tunnel for a lengthy period, and a reverse-function enables trains to quickly reverse at fast speed thus superseding a time-consuming shunting effort.

The rail safety systems are supported by the SCADA system and network infrastructure that is used for supervising and controlling all technical field devices and sub-systems installed in the road and railway tubes that are of vital importance to normal daily operation of the tunnel and also essential in critical situations.

The installations and systems to be controlled include important equipment such as:

- Power supply systems and traction power supply
- Tunnel lighting and ventilation
- Communication systems and traffic management systems that ensure control of all movements in the railway tunnel and in the safe areas in the adjacent tunnel tubes.

In case of total breakdown in the Danish power supply grid, the German traction power supply system in Fehmarn, owned by Deutsche Bahn, can be switched over to provide an emergency power supply, in order to move stranded trains out of the tunnel tubes.

All safety related systems forming part of tunnel installations will have short break power supply and the more safety critical systems will have uninterruptable power supply (UPS), for instance the SCADA system, the emergency lighting, and detection and alarm systems.

**Future**

The Danish Parliament has passed the construction act for the tunnel, and construction can begin when contracts are signed and the necessary German approvals are in place.

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**Communication**

In the railway tubes, additional to the GSM-R system, there will be a separate emergency telephone system at each emergency door. A call from an emergency phone will reach the Train Traffic Control Centre (TCC) in Copenhagen. The Link Control Centre (LCC) will immediately receive a message via SCADA that says an emergency phone is being activated.

Johnny Restrup-Sørensen graduated in 1980 with a M.Sc. degree in Civil and Structural Engineering from the Technical University of Denmark. In 1999, he received an Executive MBA degree. Johnny has a track record of more than 30 years’ employment from management positions in public and private enterprises, mainly within the railway business. He has extensive experience from his work on large-scale infrastructure construction projects. These include positions as Project Director at the Øresund Fixed Link and Chief Resident Engineer at the Sua Pan Branch Line project in Botswana. Johnny is currently Contract Director at Femern A/S responsible for the management of the Fehmarnbelt railway project.

**Operating at minimal risk**

Femern A/S has implemented an overall operational risk analysis for the combined, Fixed Link tunnel infrastructure rail and road, following the EU CSM-RA Regulation. The aim is that the risk shall be equal to, or lower than, the acceptance criteria, which are set up based on the National Reference Values (NRV) as given in 2012/226/EU. For all the defined safety targets set for the Fixed Link, it is documented via the risk analysis applied for the present design stage that the risk is acceptable and that the tunnel is comfortably below the acceptance criteria for both rail and road.
Infrabel’s replacement, renewal and awareness-raising strategy
Ann Billiau, Director of Traffic Management & Services, Infrabel

Irish Rail’s 10-year asset strategy for user-worked level crossings
Cathal Mangan, Technical Manager, Irish Rail

British Transport Police efforts continue to make level crossings even safer
Becky Warren, Inspector for Fatality Management and Disruption, British Transport Police

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Infrabel’s replacement, renewal and awareness-raising strategy

Infrabel, the Belgian railway infrastructure manager, continually works to improve safety at level crossings in its network. For European Railway Review, Ann Billiau, Infrabel Director of Traffic Management & Services, sets out the strategic priorities and describes recent measures concerning level crossings in Belgium.

Safety at level crossings is a universal issue
The International Level Crossing Awareness Day (ILCAD) took place on 3 June 2015. Over 40 countries joined forces to raise awareness of the number of accidents at level crossings across the globe. ILCAD is organised each year by the UIC (the International Union of Railways).

Although most accidents at level crossings are still caused by drivers of cars, vans and lorries, the UIC also reports a global increase in the number of accidents involving pedestrians and cyclists, who are known as ‘vulnerable road users’. This was the main theme of the 7th ILCAD, which was fully supported by Infrabel from the outset.

Gradual reduction in accidents at Belgian level crossings
In 2014, Infrabel recorded 47 accidents at level crossings on the Belgian rail network, involving 11 fatalities (five pedestrians and six motorists). Over the previous 10 years, from 2005 to 2014, there were 53 accidents and 12 fatalities on average each year.

This represents an 11% reduction in accidents in 2014 and 9% fewer fatalities compared with the whole period 2005-2014. However, there is no cause for complacency as, despite the reduction in recent years, the number of accidents and fatalities rose again in 2014 compared with 2013 (43 accidents and seven fatalities). Since every accident and every
victim is one too many, the annual toll remains hard to bear.

The statistics for 2014 also show that 41 accidents (87%) involved vehicles and six accidents (13%) involved pedestrians or cyclists. Vulnerable road users are at highest risk of a fatal accident at a level crossing as they are less protected than those in a vehicle.

**Obeying the rules of the road – a fundamental requirement**

Road users play a crucial role in reducing the number of accidents at level crossings. The main causes are still recklessness, carelessness, haste and ignoring the crossing signals (lights, ringing bells and barriers). According to figures from the UIC, nearly 98% of accidents at level crossings in Europe are due to failure to obey the rules of the road, a common problem in today’s society.

In addition to our infrastructure-related measures, we also need to tackle this issue directly by raising awareness. Therefore, since its establishment in 2005, Infrabel has launched annual campaigns to raise awareness of the safety rules at level crossings among specific target groups and the general public.

**Awareness-raising campaigns aimed at the general public**

Infrabel launched its latest and most striking awareness-raising campaign at the beginning of July 2015, when the Tour de France passed through Belgium. In TV ads, famous Belgian cyclists, including Tom Boonen and Greg Van Avermaet, reminded everyone to always obey the rules of the road at level crossings.

However, earlier this year, there were several incidents involving cyclists riding past closed level crossing barriers during races (e.g. Paris-Roubaix). Infrabel produced this new ad – aimed at cyclists and road users in general – in conjunction with the Royal Belgian Cycling League and six cycling teams.

Other awareness-raising activities during recent months have included setting up a pretend level crossing with mobile barriers in shopping areas of major cities, distributing a new educational game and the annual rail safety school calendar in Belgian schools and the transmedia campaign concerning the installation of the new electronic bells at level crossings.

To watch the new ads with the cyclists and find out more about Infrabel’s awareness-raising campaigns, go to www.infrabel.be/wachten

**Effective strategy for improving safety**

Infrabel continues to invest in its strategy of eliminating, replacing and renewing level crossings in order to bring about a gradual and permanent improvement in safety on the Belgian rail network.

The Belgian rail network is one of the busiest in Europe, with 3,631km of railway lines and 1,818 level crossings – 1,584 of them public and 234 private. Around 95% (1,500) of public level crossings are equipped with active road signs (barriers and/or lights and bells). The remaining 5% (84) with passive signals (road signs) are on quiet lines.

In 2014, Infrabel eliminated 11 level crossings and decommissioned 19 other level crossings on industrial rail lines and in ports. The eliminated level crossings were replaced by bridges, tunnels or parallel roads. Infrabel works closely with local authorities and residents to seek alternative
mobility solutions. In the last 10 years, around 250 level crossings have been eliminated (and/or decommissioned).

Where we are unable to eliminate a level crossing, Infrabel invests in renewing, adapting and maintaining it. This involves improving the road signs (installing lights, extra barriers for pedestrians and cyclists, etc.) and arranging with the road authorities to carry out the necessary works to increase the visibility of the level crossings.

Since the autumn of 2014, Infrabel has installed new electronic bells on all level crossings. By the beginning of 2016, all level crossings equipped with bells will have the new electronic sound. The aims of this project are sustainable renewal, greater convenience and increased safety.

Working together to improve safety: with everyone on board
Infrabel’s multi-pronged level crossing strategy also improves the punctuality of rail traffic. Accidents at level crossings cause significant delays to passengers. In 2014, Infrabel recorded delays of up to 1 hour 45 minutes a day on average due to accidents and incidents at level crossings. This figure is down on the previous two years, when it stood at 2 hours 10 minutes.

One thing is clear: it is essential for railway infrastructure managers, rail operators, government bodies and European organisations to continue to work together to tackle this issue, at both a national and international level. We also rely on media support to help us make all road users aware of the importance of safety and obeying the rules of the road at level crossings at all times.

But above all we need the cooperation of all road users. The message to them is simple: always stop at a level crossing when the bell rings, the red lights flash and the barriers are down or coming down.

Prior to her present role of Director of Traffic Management & Services at Infrabel, **Ann Billiau** held a number of positions for the Belgian railway infrastructure manager since 2005, including Director-General of Rail Access, Account Director of the Rail Access Directorate and Head of the Department for Customer & Products in the Rail Access Directorate. Furthermore, Ann is also a Member of the Management Board of Infrabel. Ann has also held positions at SNCB including Project Leader for ICT Projects and Account Director of the ICT Department. She is a Master of Mathematics and a Master of Advanced Studies in Geophysics, plus Member of the Board of Directors of TUC Rail, Chairwoman of RFC2 and Vice-President and Member of the Managing Board of RNE.

Infrabel orders Prover iLock for validation of requirements for level crossing systems
Prover Technology, a world leader in software technology for Automated Development of Rail Control Software, recently announced that Infrabel—the Belgian railway infrastructure manager—has placed an order for using Prover iLock for validation of level crossing control requirements.

The Belgian railway network is one of the busiest in Europe, with more than 1,800 level crossing systems. Infrabel chose Prover iLock in order to validate the requirement specifications for new, computerised level crossing systems. Requirement validation detects specification errors and ambiguities, enabling improved quality of requirements specifications and reducing the risk of delays in delivery of computerised rail control.

As part of the order, Prover Technology will formalise Infrabel’s level crossing requirements in the formal specification language PiSPEC, and perform requirements validation using the Prover iLock software tool suite.

**Requirements validation with Prover iLock**
Based on design, test and safety requirements defined in the formal specification language PiSPEC, the Prover iLock tool suite offers efficient support for requirements validation based on functional simulation and formal safety verification.

The use of formal verification for safety assessment is required by leading railway infrastructure managers, and highly recommended by standards such as CENELEC EN 50128. The reason: formal verification can establish that a rail control system is safe in all possible situations that can arise, as opposed to traditional and time-consuming methods based on test and review.

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Irish Rail’s 10-year asset strategy for user-worked level crossings

The Irish Rail network has a large number of user-worked level crossings which present great dangers. As Irish Rail’s Technical Manager Cathal Mangan explains, a 10-year plan has been developed to help improve safety and reduce risks at these level crossings.

The Irish Rail network is broadly radial in nature with main inter-city routes emanating from Dublin and, apart from double-track main routes to Cork, Belfast and within suburban areas, the network is extensively single line. It is also quite a rural network beyond the main suburban extents and as such, contains a substantial number of user-worked level crossings. These are interfaces where the user is required to operate the gates; there is no other system of control at these crossings and they fully rely on the user to ascertain whether it is safe to cross the railway. As such, they represent the biggest single infrastructural asset risk on the Irish Rail network. There are 721 of these crossings on the operational network currently across the three main types as outlined in Table 1 on page 68.

In 2013, in response to the on-going risk posed by this high risk asset category, Irish Rail developed a 10-year Level Crossing Asset Strategy which has the objective of improving safety and reducing risk through crossing upgrades, elimination, introduction of technology, standardisation, education and enforcement.

The strategy seeks to provide a framework for Irish Rail to develop and implement meaningful work programmes aimed at improving level crossing safety. The core of the strategy is based on the adoption of the following four key principles:

Principle 1
Application of developments in technology and safe systems
One of the key drivers for change is that user-worked level crossings operate in a modern environment for which they were not designed nor are appropriate today. Modern, faster and more frequent trains are operating over live roadways where the expectation is for the road user to operate the level crossing gates and where the only means currently of alerting the user as to the presence of trains is their own visual check for this.

Warning system technology has been advancing continuously over the last number of years and such solutions are being progressed at user-worked crossings in a number of railway administrations. Irish Rail
LEVEL CROSSING SAFETY
SUPPLEMENT

(IÉ – Iarnród Éireann) is looking to build on the technological advances in this area through utilisation of such systems, adapted to the specific characteristics of our rail network. It represents a cost-effective methodology of achieving significant risk reduction at a greater number of crossings that would otherwise only be achievable through costly capital investments required for level crossing closures or upgrades.

Principle 2
Risk-based prioritisation

A key principle adopted is for the prioritisation of all works based on risk. Irish Rail operates a Level Crossing Risk Model (LCRM) which is a live tool evaluating the collective and individual risk at all level crossings on an ongoing basis. The LCRM requires the inputting of 120 characteristics for each level crossing which are determined based on a cyclic programme of inspections in line with Technical Standards. While the risk profile is constantly changing as risk changes, the LCRM is a key tool in allowing the identification of any intolerable risks as well as any evolving negative trends. The utilisation of the LCRM is important in ensuring that the application of resources and funding is targeted in the appropriate areas and where maximum benefit can be achieved.

Principle 3
Engagement and enforcement

Communication on an ongoing basis with the level crossing user is an important principle to be adopted. Such a high-risk interface determines that this communication requires specific plans to target users and make them aware of the dangers of level crossings as well as their own responsibilities for the safe use of these.

Principle 4
Standardisation

The diverse nature of the level crossing infrastructure that is in place and that has developed over the last number of decades is one of the contributors to the high risk associated with level crossings. The complexity of this diversity is compounded by the existence and utilisation of these user-worked level crossings in a modern environment with heavily trafficked public roads and modern agricultural activities utilising major farm machinery. The principle of standardisation of our level crossing infrastructure is therefore important so as to develop and improve the overall interface for the level crossing user and to ensure this interface is fit for purpose and appropriate for the usage requirements.

Five key strategic areas

These principles have given rise to the following five key strategic areas designed to provide a complete framework for the management of user-worked level crossings over the next 10 years:

1. To develop and implement technological solutions at user-worked level crossings
2. To implement targeted closures of level crossings on a cost-effective basis
3. To reduce the risk of collisions and near misses at level crossings
4. To improve the safety culture and awareness both of internal and external stakeholders
5. To implement standardised approaches to level crossing types.

1. Technological solutions at user-worked level crossings

A fundamental component of the 10-year strategy is the development of a warning system for user-worked level crossings on the IÉ network that provides the level crossing user with an appropriate alert as to the approach of trains and advises when it is not safe to cross. This system must have fail safe modes to further alert users that it is in degraded mode and advise the user on a safe course of action to take.

The overall principle of the project is the introduction of low-cost technological solutions so as to achieve a more widespread, and greater, risk reduction across a wider asset range than would otherwise be achievable by the capital intensive investment of other solutions (such as bridge provision or CCTV) at a smaller number of level crossings. Based on typical unit costs and compared with the capital investment requirement for the broader solution, it is estimated that the amount of total risk reduction that can be achieved via the implementation of low-cost technological solutions is a factor of 7–10 times that that would be achieved by targeting single or small numbers of crossings for capital investment. This strategy is particularly important in the constrained funding environment currently being experienced where there is a significant shortfall on the steady-state funding required.

Irish Rail are currently working with Schweizer Electronic for the design and implementation of these low-cost solutions through their proprietary ‘Vamos’ system.

2. Level crossings closures

Ultimately, the elimination of level crossings is always going to be the best solution to reducing risk. As financial constraints have curtailed major capital investments in elimination of crossings through provision of bridges, a comprehensive and detailed network review is being undertaken with a view to identifying opportunities for low-cost level crossing elimination. This can typically be through searches for split ownership of land enabling Irish Rail to close a level crossing, where low value property acquisitions can be made or where apparently disused crossings can be formally closed. This is a potentially high value for a low-cost programme of work. The project involves the close liaison between the Infrastructure Manager entity of Irish Rail with the supporting Property and Legal services.

Since the commencement of the strategy, significant progress has been made in this initiative in particular with field crossings where low value closures have been achieved throughout the network.

However, while this initiative will continue, it is anticipated that the rate of success will naturally decrease as all realistically achievable closures under this programme are achieved.

Table 1: Summary of Irish Rail user-worked level crossings

<table>
<thead>
<tr>
<th>Crossing type</th>
<th>Definition</th>
<th>Current No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>OP</td>
<td>Level crossings on public roads where the user is required to operate the gates</td>
<td>42</td>
</tr>
<tr>
<td>O</td>
<td>Level crossings on private roads where the user is required to operate the gates</td>
<td>104</td>
</tr>
<tr>
<td>F</td>
<td>Field type level crossings generally used for agricultural activities and where the user is required to operate the gates</td>
<td>575</td>
</tr>
<tr>
<td></td>
<td>Total User-Worked Level Crossings</td>
<td>721</td>
</tr>
</tbody>
</table>
3. Risk reduction – collisions and near misses

The Irish Rail Network Wide Risk Model (NWRM) determined that train collision with vehicles at level crossings remains one of the single biggest accident types that contribute most to the overall risk on the rail network. This is in spite of improvements made over the last number of years as well as continued level crossing closures resulting in a 59% reduction in the prime risk since 2010. The NWRM output further determines that one of the areas with the greatest potential for safety improvements are at level crossings and this is in both the cases of prime and shared duty of care.

A number of serious collisions and near miss incidents have occurred on the network over the last number of years. To counteract these serious incidents, a key component of the 10-year strategy is a risk reduction programme for collisions and near misses.

A specific programme for this element focuses on the highest risk areas with the development of a bespoke risk management plan on a crossing-by-crossing basis.

The output of this then leads to a series of relevant actions and interventions determined as necessary on a specific crossing-by-crossing basis. These can typically include road improvements, traffic calming measures, additional warnings as well as targeting of specific users involved in any incidents.

4. Improvement of safety culture

A two-strand approach is adopted under the 10-year strategy for the improvement of the safety culture at level crossings made up of engagement and enforcement.

Engagement focuses on positive communication efforts with level crossing users and stakeholders. Current examples of this include positive engagement via on-going publicity campaigns such as media campaigns. Other measures include the development of appropriate publications on safety at level crossings which have targeted distribution to level crossing users. Further engagement is undertaken through representation at relevant public events such as farming conventions and other local events. Media and modern communication methodologies are also being employed for the on-going reinforcement of the safety message and for the improvement of the overall safety culture.

Enforcement focuses on safety culture improvement through application of legal means. A targeted and proactive surveillance campaign, with a view to successfully obtaining prosecutions for abusers of level crossings, is carried out at those crossings where the level of abuse warrants this. The programme is carried out in line with all legal requirements such as data protection laws.

Success measures

Key to the achievement of the strategic objectives is to have meaningful work programmes associated with each objective with appropriate success ‘measureables’. These have been established and are monitored on an on-going basis.

The overall day-to-day implementation of the strategy is carried out within the framework of the Level Crossings Asset Plan which is an annual programme identifying the detailed work programmes in a given year. The purpose of the asset plan is to identify the safety, reliability, availability and maintainability issues that currently or will have a future impact on level crossing safety, and to develop strategies for each issue identified, with an accompanying programme of actions to ensure asset performance levels are maintained or exceeded including in line with the objectives and works associated with the 10-year Level Crossing Asset Strategy.

Cathal Mangan is a Civil Engineer who has worked in the railway industry for over 15 years. He is currently the Technical Manager within Irish Rail with responsibility for all track and structures assets on the rail network, including level crossings.
British Transport Police efforts continue to make level crossings even safer

The British Transport Police (BTP) continues to build on the work that has already been undertaken to fundamentally look at the way in which they deal with and report incidents at railway level crossings. Becky Warren, Inspector for Fatality Management and Disruption at the BTP, explores further.

**Strategy**

There are over 6,000 level crossings in the UK and as the national police force for the railway we recognise that there remains the need to raise awareness of the risks associated with deliberately misusing them.

Our strategy for achieving this is broken down into a number of strands. The use and deployment of mobile safety vehicles, driver awareness courses being offered to offenders instead of a fixed penalty and points on their driving licence, partnership working with Network Rail, the utilisation of all forms of media and new ways of working through education – specifically with the innovative Yvonne Arnaud Theatre Group.

**Operation Look**

All of this is brought together in regular multi-agency weeks of action known as Operation Look. Whether it is business as usual or an Operation Look campaign – the aim and purpose of all activity is to...
educate drivers and users of level crossings on the safe and legal use with the ultimate aim of reducing risk and increasing safety at all level crossings across the UK.

The mobile safety vehicles have more than proved their worth and are currently being used extensively across the UK by all of BTP’s geographical divisions. This is just one of the ways in which BTP works in partnership with Network Rail to target level crossings where there is, or believed to be, a risk of drivers failing to comply with the level crossings lights and barriers. They are jointly tasked by Network Rail and British Transport Police to focus activity on the crossings with the highest risk and levels of failure. It is vital that we work closely with partners as this is not just a policing issue but also a business issue. There are a number of knock-on effects of incidents which occur at level crossings which can have an impact far wider than those who are involved in the incident. If the incident involves a train driver and a motor vehicle, not only is it the driver’s family and friends who are impacted, any passengers and their families are also impacted; then there are the other road and rail users who are at the least inconvenienced through either being stuck in traffic or having their trains delayed or cancelled. People miss flights, job interviews, visiting relatives in hospital or even funerals – and so it goes on. The train driver may never drive again, with the associated impact on his or her family and the impact this has on the industry and although the costs of these incidents are not a driving factor, they are not insignificant if there should be an incident at a level crossing.

The majority of drivers who are captured failing to comply with the level crossing signs are eligible for referral to undertake a driver awareness course. These courses focus on educating the driver not only in how to use the level crossing safely and legally but also what the consequences and impact of their actions could be. The course is delivered by AA DriveTech on behalf of British Transport Police. A crucial part of the course includes an evaluation solicited from the drivers who attend to get their perspective. The latest figures show that over 88% of drivers attending this course think the course content is good or excellent; 94% are happy with the delivery and more than 83% believe the course would be of benefit to all drivers.

The latter is one of the many reasons why we run the level crossing campaigns across the UK – to get the message out to as many people as possible.

We have held three successful Operation Look weeks since September 2014. These have been well-received by the public and key stakeholders and we have another one planned for October 2015.

The initial Operation Look saw extensive coverage on television, radio and newspapers – both local and national. Operation Look 2 culminated in a slot on a primetime network show ‘The One Show’ viewed by millions and reaching the biggest audience to date.

Operation Look 3 concentrated on finding new ways of getting our critical message across, particularly to pedestrian users. Although they may not be committing an offence if they cross the crossing as the lights are flashing and barriers are descending, they most certainly are putting their lives and the lives of others at risk through their actions.

We employed an innovative and direct approach during this most recent week of action. The Yvonne Arnaud Theatre Group, based in Guilford, has developed a play which it already presents to schools around the UK. The group has produced and performed a play, consisting of a series of monologues, at level crossings, on trains, community centres and schools close to crossings.

‘Off the Level’ focuses on education for young people and has been delivered across the UK in schools. The experience also includes a workshop where the young people can be involved in the outcome of the play and alter the ending of the play which is based around six characters played by three actors. They initially play three young people and their comings and goings to and from college via a level crossing – using it correctly each time – this culminates with one of them rushing across after the lights and barriers have started to come down and being hit and killed by a train. This is interjected by monologues from each of the actors who play the bereaved parent, the train driver and the BTP Officer who explain how the incident impacts them. The young people then get to see the play again but are given permission to stop the play at any point and join in. They then discuss their thoughts and feelings and, how acting on an impulse or through peer pressure, tragic circumstances can occur. This has received positive feedback from not only the schools but also the children themselves who find the interactive experience extremely useful in understanding the risks associated with level crossings.

Operation Look has so far seen hundreds of level crossings throughout the country with engagement being key to its success. Drivers appreciate the face-to-face interaction with British Transport Police and Network Rail staff. Look out for the next operation coming soon.
AusRAIL PLUS attracts around 450 exhibiting organisations biennially, 900 conference delegates, 120 high level speakers and provides 12 networking functions including delegate luncheons, gala dinners and exhibition networking drinks.

The AusRAIL Exhibition
AusRAIL has firmly established itself as the major Australasian rail event. With the continued support of the major Australasian rail associations including: ARA, RTAA, IRSE and RTSA, the event continues to grow exponentially.

The Sydney 2013 event was the largest AusRAIL exhibition ever, with around 450+ exhibiting companies participating and with over 1,200 conference participants. Melbourne 2015 should come close or exceed these attendance numbers.

Why should you exhibit?
Exhibiting at AusRAIL PLUS 2015 means you can meet senior executives from all over Australasia and from around the world under one roof over three days in a relaxed environment filled with high contact networking opportunities and quality branding. The event gives you a platform to raise your corporate profile, provide exposure to your products and services at an international level and increase your brand value within the global rail sector.

Use AusRAIL PLUS 2015 to network with the highest level Australian Owner/Operators (end-users), global manufacturers and leading figures of the rail sector under one roof.

Conference agenda
If you are arriving in Melbourne with time to relax before the event, then you can attend the pre-registration and informal welcome reception at the Melbourne Exhibition and Convention Centre the day before it all gets going (Monday 23 November 2015, between 16:00 and 18:00). This is a fantastic chance for some early networking and to register ahead of the crowd. Due to the large number of delegates to be registered, pre-registration is highly recommended to avoid the large queues on the first day of the conference.

The three-day conference programme will start on Tuesday 24 November 2015 with a State Premier Address from The Hon. Daniel Andrews MP, Victorian Government. Among just some of the speakers giving presentations and taking part in forum-discussions during the event are: Bob Herbert AM, Interim-Chairman, Australasian Railway Association; Rene Lalande, CEO, Bombardier; Jim Modrouvanos, Director, Asset Standards Authority, Transport for NSW; Mark Wild, CEO, Public Transport Victoria (PTV); Asitha Athukorala, Research Engineer, Queensland University of Technology; Rhianne Jory, General Manager Industry and Programs, Australasian Railway Association; Andrew Bressanutti, Project Engineer, Metro Trains Melbourne; David Irwin, Director, Pacific National; Howard Collins, Chief Executive, Sydney Trains; Sue McCarrey, CEO, The Office of the National Rail Safety Regulator; Nick Clark, CEO, Trandev Australasia; Peter Winder, Executive General Manager Interstate Network, ARTC; Peter Reidy, CEO, KiwiRail; Rob Mason, Chief Executive, NSW TrainLink; Bénédicte Colin, CEO, Keolis Downer; Andrew Lezala, CEO, Metro Trains Melbourne; and Mark Burgess, Managing Director, Public Transport Authority of Western Australia.

Networking events
As well as the pre-registration and informal welcome reception on Monday 23 November, there will be an Exhibition Networking Drinks held on Tuesday 24 November within the exhibition halls amongst the stands to bring together the delegates, speakers, sponsors and exhibitors for the largest networking function of the event. On Wednesday 25 November, the RTBU Yellow Tie Dinner will take place (typically attracting between 900 and 1,200 guests). Enjoy light entertainment, three-courses and flowing beverage during this relaxed, networking event. As the title suggests, guests will also be provided with a collectable yellow tie (or scarf) on arrival to wear at the dinner. This event sells out very quickly so make sure to register. And on Thursday 26 November, the AusRAIL Gala Dinner will be held – a formal black tie dinner to mark the finale to the AusRAIL week. The event expects to host around 800 guests who will enjoy a three-course meal and spectacular entertainment – another popular event, so register your attendance in advance.

For registration to the conference and dinners and to view the full conference agenda plus full exhibitor line-up with floor-plan, please visit the AusRAIL PLUS 2015 website: www.ausrail.com

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On 1 June 2015, road and rail infrastructure began to be managed by a single company – Infraestruturas de Portugal. This arose from a joint, integrated and complementary strategy which is engaged in the conception, design, construction, financing, maintenance, operation, rehabilitation, enlargement and modernisation of road and national railway networks, including the command and control of train movements.

Infraestruturas de Portugal is positioned as manager of multimodal mobility, enhancing the asset management, synergies and new recipes to ensure the provision of a sustainable, safe and efficient service.

Programme to expand and modernise the rail network in Portugal

Within the Portuguese strategy for railways 2014-2050, and according to the principle of co-modality, evolution of the national rail network must realise and respect the role of other modes of transport and occupy the space where the path of the railroad is more efficient and competitive.

The Portuguese rail network should be developed in accordance with the following strategic objectives:

- To promote the transportation of goods, facilitating the movement of cargo between the main national and international hubs, contributing to the competitiveness of the national economy
- To strengthen accessibility and urban mobility ensuring the efficiency of urban and suburban character connections, together with other modes of transport, individually or collectively
- To strengthen the accessibility and long-distance mobility, ensuring competitive links along the Atlantic Axis and contributing to its cohesion and strengthening the socio-economic position of the country in the Iberian context and to promote social and territorial cohesion with a view to reducing regional disparities.

The rail network will tend to be fully electrified at 25kW, equipped with control-command and signalling systems according to the European standard (ERTMS/ETCS) and the main freight corridors with complete terms of interoperability and prepared for 750m-long trains to travel and with 1,400 tonnes of cargo in simple traction.

The realisation of the network’s strategy, estimated to be finished by 2050, will include intermediate targets corresponding to the years 2020 and 2030, with different priorities of action for each of the periods.

Investment Programme PETI 3+

Northern Corridor: Axis Aveiro–Vilar Formoso

(see point [A] in Figure 1 on page 74)

Construction is planned for 2015–2021 with an estimated investment of €1.304 billion.

This project aims at strengthening the rail link from the North and Centre of Portugal with Europe in order to enable efficient rail freight transportation, thus promoting increased competitiveness of the national economy. It also has the objective of restoring the securities in order to overcome the successive delays that have occurred, with a strong impact on the quality perceived by passengers.

Interventions will be developed to ensure: a) the railway corridor interoperability at national, Iberian and European – providing it with bi-gauge (1,668mm + 1,435mm); b) eliminate constraints in terms of
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1. Circulation figure relates to period from 01/01/2014 to 31/12/2014

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South Corridor: Sines–Caia Axis
(see point [B] in Figure 1)
Construction is planned for 2016–2022 with an estimated investment of €772.80 billion. This project aims to strengthen the rail link to the port of Sines, with a view to increasing its attractiveness as a gateway to Europe, especially in the Iberian Peninsula, extending its hinterland and articulating with other links to the ports of the Portuguese capital, Lisbon and the city of Setúbal.

The purpose of conducting this international rail link is to provide more efficient freight transportation, whether between a source and a final destination or as part of an intermodal logistics chain, thus promoting increased competitiveness of the national economy.

It will even enhance the mobility of people between the regions of Alentejo and Lisbon and Tagus valley and strengthen the external connectivity of the territory.

The project comprises the construction of new sections, including the connection of the Sines Grândola North and Évora / Caia link, as well as the modernisation of the existing sections, a corridor which should ensure conditions of rail interoperability in the Iberian national and European level. This railway line will be electrified, equipped with electronic signalling and will ensure the passage of 750m-long trains. The project also includes the correction of ramps and the electrification of the Private Extension of Petrogal Sines.

Atlantic Axis: Minho line
(see point [C] in Figure 1)
Construction is scheduled for 2016–2021 with an estimated investment of €156.4 billion.

The design of the Minho line modernisation is aimed in order to strengthen the conditions for mobility of people and goods in the regions of Greater Oporto and the...
Alto Minho province in Portugal, and those with the Spanish region of Galicia.

Interventions will be developed in conjunction with Spain guaranteeing rail interoperability along the corridor. The infrastructure should allow the crossing and the movement of 750m-long freight trains.

The completion of electrification will allow operators to take advantage of the investment already made in this line and enhance the allocation of electric traction material, conditions for programming schedules and consequently the optimisation of operating models, creating competitive conditions for railway operation.

The project comprises the electrification of Nine–Valencia/Frontier, the route of duplication between the towns of Contumil and Ermesinde, increasing the effective length for receiving/shipping convoys in the Darque Terminal and electrificated extensions of private SN Longos Maia and Secil in Trofa.

Atlantic Axis: Northern Line (see point [D] in Figure 1 on page 74)

Construction is scheduled for 2015–2021 with an estimated investment of €357.1 billion.

This rehabilitation project of the Northern Line, the backbone of the national railway network and part of a development strategy based on the principles of increased efficiency, competitiveness and sustainability of the transport system, boosting economic growth and increased social and territorial cohesion, comes from a critical intervention for the development of the railway system.

The completion of rehabilitation aims to provide this line of homogeneous operating conditions, eliminating constraints by increasing levels of safety and reliability of the infrastructure.

The rehabilitation prevents degradation of the infrastructure and will reset the threshold of the average speeds of 140km/h, not allowing, however, the increase of the TVM (maximum speed table) it will promote no major trace changes. Interventions range in eliminating additional margins currently anticipated in the Network Directory. They should also allow the crossing and movement of 750m-long freight trains.

The project includes interventions in the sections not yet modernised, the tripling of the section north of Alverca/Castanheira do Ribatejo and the elimination of constraints on the Tagus Valley Terminal and the Bobadela Terminal – and respective links to the National Railway Network.

Western Line, Algarve Line and Douro Line (see points [E, F and G respectively] in Figure 1 on page 74)

The projects relating to these lines are being studied at the moment.

Figure 2 shows the application of the strategy funds from the Investment Plan 2014–2020 which has, as priorities, Prospective and High Potential, potential flows and modal shares between Portugal and Spain.

Portuguese investment plans up to 2020

Infraestruturas de Portugal foresees a total investment of €5.28 billion in road and rail networks, among which there are €3.56 billion for railway projects.

Investment plans

Finally, and once defined with the central axes of our performance in terms of investment, a clear privilege to railway efficiency is expected, including freight transport, as in developing co-modality and inter-modality, and even optimising the structure on the vertical axis Lisbon–Oporto standpoint of mobility.

António Ramalho is Chief Executive Officer of Infraestruturas de Portugal which, from 1 June 2015, manages the Portuguese road and railway infrastructures. António has held management positions at banks including Pinto & Sotto Mayor, Totta & Acores, Credito Predial Portugues and Chemical Finance, where he was responsible for the areas of Strategic Planning, Operational Marketing and Management Control. António was also in the Executive Committee of the Santander Totta Group and Vice President of Millenium BCP Bank. In the transport and infrastructures sector, António was Financial Manager at RA VE (the Portuguese High-Speed Rail Project), Chairman of the Board at CP-Comboios de Portugal and at EP-Estradas de Portugal, as well as Chairman at REFER (the Portuguese railway manager).
The Spanish railway industry: a benchmark worldwide

The Spanish high-speed network has provided the country with one of the most modern and advanced forms of transport to currently exist, placing it at the forefront and as a world benchmark on the matter for many different countries wishing to implement and develop similar railway systems or infrastructures. How and why is Spain regarded so highly? Pedro Fortea, Director of Mafex – the Spanish Railway Association, explores.

Spain has one of the largest and most modern railway infrastructure networks in the world. Development of this network has involved the direct participation of a world leading industry that is noted for its high degree of internationalisation and innovative technology.

At the end of 2014, Spain had a railway network running over 15,200km, of which 11,483km belong to the conventional network, 2,322km to the high-speed rail line network on UIC gauge (HSR), 119km of mixed network and 1,207km of narrow or metre gauge.

In line with EU regulations in terms of both freight and passenger transport, the liberalisation of the sector is taking place in Spain, which will involve the participation of private companies in the operating of railway transport services in direct competition with the state-owned company RENFE. A series of private companies have already been working in the freight sector since 2007 and the process is now underway in the passenger sector.

One of the most notable characteristics of the railway system in Spain is the coexistence of different track gauges over its network: the Iberian or conventional gauge measuring 1,668mm and currently in use over most of the Spanish railway network, the standard, UIC or international gauge measuring 1,435mm that is present on the high-speed lines, and the narrow track gauge, which includes all gauges below 1,435mm and that, particularly in Spain, is practically the metre gauge (1,000mm).

In light of this unique characteristic of our railway network, the Spanish industry, led by the main manufacturers of rolling stock nationwide, has developed variable track gauge systems that enable passenger trains to use the two main gauges: international and conventional. This is, without doubt, a successful solution at present and, therefore, can be exported to other countries where similar solutions may be required either internally or on their borders with neighbouring countries.

High-speed network: one of the most modern and advanced in the world

Another aspect defining the current Spanish railway network is its high-speed network. Following over 20 years of operations, with the first line connecting Madrid and Seville starting in 1992, this network has provided Spain with one of the most modern and advanced forms of transport today, placing our country at the forefront and as a point of reference for many different countries wishing to implement and develop similar systems or infrastructures.

At the end of 2014, the Spanish high-speed network had 2,322km of UIC gauge high-speed lines for commercial use and over 2,000km undergoing study, planning or construction, making it the most extensive in terms of operational kilometres in Europe and third in the world after China and Japan. Over 120 million people have travelled in the 300-plus high-speed trains serving almost 100,000 users every day, connecting around 80 Spanish towns and cities and acting as a key element in improving the structure of the country and the quality of life of its citizens.
All of this development in terms of high-speed has also made our industry a world benchmark on the matter in terms of the design, construction, management and maintenance of infrastructures and rolling stock thanks to the wide range of companies that, through the different products and services they offer, are now able to deal with any type of demand from the railway sector anywhere in the world, with the most guarantees of quality, reliability and price-quality ratio.

With regards to the signalling of railway infrastructures, Spain is the European country with the highest degree of implementation of ERTMS (the European Traffic Management System). ERTMS is a train command and control system designed to advance in terms of interoperability, streamlining the compatibility of signalling and communications between track infrastructure and on-board equipment. Over 2,000km of our network is equipped with this system, which is the most modern and advanced to date.

Spain also has the longest interoperable stretch in Europe. This is the route between Barcelona and Malaga, where rolling stock equipped with ERTMS runs along an infrastructure supplied by four different manufacturers.

Lastly, since December 2013, RENFE in cooperation with SNCF, has been operating the Madrid–Barcelona–Marseille and Barcelona–Paris, Lyon and Toulouse lines, connecting 17 French and Spanish cities.

International presence: railway projects in more than 80 countries

The Spanish railway industry has been involved in the development and modernisation of the Spanish railways since the very beginning, in some cases with companies over 100 years old, developing and evolving its capacities and solutions to meet the requirements and needs of the different players seeking railway solutions.

This has provided companies with a degree of technological development and has enabled them to increase their capacities and experience in all segments: medium and long-distance, conventional, high-speed and freight transport.

It is therefore essential to ensure the appropriate planning of investments in infrastructures, particularly in railways, to ensure the sustainable development of this form of transport in any country and, in turn, provide a competitive and state-of-the-art railway industry that stands at the forefront of not only the domestic market but also foreign markets.

The presence of Spanish railway companies in general and of Mafex member companies in particular in foreign markets has increased notably over the past decade. The experience acquired in the domestic market and the increase in the railways in comparison with other forms of transport to solve the needs of different countries, regions and major cities around the world have, without a doubt, favoured this increasing presence abroad.

Nowadays, Mafex member companies have taken part in, or are involved in, railway projects in more than 80 countries over the five continents. The signing of contracts associated to these projects often means that being physically implemented in different locations on a stable basis is a need or a must.

Insofar as the projects completed, countries such as Brazil, the USA, India, Turkey, Algeria and Chile are most noteworthy, where a greater percentage of companies to have developed or taken part in different contracts and projects are concentrated. Likewise, European countries such as Portugal, the United Kingdom, France and Poland are relevant destinations for Spanish railway companies.

The participation of Spanish railway companies in international projects covers all possible areas; from the most demanding from a technological point-of-view, such as high-speed projects, to urban, medium and long-distance, as well as freight transport.

These companies form an entire industrial sector of service providers that fully cover the value chain required by any railway project: from its initial, preliminary phases to the construction of the infrastructures themselves, their traffic management, signalling and telecommunications systems and the supply of the necessary rolling stock, complete network commissioning and its subsequent maintenance, renewal and/or expansion, depending on each case.

There are many different examples and success stories in which the Spanish railway industry has played a significant role, including:

- Design, construction, operating and maintenance of the Mecca–Medina high-speed line and trains in Saudi Arabia for 12 years, for a sum of almost of €7,000 million
- Over 5,000km of ETCS systems operated by or contracted to Mafex companies around the world (more than 2,900km outside Spain)
- Leaders in the development of the first passenger diesel locomotives at 200km/h in the world
- On the top of the design and construction of large railway tunnels measuring over 25km in distance and of viaducts measuring over 500m for high-speed lines
- Design and construction of the longest unmanned underground line in Europe, 47.8km-long, with 52 stations and 33,000 trips/day (Barcelona)
- The Marmaray project in Turkey, the only one in the world equipped with ERTMS and CBTC systems.

These companies have been able to evolve towards a global business model, while adapting locally to the needs of each client. This local experience and the capacity to adapt to different international situations have made the Spanish railway industry a benchmark worldwide to be considered by any country wishing to have modern, sustainable, efficient and competitive railway infrastructures.

The ultimate aim of the Spanish companies is, therefore, to help create and implement a more sustainable, efficient transport system that best adapts to each market. The success of this objective is based on exporting the know-how acquired during the modernisation of the Spanish railway system, their extensive international experience and their continued support for the research and development of new technologies to improve world railway transport.
Adif International – sharing Spanish expertise and technology around the world

Adif – the Spanish Rail Infrastructure Manager – has an internationalisation strategy that continues to grow and support the Spanish railway market within the global arena. Fernando Nicolás Puiggari – Adif’s International Director – gives details of the latest accomplishments.

Over the last 30 years, Spain has undergone dramatic social and economic changes. Strongly linked to our entry in the European Union in 1985, this process has turned Spain into a modern, dynamic and socially advanced country with an increasing international reach: today, Spain is one of the leading countries in the EU, growing steadily and firmly overcoming the difficult years of the crisis. Today, some of the main companies in Europe in areas such as infrastructures, telecom or banking are Spanish and our healthcare professionals, engineers, architects and designers are present all over the world.

One of the best examples of what Spain has accomplished over the last years is our globally recognised infrastructures sector: six of the 10 top transportation concession companies are Spanish, and they build or manage about 40% of all major transportation concessions in the world. And they keep growing, since Spanish companies are taking their knowledge and experience into an increasing number of markets each year.

Among these world-leading companies, many have accumulated their expertise, among other fields, while developing the Spanish rail infrastructure – an area that has positioned Spain as one of the world’s leading references in the field, thanks to both the impressive work accomplished over the years and its high levels of technological expertise. As global leaders involved in some of the biggest international projects, our industrial and rail innovation sectors have helped drive this success. All of these factors have transformed Spanish rail into a prestigious brand.

Adif, alongside government institutions and industry, is undoubtedly one of the key players in this success. We are the company responsible for the supervision of the design and construction,
as well as the management of these rail infrastructures that have helped transform our country.

Spain’s commitment with rail really began over 25 years ago, when we took the daring step to invest in high-speed, but also in the renovation of our whole rail system, since Spain was convinced that developing rail infrastructures was key to guaranteeing social and territorial cohesion, which in turn would lay the foundation for economic growth. And this conviction was backed by our investments in railways, totalling around €80 billion between 2000 and 2014 alone, in new lines, new rolling stock and new technologies.

The World Economic Forum recently acknowledged Spain’s efforts by placing our country among the top four in the world in terms of the quality of our rail infrastructure.

As a result of these investments, Adif can count on highly skilled professionals, state-of-the art technologies, and we are backed by very experienced companies. We have also demonstrated our competitive- ness at every stage in the project process, from planning and design to construction supervision, management, and maintenance.

Adif was formally created in 2005 when the former state-owned railway company Renfe split into two companies: operator Renfe Operadora and network manager Adif. In its role as rail infrastructure manager, Adif has inherited 100 years of experience from the historic operator, and we participated in the construction of the largest high-speed network (almost 3,000km) in Europe, and the world’s second largest, after China. We have also renovated our conventional network, enhancing our lines to ensure better performances in terms of speed, safety or reliability. Adif also excels in stations management, ensuring economic efficiency and new sources of income for rail infrastructure managers.

We developed and deployed top notch technologies such as ERTMS along 1,800km of our lines, more than any other country in Europe, including some of our commuter lines, in order to provide safer traffic and more frequencies; we also developed the DaVinci system, alongside Indra – one of the most advanced railway traffic management platforms in the world. DaVinci manages Spain’s high-speed network and various networks abroad, such as the Medellin metro (Colombia).
and London Underground. Due to the coexistence of three types of gauge in our country – metre gauge (1,000mm), Iberian (1,668mm), and UIC (1,435mm) – Adif is also skilled in changeover facilities, for which we have developed our own technology. This is exported to other countries with various gauges, or whose gauges differ from those of its neighbours.

We are also responsible for important technological advances in the areas of interoperable catenary, substations, maintenance technology, energy efficiency, ballast-lifting and track models, among many others.

These enhancements, renovations and new management techniques have allowed Adif-experts to gather an extremely valuable expertise that we have been sharing with partners around the world, taking part in some of the major railway projects currently underway. This is also backed by our reliability as an institution, as well as the confidence generated by the whole of the country’s rail sector.

This expertise helped Spain win one of the world’s biggest contracts: the second construction phase of the high-speed line between Mecca and Medina in Saudi Arabia. This 450km, electrified double-track line has a total budget of €12 billion, of which €6.74 billion is earmarked for phase two, which has been entrusted to the Spanish-Saudi consortium. More specifically, the second phase includes the design and construction of the railway superstructure and installations (electrification, signalling, communications, etc.), the supply of 35 high-speed trains built for speeds of over 300km/h, servicing this rolling stock, and the running and maintenance of the line for a period of 12 years.

The line has drawn on the parameters of its European high-speed counterpart; it has a design speed of 320km/h, and the journey time between the cities of Mecca and Medina will take under two and a half hours. The maximum operating speed will be 300km/h. The line will comprise a UIC gauge twin track, electrification of 25kV 60Hz, and the European ERTMS Level 2 system. It will be one of the world’s safest high-speed railways, boasting the latest in railway technology which, along with the most modern equipment available, will allow for maximum safety and quality of service.

Works on Phase 2 are currently underway, including the installation of the catenary and the substation in some areas. This level of progress allowed for the start of the dynamic testing on a 100km-long section with very positive results.

This project is the largest of its kind ever to be undertaken by the Spanish rail sector, and the biggest international contract won by Spanish companies. It is a display of confidence in Spain and our technology, and an undertaking that is being used to gain experience for subsequent projects in other countries.

Internationalisation has been one of Adif’s long-term priorities – and a field where we have deployed our biggest efforts and will continue to do so in the future as a way to capitalise upon the vast knowledge we have accumulated over the years. Our goal is to extend our collaboration to new partners, at a time when the development of rail networks is one of the top priorities all over the world in order to solve the increasing mobility needs of the population, with a faster, cleaner, more reliable mode of transportation.

Our company has important references to back our international expansion, for instance, in Latin America, especially in Mexico and Colombia. In Mexico, Adif acted as technical advisor for the Buenavista-Cuautitlán suburban railway line (27km, seven stations), where we provided technical assistance in issues such as the definition of the Circulation Management Model, staff training, regulations and handbooks. Adif also provided assistance to the Colombian firm FENOCO, for the construction and operation on a 230km-long freight line (coal exports) in the north of the country.

Adif is also providing consulting services to European countries such as Denmark or Croatia on issues such as ERTMS deployment, project finance, PPPs, etc. We are also working alongside the EU in twinning programmes in Ukraine or Egypt in order to provide our know-how in issues such as traffic safety.

The knowledge transfer processes is one of our key areas. We trained experts from Russia, Turkey, Peru, Poland and Morocco for technical areas as well as management, regulation, and institutional development etc.

Following our competence in high-speed, Adif has been advising the authorities from the United States for the deployment of these kinds of lines on the East Corridor and in California, and we have also trained technicians and experts from Turkey, for the commissioning of the Turkish high-speed line between Ankara and Istanbul.

In the field of rail, Adif’s offer combines experience and technology, commitment and knowledge, government support, and the biggest and most reliable cluster of railway companies. These elements will certainly contribute in placing Adif as one of the top international rail consultants.

Fernando Nicolás Puiggari has shaped his entire professional career in foreign trade and international affairs, working as Project Manager in different projects, especially in Africa. In the public sector, he worked for the Spanish Institute for Foreign Trade, where he became Deputy Director. Fernando Nicolás holds a master in Engineering from the Polytechnic University of Madrid, and he joined Adif in 2012.
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