Railway-News

The latest news & reviews from the industry

Railway-News

M A G A Z I N E

Inside:

ISSUE THREE 2021

Optimize Rail Communications

On the Move

Rajant Kinetic Mesh® Brings Operator Control No Matter Where Your Assets Travel

Reliable, fully mobile networks are essential for supporting real-time vehicle-to-vehicle (V2V) communications and in-transit mobile connectivity for dynamic and ever-moving railroads. Only Kinetic Mesh delivers:

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Our mobile network maintains hundreds of data connections, enabling CBTC and **V2V communications between railcars and command centers.**

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Increased Safety & Improved Passenger Experience

Powerful connectivity supports safety applications like positive train control and onboard CCTV, as well as customer Wi-Fi accessibility.

Discover Reliable Rail Connectivity

Download our "Kinetic Mesh Boosts Speed & Efficiency for Intermodal Railyard" case study at rajant.com/railway-news

RAJANT

Letter from the Editor

Dear Readers,

Following the success of RailLive in June, which also marked a return of rail events in the UK, we are now looking forward to attending not just Railtex or Infrarail – previously held in alternating years – but both shows together for the first time. Railtex, the international exhibition of railway equipment, systems and services, will take place for the 15th time, while Infrarail, the international railway infrastructure exhibition, will take place for the 13th. The venue for the joint show will be the NEC in Birmingham – a city in rail terms now closely associated to HS2.

The event partners include Network Rail, HS2, the Rail Alliance, the Railway Industry Association, the Birmingham Centre for Railway Research and Education (BCRRE) at the University of Birmingham and British Steel, whose contribution – Building Stronger Railways with British Steel – you can read in this issue on p.35. You can also read a more in-depth article on Railtex/ Infrarail on p.4.

On p.8 you can read our round up of the latest railway news in bulletin format for a quick overview of the most important developments in the sector.

In this issue of the Railway-News magazine you will also find our directory of railway suppliers. Arranged in the overarching categories of Infrastructure, Rolling Stock, Data & Information, and Services, the article cover topics such as depot equipment, using satellites for intelligent vegetation management, converting methanol to hydrogen as a solution for obtaining hydrogen fuel for H2-powered rolling stock, condition monitoring, ensuring GPS signals in tunnels, funding rolling stock and many more.

Please enjoy the interactive features such as embedded videos to get the most out of your areas of interest.

We will be publishing our third issue of the year on 13 September. As always, if you want to be featured on our site or in our e-magazine, please get in touch with Andrew Lush at **al@railway-news.com** or **+44 7432 725001**.

You might also be interested to know that our sister sites **Bus-News**, **Future Transport-News** and **Airport Industry-News** are going from strength to strength. We are publishing our first Bus-News magazine in October. If you wish to receive that, you can sign up to our Bus-News newsletter **here**.

Josephine Cordero Sapién, editor-in-chief

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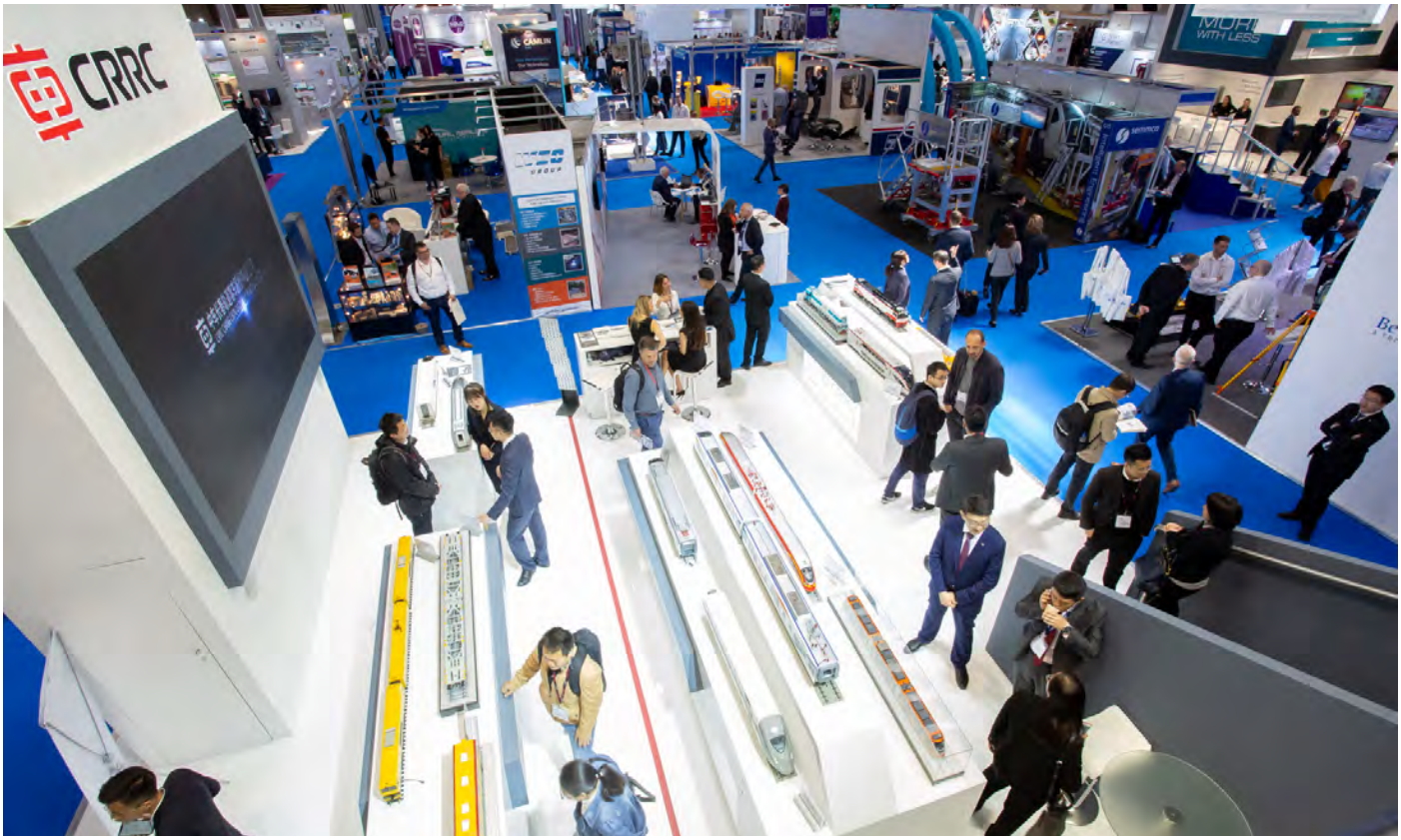


Welcome to Railtex & Infrarail 2021!

When: 7–9 September 2021

Where: Halls 11 & 12, NEC, Birmingham, England

Held in alternate years up until now, with Infrarail taking place in even years and Railtex in odd years, 2021 sees these two rail events joining forces, 'to shape the future of UK rail' as their strapline says.

There was of course no Infrarail in 2020 and no Railtex earlier this year due to ongoing pandemic-related restrictions. However, with the vaccine programme forging ahead at a strong pace there is hope at last that life can return to normal.

Railtex/Infrarail sees itself as 'the perfect platform for companies serving all aspects of the infrastructure and rolling stock sectors to demonstrate their capabilities and meet their customers'. More than 48 billion GBP will be spent on the railway in Britain over the next five years including on major projects, such as HS2, The Great Northern Rail Project, Crossrail 2 and TfL's Four Lines Modernisation. With passenger numbers recovering and set to reach 75 percent of pre-pandemic levels by the end of the year, this is the time to invest in rail so that the country does not move forward without the greenest mode of powered transport there is.

Future Focus Conference

Organised by the Railway Industry Association and held over the three days of the event, the Future Focus

Conference will address four main themes:

- Growth: rail can be a catalyst for economic growth, how can the industry/government ensure they are supporting investment, jobs and GDP?
- Geography: how can the industry/government ensure rail reaches and benefits all corners of the UK?
- Green: rail is essential for the country to meet its decarbonisation goals. How can clients and the supply chain work together to decarbonise the network even further?
- Global: countries around the world are investing in their rail infrastructure. What opportunities are there for the UK and where do the strengths of the country's rail industry lie?

The event's opening ceremony will be held on Tuesday at 10:30am. Over the next three days there will then be panel discussions and Q&As under the four main themes addressing topics such devolution and levelling up; decarbonising for a green future; free trade agreements; major projects; and equality, diversity and inclusion (EDI).

Speakers taking part are from Network Rail, RSSB, Siemens, Alstom and Northern Powerhouse Rail as well as government ministers.

Demonstrations

There will be an on-track display, with two lengths of track in the hall on the exhibition floor where exhibitors can display and demonstrate tools and equipment. British Steel is the sponsor of the track.

Exhibitors will also display their larger plant and machinery products for railway works at their stand.

Unlocking Innovation Programme

RIA has run its Unlocking Innovation Programme for more than a decade and this year it will take place at Railtex for the first time. Its aim is to bring together those with the ideas and ambition to drive change with those who can turn those ideas into reality. The programme has two strategic partners – the Network Rail R&D Portfolio, which is a 357 million GBP fund, and the UK Rail Research and Innovation Network (UKRRIN), a 92 million GBP partnership between academia and industry to drive innovation in the sector.

Throughout the show there will be morning and afternoon presentations covering four areas:

- High-level challenges/ opportunities from UK rail clients
- Near-term challenges/ opportunities from Tier 1 and Tier 2 companies
- Help with funding and partners to get an innovation to market
- Elevator pitches from a range of contributors including SMEs and start-ups

There will be an Unlocking Innovation Showcase Stand where the presenters will be exhibiting, including organisations such as Network Rail, UKRRIN, HS2, InnovateUK, Network Rail's Rail Innovation Development Centres, Tier 1 suppliers, regional authorities and others.

RAILTEX

INFRARAIL

Supplier Spotlight

Supplier	Stand
Alstom Transport	Hall 12 Stand B11
Arentis	Hall 12 Stand E46
Axminster Carpets	Hall 12 Stand B30
Bender UK	Hall 12 Stand B11
Bespoke Composite Panels & Corex Honeycomb	Hall 12 Stand H10
Bollé Safety	Hall 12 Stand B47
British Steel	Hall 11 Stand N71 | Track TA9
CoMech Metrology	Hall 12 Stand G17
Hübner UK	Hall 11 Stand N46
Jewers Doors	Hall 11 Stand P42
Mechan / NextSense	Hall 12 Stand D31
Nomad Digital	Hall 11 Stand P69
Pandrol – Vortok	Hall 11 Stand P40
Radionika	Hall 11 Stand N67
Thales UK	Hall 12 Stand G57
Thermit Welding	Hall 12 Stand E50
Totalkare	Hall 12 Stand F46
Worldsensing	Hall 12 Stand D34
Zöllner UK	Hall 12 Stand G40
Zonegreen	Hall 11 Stand N02

In the News...

HS2's Tunnel Boring Machines Are on the Move

HS2 launched its first tunnel boring machine (TBM), Florence (after Florence Nightingale), in May 2021 – one of 10 TBMs that will dig the 64 miles of tunnel on Phase One of the high-speed railway. Florence measures 170m and will dig 10 miles of tunnel under the Chilterns for the next three years.

The following month HS2 launched a national vote to name the TBM that will dig under **Long Itchington Wood** in Warwickshire. It will launch later in 2021 and will spend one year digging a one-mile twin bore tunnel. The shortlisted names are Anne (after Anne Hathaway, wife), Dorothy (Dorothy Hodgkin, first British woman to win the Nobel Prize in Chemistry) and Mary Ann (Mary Ann Evans, who is better known by her pen name George Eliot and famously wrote Middlemarch).

In July, then, HS2 launched its second TBM – Cecilia – at the Chilterns site. The two TBMs are due to break through at the same time despite their different start times because Cecilia (after astronomer and astrophysicist Cecilia Payne-Gaposchkin) will run slightly faster, aided by geological data fed back by Florence.

Excavation for the first of five vent shafts that will sit over the **Chiltern tunnels** also began in July. It will be 78m deep and is located near Chalfont St Peter.

Chalfont St Peter vent shaft excavation July 2021 © HS2 Ltd

At the beginning of August Pacadar was awarded the tunnel segment contract for HS2's **London tunnels**, twin tunnels measuring 13 miles each. These segments will be used by the two TBMs that will launch in early 2022.

The London tunnels will run between London Euston station and West Ruislip. Other HS2 tunnels:

- The **Wendover tunnel** in Buckinghamshire, a 'cut and cover' tunnel measuring just under one mile in length
- **Chipping Warden tunnel:** 1.5 miles
- **Greatworth tunnel:** 1.6 miles
- **Bromford tunnel**, West Midlands: 3.5-mile twin-bore tunnel
- **Burton Green tunnel**, West Midlands: the shortest Phase One tunnel, 0.5 miles long

Paddington Elizabeth Line Station Transferred to TfL

The Paddington Elizabeth Line station is the sixth of ten new stations that has been handed over to TfL. The work was delivered by the Costain Skanska joint venture, which completed all the key elements of the station such as the main building and structural works as well as highways and traffic management works, system-wide communications equipment and materials, mechanical, electrical, fire and public health works, landscaping, site restoration and other urban realm improvements.

Mark Wild, Crossrail Chief Executive, said:

"I am delighted that Paddington Elizabeth line station has been transferred to Transport for London. This beautiful new station will provide a gateway for those travelling from the Thames Valley or Heathrow into central London and beyond, providing greater transport links, better job opportunities and a significant economic boost."

The ORR Is Consulting on Speedier Access to Rail Ombudsman

The Office of Rail and Road (ORR) is consulting on options to reduce the time passengers in Britain must wait before seeking resolution with the Rail Ombudsman to improve handling of passenger complaints. More than half a million passenger rail service complaints were responded to between April 2019 and March 2020. Now, the ORR has proposed a new code of practice that aims to simplify

and strengthen requirements on complaints handling to ensure they keep up with passenger expectations.

No Traces of Covid-19 Found at Major UK Stations

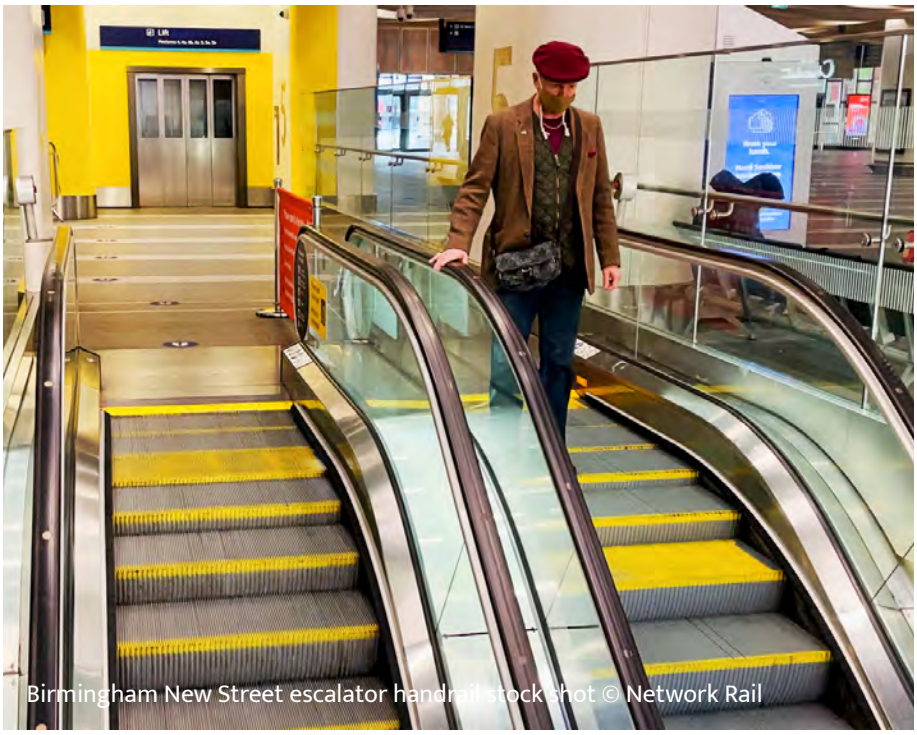
University academics examined four major British railway stations – Liverpool Lime Street, Birmingham New Street, London Euston and Manchester Piccadilly – during two rounds of testing and found no traces of Covid-19. The academics looked at places regularly touched by passengers, such as handrails, escalators, ticket machines and benches. These were swabbed. Furthermore, hour-long air samples were taken on station concourses in January and June and these tests were also repeated on a number of intercity train routes. All lab tests by Imperial College London showed zero Covid-19 contamination of any surface tested or airborne particles of the virus in stations or on trains.

Milestone Reached on the Dawlish Sea Wall

The new sea wall at Dawlish has reached a milestone on its way to completion after the wall panels were successfully installed. All 143 concrete wall panels are now in place. The panels range in size from 6.09 metres to 6.69 metres and weigh between 11.55 and 12.95 tonnes. Concrete is being poured behind the panels to backfill the area between the new and old sea walls. To keep the carbon footprint as low as possible, low-carbon concrete was used for the backfill.

National Strategy to Boost Accessibility for Disabled Passengers Launched

An audit of all UK train stations, which was promised in the Williams-Shapps Plan for Rail, has been launched. It is to identify improvements and highlight existing areas of excellence. These findings will then form a new public database to help passengers plan their journeys. Together with input from disabled passengers, this database will shape future investment in accessible rail travel.



Birmingham New Street escalator handrail stock shot © Network Rail

Dawlish sea wall on 23 July © Network Rail

RAILWAY INTERIOR Innovation Summit

09-10 NOVEMBER 2021

Auditorium Friedrichstraße | Berlin, Germany

CELEBRATING THE EUROPEAN YEAR OF RAIL
THROUGH COLLABORATIVE AND INNOVATIVE RAILWAY INTERIOR

Hosted by AISLING NORTON, Irish Rail: Iarnród Éireann Irish Rail

2021 SUMMIT SPOTLIGHT

According to European Commission, 2021, is seen as the year of European Rail. **Andreas Scheuer**, German Federal **Minister for Transport and Digital Infrastructure**, President of the Council mentioned that in 2021, 'Rail is **the answer to many critical issues** in mobility, such as climate neutrality, crisis resilience and safety. **The Year of Rail aims to give a boost** to the sector and to encourage **more tourists, businesspeople and manufacturers to choose the train.'**

RedCabin designed the summit to encourage manufacturers, operators, suppliers, and design houses to collaborate and utilizing the **'year of rail'** moment to improve passenger experience, current and future railway interior designs.

OUR CONFIRMED SPEAKERS INCLUDE:

- **MICHAEL SOHN**, Head of Design, *Alstom Group*
- **XAVIER ALLARD**, Design Director, *Alstom Group*
- **KIRSTY DIAS**, Managing Director, *PristmanGoode*
- **MAG. SARAH FESSL**, Fernverkehr & New Rail Business, Customer Experience, *ÖBB-Personenverkehr AG*
- **MARC JAMOT**, CEO, *Compin Fainsa*
- **DIETER KOBEL**, Director Design Management, *Tricon AG*
- **PHILIP DE WULF,** CEO, *Yellow Window*
- **ALESSIA GIARDINO**, CMF Designer Lead, *Arrival*
- **ALEXANDER WETZL**, Deputy overall Project Manager, VDV TramTrain, *VBK - Verkehrsbetriebe Karlsruhe GmbH*
- **JULIANE TRUMMER**, VP of Strategy & Design, *Mormedi*
- **CARSTEN HUTZLER**, Head of DB IdeasTrainCity Customer Experience Strategy (P.FMP 11), *DB Regio AG*
- **DR. MARK VAN HAGEN**, Principal Consultant Customer Experience, *Nederlandse Spoorwegen* and more ...

WHAT YOU WILL EXPERIENCE ON SITE:

- KEYNOTE SPEECH
- INTERACTIVE PANEL DISCUSSION & AUDIENCE Q&A
- PRESENTATIONS
- INTERACTIVE WORKING GROUPS
- SPEED NETWORKING
- EVENING DINNER

For further information, sponsorship opportunities or registration please call Andreas Wibowo:
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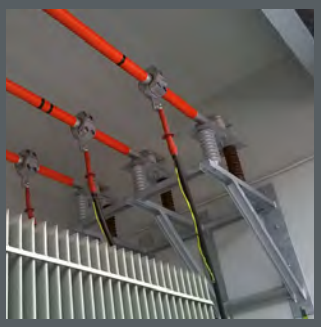
Directory

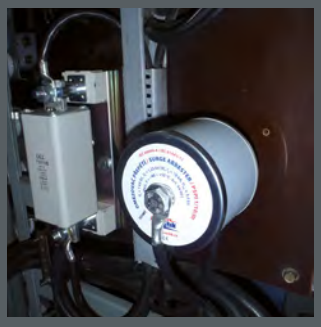
PROTECTION AGAINST ATMOSPHERIC AND SWITCHING OVERVOLTAGE IN AC SYSTEMS

protection of high voltage transmission systems, transformers, switching equipment and HV cable systems


PROTECTION AGAINST ATMOSPHERIC AND SWITCHING OVERVOLTAGE IN DC SYSTEMS

protection of DC traction system, rail traction vehicles and equipment in DC systems


LOW VOLTAGE LIMITERS FOR RAILWAY VEHICLES IN DC NETWORK

protection of non-live parts of metal structures in DC traction power supply systems



PROTECTION AGAINST ATMOSPHERIC AND SWITCHING OVERVOLTAGE IN AC NETWORKS

protection of LV outdoor lines, household connections, distribution transformer switchboards



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Jewers Doors

Keeping Your Facility on Track

Lilyfield Maintenance Depot – Sydney Light Rail – 6 sets of Swift-SEW bi-folding doors

For more than 35 years Jewers Doors has been supplying their Phoenix range of horizontally sliding and folding doors to businesses across the globe.

The doors' robust design, excellent insulation properties, ease of operation, safety, reliability and low maintenance make them the perfect choice – whatever the industry.

Engineered and manufactured with the highest-quality components and complying with stringent European safety stands, the Phoenix range of doors is rapidly becoming the mainstay of rail facilities around the world, with projects completed throughout the UK and as far afield as Bergen, Doha, Dubai, Hong Kong, Kuala Lumpur, Sydney and Auckland. Since 2008, Jewers Doors has provided more than 300 doors for railway depot and station projects.

Industrial Folding Doors for Railway Facilities

The Swift-SEW bi-folding door has been purpose-designed to accommodate the taller openings, overhead electrification wires and rail tracks through the doorway, whilst not forgetting the daily

operational demands and unrivalled safety requirements of modern rail maintenance depots.

Purpose-Designed Drive Systems for Bi-Folding Rail & Tram Depot Doors

Based on the original Swift door, the Swift-SEW incorporates studier hardware and a powerful central drive unit working in tandem with a programmable smart relay control board to create an extremely smooth, safe and future-proof door system that will last as long as the building.

The door can be integrated with building management systems (BMS), depot protection systems (DPS), heating, ventilation or air-conditioning (HVAC), and train wash plant to create ultimate control. A visual display on the door control panel provides real-time status or error reporting to the user and back to Jewers' HQ for instant fault diagnosis.

Versatile Multi-Leaf Sliding Folding Doors

The Swift-SEW door will accommodate openings up to 5m wide. For wider openings where greater flexibility of rolling stock movement is required, horizontally moving Osprey and Kingfisher doors provide versatile opening solutions not possible with vertically moving doors. Powered operation is available for doors of up to 20m wide while there is no limit to the width for manually operated Osprey doors, which would typically be used across railway traversers or for wider depot openings.

A recent installation at Crown Point Depot – Road 14 in Norwich. One set of Osprey folding doors for an opening 6.5m wide by 5m high. The door is electrically operated with four leaves folding to each side.

Nexus Training Facility in South Shields – two sets of Swift-SEW bi-folding doors

Jewers Doors solutions are not just about being robust and durable; the Phoenix range also combines aesthetic appeal with modern technological advancements to offer rail facilities a comprehensive package that not only gives a reliable solution but can also complement new and existing architecture.

Jewers Doors is well equipped to take on extra business having recently moved into its own brand-new purpose-built headquarters in Biggleswade, Bedfordshire. The new premises are more than double the size of the old building, boasting 45,700 sq ft of factory and over 12,000 sq ft of office space. The Phoenix side of the business is currently installing a state-of-the-art 8m panel press and a new powder coating plant is already in action. The new facilities will hugely improve the quality and service they are able to provide for their folding sliding doors.

Some of the first orders to come off the production line at their new factory will be for five sets of Swift-SEW doors for Siemens Mobility at their brand-new train manufacturing plant in Goole, East Yorkshire. And a fantastic order for 14 sets of Swift-SEW doors for the new Etihad Rail Network at the Al Faya Depot in Abu Dhabi.

Jewers Doors will be exhibiting at Railtex on 7th – 9th September at the NEC in Birmingham – Hall 11 – Stand P42 – drop by to discuss your next project for Rail Depot Doors.

WHAT'S THE COST OF LIVING?

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safe working solutions

Renowned as global market leaders in depot protection systems, the **SMART DPPS**™ delivers physical protection from vehicle movements to rail depot staff whilst providing visual and audible warnings.

RAILTEX
INFRARAIL

7 - 9 September 2021
NEC, Birmingham

Visit us at Stand N02, Hall 11

www.zonegreen.co.uk Tel: +44 (0)114 230 0822 info@zonegreen.co.uk

Zonegreen

Reducing the Risks in Rail Depots

Even though the UK boasts one of the safest railways in the world, accidents are still happening with worrying frequency.

With a deadly combination of high-speed vehicles, high-voltage electricity and powerful machinery, maintenance depots are undeniably dangerous places to work. It is no surprise that a quarter of all workforce fatalities have occurred in depots in the last five years and they account for 20% of all workforce harm, according to the Rail Safety and Standards Board's (RSSB) latest Annual Health and Safety Report.

The continued level of incidents in depots prompted the RSSB to conduct an analysis with the Passenger Operators Safety Group into patterns in reported injuries. The study found clear peaks in incident rates at 10am and 11pm, which correlate with peak times for trains arriving at depots for servicing after the morning rush hour and at the end of the day.

The RSSB states: "*After arriving back on depot…trains are moved for refuelling, servicing and cleaning. This involves activities such as coupling and decoupling.*"

It concluded that more attention needed to be paid to how trains enter depots, particularly during peak times.

Protecting Our Depot Workers

If we are to mitigate accidents and injuries in rail depots, it is clear the movement of vehicles needs to be made safer. The easiest way to do this is to remove the margin for human error.

Zonegreen's flagship Depot Personnel Protection System (DPPS) is an innovative, automated means of allowing the safe and efficient movement of vehicles in and around maintenance depots. Workers are able to create 'safe zones' in which to operate, which are physically protected by Network Rail-approved powered derailers.

Staff members log on to DPPS using contactless RFID tags that identify where they are working. The system then prevents any vehicle movements being authorised on to that road until all staff members have logged off and the road is clear. In the event that a signal is passed at danger (SPAD) the vehicle is physically prevented from entering the maintenance shed by either a Network Rail-approved derail or wheel stop. When a train needs to be repositioned, a designated person can give permission for the movement using the system's user-friendly road end control panels, which are placed strategically within the depot (normally next to the doors), giving a clear line of sight to incoming and outgoing activity.

Only after the derailer has been lowered will the proceed signal be given. Audible and visual warnings are simultaneously activated on the road when the derailer is lowered to indicate a train is on the move.

Certified Risk Reduction

Unlike most competitor depot protection systems, DPPS has been independently certified to meet hardware safety integrity requirements of SIL 2. This is a measurement of the performance required for a safety instrumented function and is defined by assessing the relative levels of risk reduction it provides.

Although there is no defined SIL requirement for depot protection, some alternative products integrate an off-the-shelf SIL2 PLC into an otherwise untested system. However, Zonegreen has subjected the whole of DPPS to the functional safety assessment, demonstrating its commitment to improving the depot environment for maintenance workforces. The firm's continued research and development has enabled its team to create a standard DPPS product that can be simply and quickly configured to each depot's unique layout. This means every installation, going forward, will be certified to SIL2 with respect to hardware failures.

Safety Demonstrations

Zonegreen will be exhibiting its market leading depot protection system at Railtex/Infrarail this year, 7–9 September, on stand N02 in Hall 11 of the NEC. Visitors will be able to see first-hand how staff are protected and vehicle movements are controlled via the RFID-operated road end panel and powered derailers. They will also be able to learn more about the benefits of the Depot Manager software.

Gemma Houghton, the firm's sales and marketing director, said: *"After a very long wait, we are really looking forward to catching up with old friends and introducing DPPS to new contacts at Railtex.*

"We have been hard at work throughout the pandemic installing DPPS at UK depots and looking for innovative ways to improve the system and demonstrate its effectiveness. Being certified to meet hardware safety integrity requirements of SIL2 is a fantastic endorsement of our product and we are very proud to have achieved this independent accreditation."

For more information about DPPS, call at **stand N02 at Railtex**, telephone Zonegreen on (0114) 230 0822 or visit **www.zonegreen.co.uk**

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Mechan

Mechan Showcases Bespoke Skills

Mechan – manufacturers of the ubiquitous yellow lifting jacks – will be back at this year's Railtex/ Infrarail to show visitors the reliability and versatility of their wide range of rail depot maintenance equipment.

Lindsey Mills, the Sheffield-based firm's sales manager, said: "*After such a long break, we're really looking forward to be exhibiting again. Railtex is the perfect opportunity to catch up with old friends, meet new colleagues and learn more about the impact Covid has had on the industry at large.*"

Mechan is best-known for its flagship jacks, which grace some of the most advanced depots across the globe, and orders have remained strong throughout the pandemic, with interest growing in the newest addition to its range, a version designed specifically for the tram and light rail markets.

The firm has recently delivered one of its largest-ever orders of lifting jacks to London Underground's Acton depot. A total of 44 ten-tonne units were installed, taking the overall number of jacks in use at the facility to 68. They are housed in the site's new train modification unit and in the first instance, will be used to assist with an ongoing project to reduce increasing maintenance costs and improve the reliability and efficiency of the Central line fleet.

The 44 new jacks have been designed to the same specification as 16 existing units supplied to Acton in 2017, with moving anvils and a base that allows them to be transported around the depot by pallet truck, for added versatility. Modifications to the older jacks were made last year, so they will all work in synchronisation, using the firm's innovative control system. Wiring updates were also made to eight jacks supplied in 2015, so they too can be used with the latest order, if required.

Mechan's control system is one of the most flexible and advanced on the market. Using a portable panel, synchronised chains of jacks can be set up, raised and lowered safely and efficiently by just one operator. This enables work on the underside of trains to take place at a comfortable height without decoupling, saving valuable servicing time. The remote handset has a full-colour touch screen that

provides constant feedback on the lift and invertor technology is used to produce power savings, compared to similar products.

The firm's cost-effective lightweight jacks retain all of the features that make Mechan products so revered by the industry, but have a lower lifting height to cater for the proximity of light cars to the rail. The jacks have a different base arrangement and built-in assembly for ease of movement around a depot and can be linked together in sets of any length.

An Unrivalled Record for Traversers

One of Mechan's many strengths is its ability to create bespoke equipment that suits the unique needs of each client and the environmental constraints of depots.

This is perhaps best illustrated by the rail traversers it produces, which include the largest installation in the country at the Port of Felixstowe. Each traverser is built to order and incorporates the latest technology, ensuring it is adaptable enough to handle future trains that are expected to be longer than those in use today.

Mechan's latest installation is at the new £29 million Intermodal Rail Freight Terminal that is being constructed by main contractor, Winvic, for Prologis at its DIRFT logistics park in Northamptonshire. Known as DIRFT III, the 344-hectare project will include a state-of-the-art rail freight terminal. The traverser is situated outside the terminal building, at the end of 9km of new lines and will be used to move Class 66 locomotives in a perpendicular direction to the tracks, so they can return to service after loading/unloading. This has allowed the terminal length to be shorter, as a head shunt isn't required.

Working closely with Winvic, Mechan designed the multi-rail traverser to suit the specific conditions at DIRFT III. It spans 28 metres, has a capacity of 140 tonnes and comprises an access platform, plus loco buffer to prevent trains overrunning.

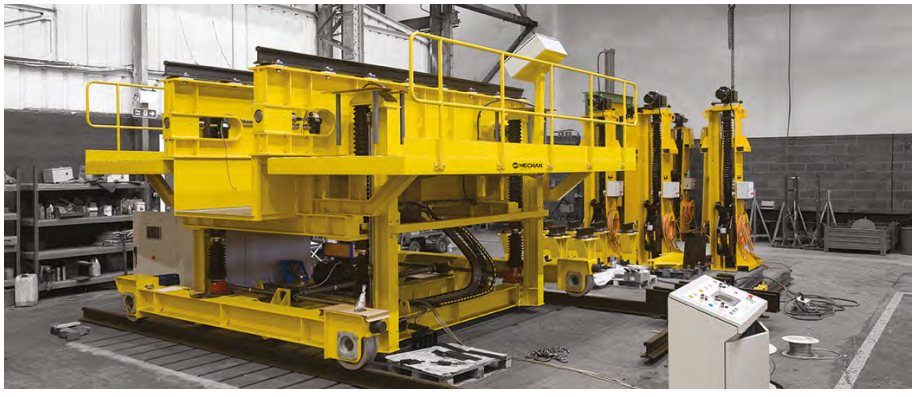
Innovative Bogie Drops

Bogie drops are another area in which the firm's specialist engineers can save depot operators time. Thanks to their innovative design, it is feasible to undertake a complete bogie change in just two hours. Like traversers, each bogie drop is made to the client's requirements, enabling complete bogies, wheelsets and other underfloor modules to be changed quickly at track level, whilst maintenance, inspections and cleaning can continue at the same time.

When a bogie needs changing, the vehicle is positioned centrally on the bridge section of the drop. Support beams spanning the pit are pushed into position and hydraulic jacks take the weight of the vehicle. The bridge section can then be lowered and traversed to the side and exchanged for a new bogie. Norwich's Crown Point depot is the latest recipient of a custom-made bogie drop, which was installed earlier this year as part of the largescale development at the facility. It is being used to remove underframe equipment, including bogies, wheelsets, transformers and cooling units from the new Stadler and Bombardier (now Alstom) trains, introduced on Greater Anglia's intercity and Stanstead express services.

Mechan has worked closely with main contractor, Taylor Woodrow, to enable the depot to remain operational throughout the installation. The bogie drop was designed specifically to work with the Stadler vehicles, which have articulated bogies that sit between carriages, meaning the ends of two cars need supporting during removal. It has a roll over capacity of 75 tonnes and incorporates mini jacks that act as the body supports. Depot operator, Abellio, also specified automatic wheel stops and interlocked access gates as additional safety features, which were designed into the unit, drawing on past experience.

To find out more about Mechan's extensive range of depot maintenance equipment, speak to its Railtex team on **stand D31 in hall 12** of the NEC. To find out more about the firm's bespoke design services, telephone (0114) 257 0563, visit **www.mechan.co.uk** or follow the firm on Twitter, **@mechanuk**



Emeg®

A TRADITION OF RAIL EXCELLENCE

With headquarters in Chesterfield and international offices in Dubai, we provide a range of specialist design, M&E and maintenance services and innovative depot solutions to rail operators around the world.

20 YEARS OF RAIL EXPERTISE

AN UNRIVALLED SAFETY RECORD

100% FOCUSED ON THE RAIL INDUSTRY

Middle East RAIL

Visit us at the Middle East Rail Expo on **Stand C20**
12-13 October 2021

www.emeg.co.uk

Emeg Group

A Year of Growth for Emeg Group

Make hay while the sun shines, as the old adage goes, and while it's been a pretty gloomy 18 months for most, Emeg Group has taken full advantage of the opportunities that have come its way, resulting in a sustained period of growth and expansion into international markets.

Established almost 25 years ago as a rail-focused engineering company, Emeg Group now comprises a head office and state-of-the-art manufacturing, distribution and training centre in Chesterfield, a design office in Manchester and a new international base of operations in Dubai.

Emeg provides a range of specialist services individually tailored to the needs of owners and operators of rail facilities, depots, stations and sidings, including design, engineering, mechanical, electrical, plumbing, maintenance and Depot Protection Systems (DPS). In fact, Emeg engineers were involved in the design and installation of the very first DPS at the newly built Norwich Crown Point depot in 1980.

"I've worked in the rail sector for over 40 years, on everything from station upgrades and refurbishments to re-signalling and permanent way projects, so there isn't much I haven't seen. The one thing that's stayed consistent throughout is my firm belief that safety is a behavioural culture and an attitude that needs to be driven from the top down. Our unprecedented success in continuing to achieve zero accidents over our full trading history is a tribute to our safety-first work ethos."

Managing Director, Richard Simmonite

A one-stop-shop for rail operators, Emeg also supplies a wide range of industry-leading depot products, including carriage wash machines, fuelling systems, fume extraction, fluid mixing, air purification and ventilation, controlled emission toilets, shore supplies, lighting, cleaning products, depot heating and cooling, laser scanning, signalling systems, auxiliary products and a full turnkey, smart depot integration solution – depotCONNECT.

Maintenance Manager, Graham Mansell, said: "*I think it's fair to say that the depot products and services we provide to global rail operators are second to none, but what really sets us apart is our commitment to post-install aftercare, uptime and lifecycle replacement. By offering the very highest levels of depot maintenance services, including planned preventative measures, we help to ensure that our clients can run their rail facility safely and at maximum efficiency, wherever they are in the world.*"

Emeg's experienced team is focused on delivering the highest level of service, efficiency and safety, with its Nil-Accident Culture HSE platform (Have you got the NAC?) and a growing list of accreditations to prove its commitment to quality. Emeg's impressive client list includes Network Rail (as a Principal Contractor), Etihad Rail, Bam Nuttall, Bombardier, Virgin, Buckingham Group Contracting, Nexus, GallifordTry, Balfour Beatty, Vinci, Kier and Morgan Sindall, to name just a few.

In the past six months, Emeg Group has opened a new office in Dubai, which will enable it to better serve its growing list of clients in Europe, the Middle East and Africa (EMEA) on some of the most ambitious rail engineering projects taking place in those regions.

General Manager (Middle East, Africa & Asia), Martyn Brain, said: "*I'm very much looking forward to continuing to drive the growth of Emeg Rail Systems' rapidly expanding international business operation throughout the Middle East, Africa & Asia, whilst working closely with new and existing clients to drive sales of our new portfolio of OEM and in-house products.*"

More recently, back in the UK, Emeg has opened a new, purpose-built manufacturing and distribution 'Centre of Excellence' in Chesterfield, which means its entire product range can now be manufactured in-house and under one roof, resulting in greater quality control, a reduced carbon footprint, reduced risk in the supply chain, lower transportation costs, and a more direct contribution to the UK economy.

No longer having to rely on 3rd-party manufacturers and suppliers, coupled with streamlined communication from end to end, means Emeg Group has increased and optimised its manufacturing output, vastly improved its lead times and can now accept smaller

minimum order quantities from its international customer base.

In addition to manufacturing and distribution, this brand-new facility will also include a cutting-edge Training Centre and Rapid Product Development Centre for rapid prototyping, factory acceptance testing, and the education of the next generation of Emeg apprentices and engineers.

Emeg Group's Operations Director, Carl Backhouse, said: "*We're all really excited about the overseas expansion and new opportunities to showcase our rail expertise in international markets, as well as the new facility we've just brought online here in the UK. The R&D centre will allow us to develop new products in response to the specific needs of our customers, so we can bring innovative, fit-for-purpose products to market quickly and cost-effectively.*

"*We're looking forward to further improving our operational efficiency and increasing value for our clients by fully adopting 'lean manufacturing' principles and processes.*"

It isn't just Emeg Group's global reach and property portfolio that has expanded, the team itself has grown dramatically over the past year, with the design team, in particular, more than doubling in size as a host of time-served BIM/CAD Engineers, Systems Architects, Electrical Estimators and Controls Software Engineers has come aboard to meet customer demand.

Head of Design, Alex McAdam, said: "*We're really pleased to be welcoming such talented individuals to our design team. It's great to see the strength of the Emeg Group brand when it comes to attracting top-tier designers and systems architects – making us an employer of choice within this highly competitive sector. Our people have always been our key differentiator as it's they who ensure our products are the pinnacle within the rail industry, both domestic and international.*"

The increased demand for Emeg's services comes from a series of high-profile contract wins, including a partnership with Buckingham Group Contracting on the 100m GBP Beckton DLR depot extension project, HVAC and fire suppression upgrade works for the existing Sandhills IECC relay rooms in Liverpool, and the design and build of the main depot at Al Faya, the largest and most important O&M facility in the Etihad Rail network in Abu Dhabi.

Sales Manager (EMEA), Ryan Pickard, said: "We are very proud to be working with, *and strengthening our relationships with, Buckingham Group, Network Rail, Merseyrail and Vinci on these prestigious international projects. As one of very few PADs-approved principal*

contractors, we're delighted to be a trusted partner on multi-million-pound projects where critical upgrades are required to vital facilities whilst the network remains live 24/7 with zero-hours planned disruption. It's the kind of challenge our dedicated team of experts relishes!"

To find out more about Emeg Group and to download the latest product catalogue, visit **www.emeg.co.uk** or call +44 (0)1246 268678 to learn how Emeg can improve productivity and efficiency on your next rail project.

You can also visit them on **Stand C20** at the **Middle East Rail Expo** in Dubai on 12 & 13 October 2021.

LiveEO GmbH

Better from Above: How Satellites Revolutionise Track Maintenance

A revolution of sorts is taking place in Earth observation. The number of satellites in orbit is going to increase from about 8,000 to 57,000 by 2029. Along with this expansion comes a massive increase in higher-quality data, leading to new use cases for satellite imagery analysis. One of those use cases is identifying threats to linear infrastructure, including vegetation encroachment and ground deformation.

Vegetation around infrastructure networks, such as railway tracks, can cause severe problems for operations. Equally concerning are ground movements, with landslides or even derailments the result.

Traditionally, networks dealt with these risks by hiring individuals to perform manual inspections of the track. This demands both significant time and staffing, resulting in much higher costs for operating. Satellite-based monitoring provides high-frequency overviews of the entire network along with actionable insights for segments that demand immediate attention.

Satellite Data & AI-Powered Vegetation Management Make a Difference

LiveEO analyses vegetation encroachment to railway tracks using satellite data. The approach makes grid-wide up-to-date overviews of vegetation risk along the asset a reality.

The company has developed a vegetation classification system based on state-of-the-art artificial intelligence, which enables the continuous updating of satellite data to monitor vegetation and provide a better assessment of risk. The insights are directly accessible through LiveEO's web and mobile app.

As a result, in many cases, networks no longer require manual, on-site inspections,

depending on the software's risk assessment. What was once monitored on foot, by car, or even helicopter can now be recorded and viewed from space. The data used for railway monitoring features spatial resolutions down to the sub-metre range.

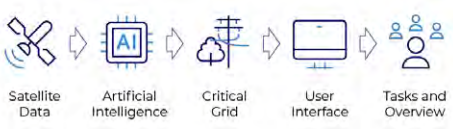
The distance between vegetation and the assets is determinable through satellite data analysis. So too are multiple other parameters, all of which improve the risk classification—even the height of trees or even trees outside of the right-of-way are captured. Satellite analysis can also determine healthy trees vs. sick trees. High-resolution and multispectral data allow the system to identify different vegetation species.

Condition-based vegetation management supports the careful removal of trees that present a risk to the operability of any network. Despite this, climate change is unpredictable, and the severity of storms will likely increase vegetation falling into the right-of-way.

The accuracy of LiveEO's solution has been validated on field trips repeatedly © LiveEO GmbH

From Satellite to Ground Worker

The process from automated data acquisition to the provision of the results is visualised in this image:



The process from data acquisition to vegetation managers and task execution

The continually updated satellite data is downloaded via API from various satellite constellation operators and combined in a database. There, artificial intelligence does the vegetation classification and performs an automated risk assessment of the data. Based on the risk assessment, the software automatically generates maintenance and inspection tasks and prioritises them.

A web application or mobile app is then used by supervisors and on-site personnel to efficiently access the information and plan work. The in-depth risk assessment makes it easier to prioritise the right tasks. The system goes beyond analytics and allows work orders, which are automatically generated based on the risk assessment, to be assigned directly to the appropriate staff members or subcontractors. Making the switch to satellite-based vegetation monitoring improves the efficiency and transparency of the vegetation management process. Savings in operational costs have been reported to be up to 30%.

Ground Deformation Detection

Detection of ground deformation is another important application of satellite analysis for railway operators. Ground deformation is not visible to the naked eye but can cause significant damage to railway tracks and even lead to derailments. Even slight elevation changes can be the first sign of seriously concerning events such as dam failures or landslides.

Most research indicates that half of all train derailments are caused by bent or damaged rails. In the U.S., there are, on average, 3.7 derailments per day. In the EU, there were 68 such derailments in 2016. Not only are these derailments a cause of fiscal concern, but they

"Keep in mind, even the most on-site measurements could not map large areas on a similar scale with comparable accuracy."

also come with an increased risk to passengers.

To combat this problem, LiveEO utilises satellite-supported radar data monitoring. SAR (Synthetic, Aperture, Radar) is the technological means used for this process. It can cover massive areas and pinpoint problems down to millimetres.

The method provides a comprehensive overview of larger areas and can detecting trends to make railways safer and more reliable.

Monitoring 34,000km of Rail Network for Deutsche Bahn

LiveEO has worked with the German railway operator Deutsche Bahn since 2018. Its 34,000 km rail network consists of a dense tree population, which has proven to be an essential factor in passenger and freight traffic operability. Because of a lack of manual solutions to properly analyse the entire network quickly, and a lack of reliable data for determining the appropriate budget, strategy, and personnel management, LiveEO was commissioned to determine the number of track kilometers directly impacted by trees. Ongoing collaboration with Deutsche Bahn and a detailed field validation campaign enabled LiveEO to increase their training and classification models. The enormous scale of this early client has pushed LiveEO to develop a solution that can handle vegetation classification for networks on a country scale with a high level of accuracy. For their innovative solution, LiveEO has recently been awarded Deutsche Bahn's Supplier Innovation Award 2021.

Outlook

A significant amount of data collected from space now leads to new potentialities for railway network vegetation management. These insights have led to ongoing risk updates for railway tracks through spatial and temporal resolution from satellite data. Increased transparency, improved efficiency in task and personnel management, along with increased organisational security, and better network availability, are all possible thanks to the automation of risk assessment and digitising processes. In the future, more use cases are expected.

The project with Deutsche Bahn has proven that more advancements are on the horizon for vegetation management for rail traffic. An increase in extreme weather conditions has led to more problematic railways. Faster and more efficient hazard tree detections are necessary for the safety and reliability of rail transport.

www.live-eo.com

Jan Grothe and Dr Richard Lutz of DB AG award Daniel Seidel, LiveEO GmbH, with DB's Supplier Innovation Award 2021

BRITISH STEEL

PROUD TO HELP OUR CUSTOMERS SUCCEED

Understanding your needs to deliver railway success

As a modern company with 160 years of heritage, we've been developing premium products and providing tailored solutions to secure a sustainable rail industry.

We're proud to be helping build stronger futures for high speed, heavy duty, mixed traffic, metro and tramway networks.

Discover how we can work with you to help you succeed.

FIND US AT RAILTEX / INFRARAIL

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BUILDING STRONGER RAILWAYS

British Steel

Building Stronger Railways with British Steel

Specifying the right product for your rail project can make all the difference between trouble-free, longer service life, and a poor-performing maintenance-heavy track.

That's why we work closely with rail customers to meet the challenges of higher traffic volumes, heavier axle loads, higher train speeds and shorter possession times.

We're delivering products and services that directly address our customers' needs for more railway life with fewer maintenance requirements:

Zinoco®

Our award-winning Zinoco rail corrosion protection system is a revolutionary product that can withstand some of the harshest corrosive environments such as coastal lines, level crossings and wet tunnels. Rail in these areas can become contaminated with salt, water, minerals and biological matter so needs a tough, durable solution, which Zinoco provides.

Significant investment in new equipment has allowed us to develop the world's first ultra-long corrosion-protected rail in a single 108m piece – or 216m with a single factory weld.

The new and improved Zinoco is also the world's first rail with a super-

hydrophobic finish that repels water and dirt. Available in any length from 9m to 216m, Zinoco offers 5 to 10 times life extension where corrosion is the main degradation mechanism.

Zinoco achieves the highest levels of durability through excellent impact and abrasion resistance, and also provides sacrificial cathodic protection – so the protection of the metal is guaranteed, even when the zinc layer is damaged.

Suitable for any track environment, including third and fourth rail areas, Zinoco is available on any grade and any profile. And it's the only rail corrosion protection system approved for use across all Network Rail infrastructure.

HP335

HP335 is our award-winning high-performance premium rail grade and is our most wear-resistant rail. Its patented composition and uniform through-hardness is metallurgically engineered to offer improved resistance to both wear and rolling contact fatigue (RCF) compared to standard-grade rails.

HP335 is the ideal solution for areas where RCF and wear are key issues. The improved resistance to both degradation mechanisms means that rail grinding and track maintenance requirements are greatly reduced, delivering extended rail life and reducing rail life-cycle costs.

Previously known as HPrail®, it's designed for curved track and other high-duty areas. HP335 received full product approval from Network Rail in July 2012 and is the premium rail of choice in the UK mainline network. Several light-rail operators have also adopted HP335 as their premium rail solution for reducing wear, corrugation and grinding requirements to maximise rail life while reducing life-cycle costs.

Independent research has stated that converting your track from R260 to HP335 could result in savings of more than 60% over the life of the rail.

HP335 can also be supplied, by agreement, as HP350 with an enhanced hardness equivalent to that usually only found in heat-treated rails.

Weathering Steel

Our recently launched weathering steel structural sections are perfect for a whole range of outdoor projects in exposed locations, thanks to their self-protecting and durable nature. They offer an attractive and economic solution for many structures, including bridges, buildings and catenary gantries.

High-strength, low-alloy, weathering steel defends itself from corrosion by forming a protective oxide patina, so there is no need to use paint or other protective coatings.

The steel's corrosion rate is so low that structures fabricated from unpainted weathering steel can achieve long lifespans – in some cases up to 120 years – with only minimal maintenance. This makes it ideal for bridges and structures where access is difficult or dangerous, resulting not only in enhanced safety but also in reduced associated costs with fewer required road and rail possessions.

Weathering steel also connects perfectly with the environment – its attractive appearance blends sympathetically with its surroundings, changing and improving with age, while avoiding the environmental problems linked with volatile organic compounds associated with paint.

Rail Technical Services

Our technical team offers expert advice and support, helping you optimise your rail selections. Rail products and grades can be matched precisely to track conditions, track types, environmental conditions and a

host of other variables to ensure every rail we deliver provides optimum performance throughout its service life.

Our wide range of technical services helps improve operational efficiency and network integrity on both light and heavy rail networks:

Metallurgy and materials technology

Experienced metallurgists and materials technologists help design and select track system components to meet specific duty requirements. The team works closely with network operators and maintainers to enhance network performance, reliability and safety.

Failure analysis

Our extensive knowledge of rail steel metallurgy and understanding of fracture mechanics means we can provide a full range of investigative services to establish the root causes of failure, as well as recommending corrective and preventative actions. If you have unexplained track or component failures, then our team can help.

Track monitoring

Our multi-disciplined team has vast experience of monitoring the in-service performance of rail networks. Monitoring techniques range from detailed visual inspections to using precise instrumentation and non-destructive testing. Survey results can be used to identify causes and rates of degradation, enabling rail operators to accurately predict performance and develop appropriate techniques for effective asset control.

Welding technology

Our welding technology consultancy service helps customers produce reliable welds, reduce weld maintenance costs and extend rail life. We can develop welding schedules designed to control weld geometry, optimise weld process control and enhance process monitoring and analysis.

Laboratory testing

We can also conduct a wide range of laboratory tests to international standards, as well as designing and building bespoke test arrangements. These provide customers with independent certification of the performance of safety-critical railway components. Laboratory testing can also be used to investigate the performance of worn components to optimise their service life.

Over the last year, to combat the lack of opportunities brought about by COVID-19 to showcase our products and services, the team launched a series of #TechnologyTuesdays webinars that were very well-received and addressed some of the hot topics facing the rail industry. However, there's nothing quite like being face-to-face with real-life demos to demonstrate our capabilities.

Find out how we can help you build stronger railways by visiting our rail team at Railtex/Infrarail – Hall 11, Stand N71.

www.britishsteel.co.uk

BRITISH STEEL

complete composite systems

TouchSAFE Composite Palisade Fencing

Made to offer a strong, safe, and non-conductive fence to rail industry customers that need a robust barrier to screen electrical hazards or enclose electrical equipment

- **Ideal for protecting the likes of LOC suites, substations & OLE masts**
- **FRP (fibreglass-reinforced polymer) construction releases fewer carbon emissions into the atmosphere than traditional metal fencing**
- **Engineered plastic fixings hold the interlocked pales and cross rails to create a robust, structurally sound panel**
- **Lightweight in comparison to steel alternatives**
- **Zero metal parts and corrosion resistant**
- **Delivered in full panels, reducing installation time**
- **Developed to provide a greater resistance to vandals**

Complete Composite Systems T: +44 1462 659 876 E: info@completecomposites.co.uk

Complete Composite Systems

TouchSAFE Composite Palisade Fencing

TouchSAFE FRP Composite Palisade Fencing offers a strong, non-conductive barrier for the secure containment of electrical equipment.

The panels are manufactured from pultruded profiles, with pales and cross rails that are interlocked to form a robust, long-lasting structure. There is no need for maintenance and less chance of damage from potential vandalism incidents, with pales passing through the rails to reduce the risk of prising apart.

As composites are natural electrical insulants, the fencing provides a non-conductive boundary for the safe housing of electrical equipment on rail applications such as substations, LOC suites, and OLE masts.

Delivered in full panels to reduce installation time, all fixings are comprised of engineered plastic so earthing is not required. The fencing is also lightweight and corrosion resistant against most oils, acids and alkaline chemicals. TouchSAFE is produced with UV inhibitors within the resin and finished with a UV-resistant synthetic polyester veil that encapsulates the profile's reinforcement pack to add further protection against the elements.

Key Benefits:

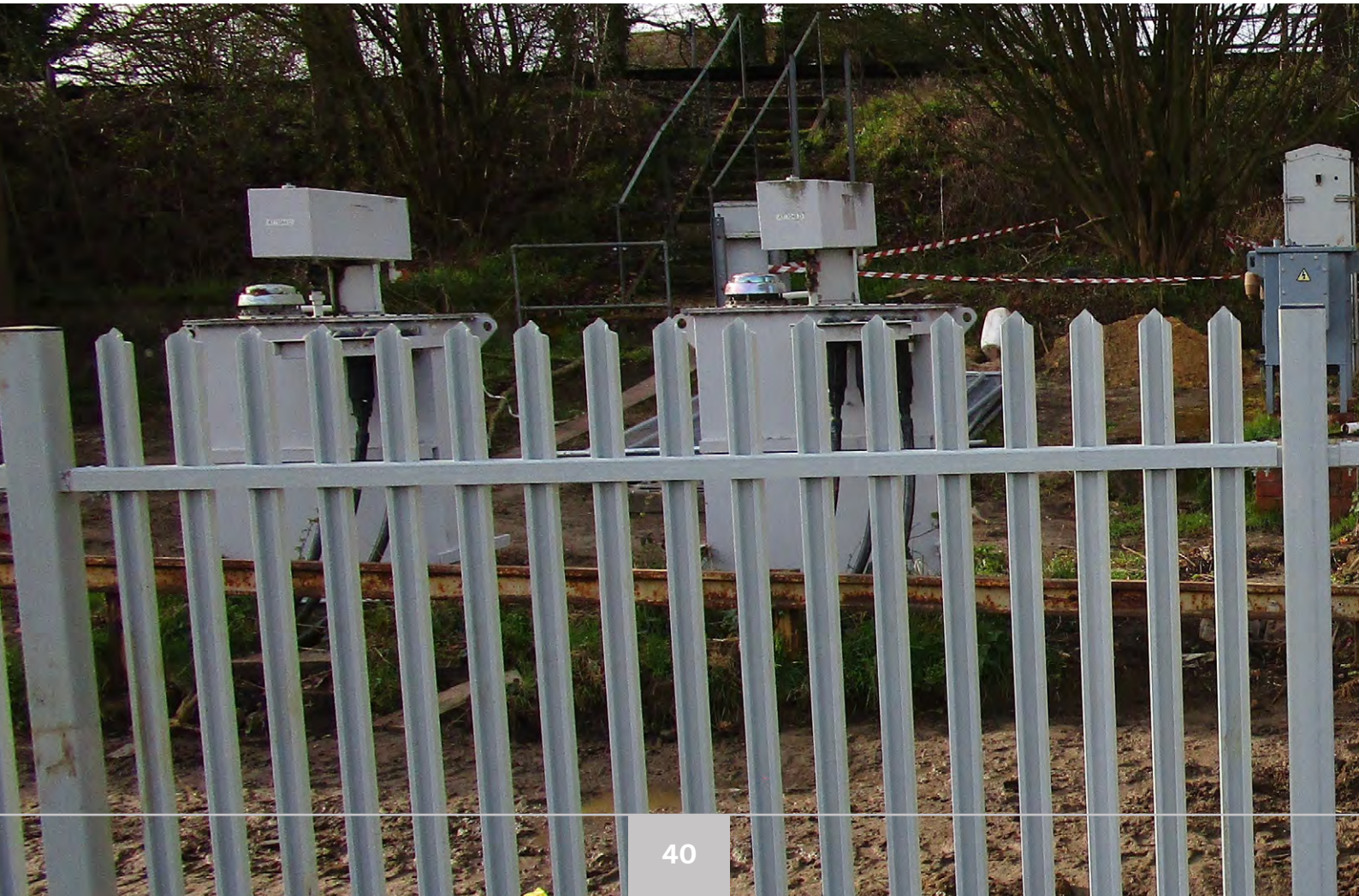
- Strong panels produced using pultruded profiles conforming to EN13706 grade E23
- Lightweight – 75% lighter than steel
- Maintenance free
- No metallic fixings
- EMI & RFI transparent
- Electrically insulating
- Supplied fully assembled, enabling large expanses of fencing to be installed quickly and easily
- Made with a resin that is corrosion resistant, fire retardant, and protects against UV rays
- Outer surface of the profiles is coated with a polyester surface veil for long-lasting strength in all weather conditions
- Available in light grey or leaf green

Materials and Performance

TouchSAFE Composite Palisade Fencing is manufactured from FRP (fibreglass-reinforced polymers) and secured with high-strength polypropylene dowel fixings. The panels are free of any metallic fixings, meaning there is no need for maintenance and less chance of hazardous incidents. As composites are natural electrical insulants, TouchSAFE provides a non-conductive border to protect electrical equipment.

TouchSAFE Palisade Fencing complies dimensionally to BS 1722 part 12: 2016, but as yet the standard makes no provision for materials of construction other than steel.

The panels are engineered from isophthalic polyester pultruded profiles. In highly corrosive environments, UV-inhibited vinyl ester can be selected as the most appropriate resin system, modified with fire retardants, where needed. As with all TouchSAFE profiles,



the reinforcement pack is encapsulated within a polyester surface veil for excellent durability in all weathers.

Pre-assembled TouchSAFE Fence Panels are available in three standard heights. Fabricated using a strong, rigid 72mm-wide wave profile pale, the standard width of a TouchSAFE panel is 2700mm. Matching single-leaf gates are also available in the standard heights of 1800mm, 2400mm and 3000mm. Double-leaf gates can be supplied to order.

Drawings of the complete TouchSAFE system are available on demand, together with reports on mechanical performance and sustainability. Information such as a parts list detailing product descriptions, sizes, dimensions, and the resin systems used, is also available by contacting the team at Complete Composite Systems.

Environmental Benefits

TouchSAFE Palisade Fencing offers environmental benefits, providing a lower carbon footprint than traditional metal fencing. Reports describing the life-cycle analysis and environmental impact of TouchSAFE are available on request. The reduction in environmental impact can be further enhanced by using TECHNO-CRETE® as a replacement for concrete post mix if using buried fence posts during installation.

complete composite systems

info@completecomposites.co.uk

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503 Broadway
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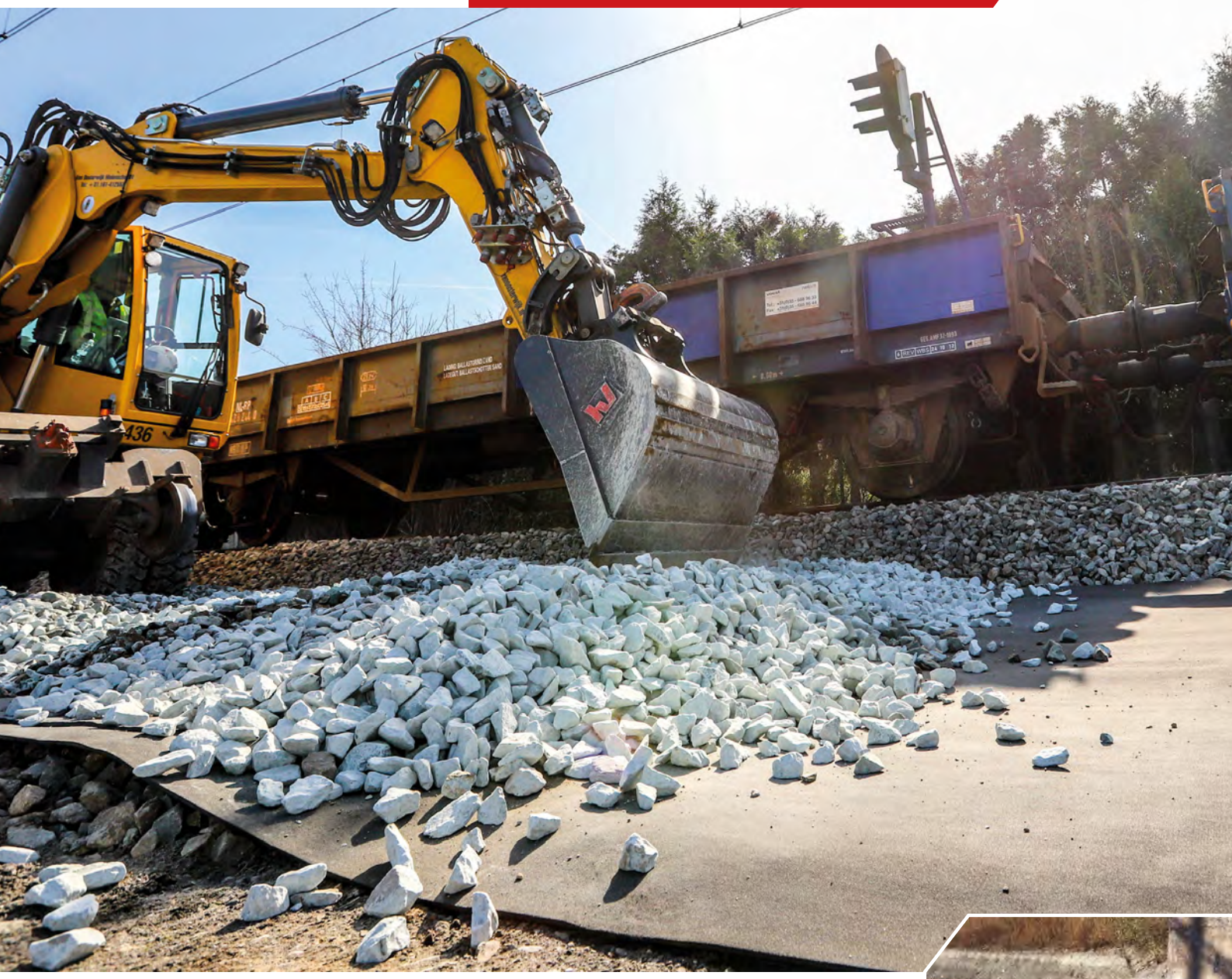
Hertfordshire, SG6 3PT

TrackTex™
Anti-Pumping Geocomposite

The solution to mud pumping



Increase trackbed maintenance intervals by more than 25 times

- Proven performance
- Improved track quality
- Durable in extreme conditions
- No specialist equipment required

GEOfabrics®

www.tracktex.us

GEOfabrics

Proven Performance More than a Decade on

TrackTex Geocomposite – The 'Once Only' Solution to Mud Pumping

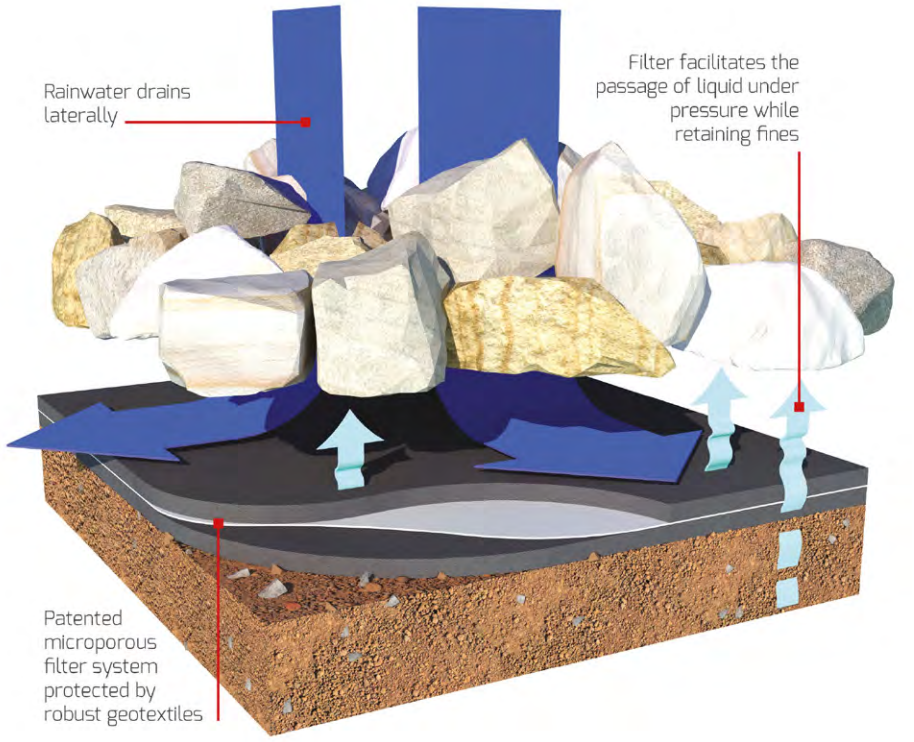
Problem areas of ballast contamination in trackbeds can be a real headache for rail operators and contractors alike. Re-ballasting can solve the issue for a limited period. But over time, the problem will come back again and again. The cost implication of regular, ongoing maintenance is significant but can be avoided with a specialist solution to mud pumping in place. And this is where TrackTex comes in.

A patented, anti-pumping geocomposite, TrackTex is the result of more than a decade of research by trackbed engineers. Its unique filter system improves trackbed quality over time and has been proven to significantly increase maintenance intervals – by more than 25 times.

A Global Solution with a Successful Track Record

Actively used in live rail since 2010, TrackTex has provided significant cost savings to the rail industry world-wide. Some of the world's leading operators have already installed TrackTex as a spot treatment: including Network Rail (UK), ProRail (Netherlands), and North American Class 1 railroads Norfolk Southern, Union Pacific, Canadian National and Canadian Pacific, to name but a few.

With over 8 million ft^2 of TrackTex installed in Europe, Australia and the United States to date, the numbers speak for themselves. Site monitoring across a number of key sites has also resulted in clear evidence for TrackTex's success and it's now accepted as the most cost-



effective way of preventing and correcting mud pumping failure.

Effective Track Rehabilitation in the UK

Back in 2009, Network Rail made the decision that the up line through Bradley Junction was life expired and would not be able to carry the proposed increase in annual tonnage from 6 million to 11 million. An investigation, undertaken in 2010 by AECOM, described the trackbed as variable – with very dirty waterlogged ballast and evidence of upwards migration of clay formation. This had caused the track geometry to deteriorate rapidly.

Network Rail chose to install TrackTex as a method of preventing mud pumping and to prolong trackbed performance. In 2017, they commissioned an independent evaluation by AECOM, to determine just how effective the track rehabilitation had been. The results were conclusive. TrackTex prevented the migration of clay fines from beneath, preventing any significant loss in the residual life of the ballast. There was no evidence of subgrade pumping or ballast contamination above the geocomposite microporous filter. Further site visits have confirmed that TrackTex continues to perform to this day.

Contamination Protection Success in the US

TrackTex was installed at three locations of the Virginia Division/ Christiansburg District during September and October 2014. All three sites had been undercut within the previous two years and needed undercutting again because of pumping failure. Following the installation of TrackTex there has been no further contamination of the ballast and the product continues to perform well to this day.

Andrew Leech, Commercial Director at GEOfabrics explains, *"What makes TrackTex such a valuable solution is that it deals instantly, effectively and permanently with problem areas in the trackbed. Whereas before, rail operators had to send teams out year after year to carry out maintenance, once TrackTex has been laid they have the peace of mind that the issue is resolved. It's a specialist product tailored precisely to meet the needs of the rail industry – and does this exceptionally well."*

PRESTO GEOSYSTEMS®

Combating the Railroad's Soil Stabilisation Challenges

When railroads encounter soft or unstable soils, operations can come to a halt, leading to costly downtime.

Soft, saturated subgrade under the track causes speed reduction and, in severe cases, even derailment. Right-of-way embankment soils that become saturated after storm events often cause washouts or slides, impacting safety and operations. In this article, the GEOWEB® 3D Soil Confinement System is presented as an effective and reliable solution for addressing some of the common geotechnical challenges faced by the rail industry.

Soil Stabilisation for Soft Soils & High-Impact Areas

The GEOWEB® 3D Soil Confinement System (Geocells) has been

successfully used by the railroad industry for over 40 years, helping to solve challenging soil stabilisation problems for both new construction as well as railroad repair work. It is a proven and versatile ground improvement solution that is beneficial in soft soil environments and high-impact areas subjected to heavy stresses such as bridge approaches and crossings.

In load support applications, whereas conventional rolled geosynthetic products provide reinforcement only along a two-dimensional plane, the GEOWEB system is a three-dimensional geosynthetic that allows for the effective transfer of lateral earth pressures developed beneath applied loads to an interconnected network of honeycomb-like cells. As a result, stresses are reduced and distributed over a wider area through a phenomenon known as the mattress effect. The mattress effect reduces stress reaching the sub-grade, and therefore can mitigate the negative effects of deflection and settlement. For railroad applications, some of the key benefits of the GEOWEB 3D system are identified below.

Table 1: GEOWEB Geocell Advantages for High-Impact Areas

High-Impact Area	Challenge	GEOWEB Geocell Advantage
At-Grade Crossings	Prone to stresses from aggressive rail loads and high-volume traffic	Dissipates stresses to control settlement and reduce maintenance/ repair costs
Road Crossings	Excessive braking and acceleration forces transferred through the crossing to the subgrade	Dissipates forces from traffic and rail while delivering a floating platform that absorbs the braking and acceleration forces
Bridge Abutments	High-impact loadings and settlement	Dissipates stresses to control settlement and reduce maintenance/ repair costs
Railroad Scales	Scales require a very stable subgrade for accurate measurement	Strengthens scale areas with the GEOWEB 3D system for extra stability and accuracy, especially over soft subgrades

Moreover, as summarised in Table 1, the GEOWEB 3D Soil Confinement System can be used to improve high-impact areas that may be susceptible to settlement and long-term stability issues.

Project Highlight: Florida East Coast Railroad, Subgrade Reinforcement for High-Impact Bridge Abutment

On a Florida East Coast project, the GEOWEB 3D system was applied at a bridge abutment and through the grade crossing – both high-maintenance areas due to soft soils and frequent, heavy truck loadings.

The end result is a more durable subgrade that increases railway life by preventing long-term settlement and consolidation. The ability to quickly install the GEOWEB panels and limit the track downtime was critical in maintaining operations.

Project Manager's View:

"Estimated time to install the GEOWEB system was minimal. Since the location was pumping, we had to excavate and grade the subbase lower than normal. For this particular location, we completed the subbase preparation and installation of the GEOWEB material in approximately three hours. If hot mix asphalt had been used for the subbase, in proper lifts and thicknesses, it would have been an all-day process and at least twice as expensive. We would have required pavers, and additional compaction equipment."

Houston Spears, P.E., Project Mgr, Gonzales & Sons Equipment, Inc.

Key Benefits:

- **The 3D soil confinement technology creates a high-stiffness foundation under the track that reduces vertical stresses, allowing for a reduction of the sub-ballast section of up to 50%**
- **The GEOWEB System's confinement reduces ballast compression and displacement leading to a more stable track surface requiring less maintenance**
- **The GEOWEB System limits upward movement of ballast particles and significantly increases the stability of the track**
- **The system is quick to deploy and install, limiting track downtime**

Railroad Embankment Repair

The GEOWEB 3D Soil Confinement System has also been successfully used for slope protection and emergency railroad embankment repair. The cells can be infilled with soil to support development of a vegetated slope, or the cells can be infilled with aggregate for non-vegetated slopes. For hard-armoured protection, concrete infill is also an option.

In Burlington Northern Santa Fe's track in the U.S. Pacific Northwest, for example, a failure on a 1:1 railroad embankment caused by record rainfalls and saturated soils led to a slide that caused interruptions in service. An immediate repair was critical to restoring service and mitigating track closure costs.

The GEOWEB geocell solution was designed with aggregate infill over a geomembrane liner to create a permeable, weatherproof slope cover.

The liner was integrated into the final design as an additional protective measure to prevent subgrade soils from becoming saturated and sliding down the steep embankment. In conjunction with the aggregate-filled permeable aggregate it facilitates drainage and minimises sheet flow.

Secret Weapon for Emergency Repairs

Offering the ability to repair washouts and address localised track issues quickly and economically with a single solution, the GEOWEB geocells have gained acceptance by the rail industry as a powerful tool in emergency repair situations.

The GEOWEB system is easy to deploy and install, even in areas with limited site access.

Railroads can inventory a few pallets to quickly repair problem areas. The GEOWEB sections are packaged in bundles and expand to cover 230 sq. ft—each section is 8.5ft wide by 27ft long. One pallet covers 2800 sq ft and one truckload covers 120,000 sq ft.

Low-cost, locally available materials can often be used as infill. Another benefit is that ease of installation allows railroad maintenance crews to do their own installations.

Presto Geosystems offers a free project evaluation service to evaluate the unique needs of each project. Our recommendations will deliver a structurally sound, cost-effective solution based on four decades of accredited research and testing data.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Low-Voltage Limiters for Railway Vehicles in DC Systems

LOW-VOLTAGE LIMITERS P60G, P120G – (VLD-F)

– for outdoor and indoor use

P60G and P120G are new types of low-voltage limiters Type 1 VLD-F based on the requirements of EN 50122-1: 2011, which are designed to protect the non-live parts of metallic structures in DC or AC traction power supply systems. They are used to provide effective protection to individuals who may come into contact with these parts during lightning strikes or during a defect of the tractive overhead line. The limiter has a high internal resistance if there is a voltage lower than its specified DC sparkover voltage UVDC and becomes conductive when this level is exceeded. In case of failure due to the live part of the traction power supply system and the conductive part (which are connected) unintentionally coming into contact with the return circuit, the limiter protects against impermissible touch voltage by becoming conductive and causing the power to turn off. According to EN 50122-1: 2011, this type of limiter is mainly recommended for the connection between the protected part and return circuit in the overhead line areas (or pantograph areas) that may be in contact with the conductors or damaged current collector, as well as on the support structures / pylons which can become live due to an insulation failure. When the applied voltage drops again below the specified value of its nominal level, the limiter returns into a non-conductive state again.

The functional part P60G (P120G) is made using a special gas-filled gas discharge tube (GDT) with

a shortened response time of 20nsec, rated for up to three consecutive lightning strikes with a current of 50kA (10/350). A light blue silicone rubber is used on the outer insulating cover. The working chamber of built GDT is equipped with technically sophisticated fail-safe mode hardware that provides an automatic transition to short-circuit mode in the event of long-lasting overloads above 500A DC (AC) (this state is non-reversible). A blue silicone rubber is used on the outer insulating cover. It is hydrophobic and has excellent resistance against weathering, pollution and UV rays. The mounting bracket, connecting bolts and nuts are made from stainless steel and are suitable for connecting conductors with a cross-section of 16–50 mm2 Fe (Cu). The product is delivered with an integrated bracket, allowing the P60G (P120G) to be mounted directly on to the protected metal structure (pillar, wall or flange). The voltage limiter should be mounted vertically with the mounting bracket at the top. The limiter is installed directly to a protected building construction (using two bolts M12), so that in the event of its activation a conductive connection is generated between this structure and the return path. The limiter can be activated either by lightning current or current resulting from contact between a protected metallic structure and a fallen overhead line. In such a case there will be a potential difference between these parts, which amounts to more than 60V (valid for P60G), or 120V (valid for P120G). The in-built GDT ignites instantly (response time is typically 20ns) and forms a temporary electrical connection between both parts (typical internal resistance of the ignited P60G (P120G) is 0.001 ÷ 0.002 Ω). The duration of this transient process is automatically broken up by the equalisation of the potential between the protected structures and a return path, when the GDT is automatically switched off due to the recombination of its gas filling.

Protection of temporary steel structure of the tramway line by means of P120G product

MAP OF OUR CUSTOMERS

We deliver our products to more than 20 European countries, to the Middle East, Asia, Australia, USA and South America. We also co-operate with prestigious business partners in some of these countries.

With our superior technology (on a global scale), profound industry expertise, and knowledge of local markets, we can offer our customers products, system solutions, and services that help them to improve the reliability of their transmission systems.

Our manufacturing programme ensures consistent supply of high-quality products for customers worldwide. Our customers have easy access to the full range of products, either directly from us as the manufacturer, or from the system of distributors or wholesalers, which is constantly being expanded.

To check the quality of our products, 100% of the products are thoroughly tested on measuring and control devices. The measuring equipment enables precise control of the technical specifications of the entire production. For this reason we have also obtained and we constantly renew our certification as per EN ISO 9001: 2016 standard.

You may find details about ACER VOLTAGE product range in our catalogue or on the website:

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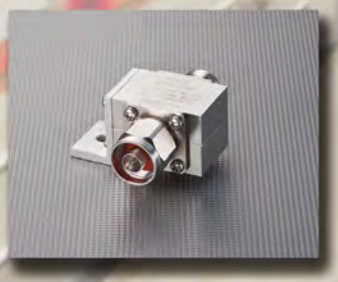

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Since 1972, Witt Solutions GmbH has been a recognized and reliable product supplier and development partner of national and international railway and industrial companies.

Our areas of expertise

Within the scope of *Professional Power Monitoring* (PPM), we manufacture and sell measurement and test technology for medium voltage up to 50 kV AC/DC and currents up to 50 kA for the power supply of railway infrastructure as well as industrial applications. Our products are based on decades of experience and are complemented by new, modern intelligent 4.0 technologies. In order to guarantee our high-quality standards, we manufacture in our own factory in Germany with a high degree of verticality.

In the field of personal and building protection, we offer products that meet the requirements of DIN EN 50122, 50123 50124, 50526 and the high standards of the German Federal Railway Authority.

What we offer:

- Monitoring of energy potentials and equipotential bonding by means of ground short circuits to avoid contact voltages
- Monitoring of energy potentials and equalization of potentials by voltage limiting devices to prevent corrosion.
- Determination of earth potentials at any point.
- Wiring monitoring (e.g. insulation monitoring, theft, etc.).
- Monitoring of the traction voltage
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- Cost effective and easy upgrade to legacy equipment
- For total compliance with NR/L2/SIGELP/27725

Approved supplier NetworkRail

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BENDER

Advertorial

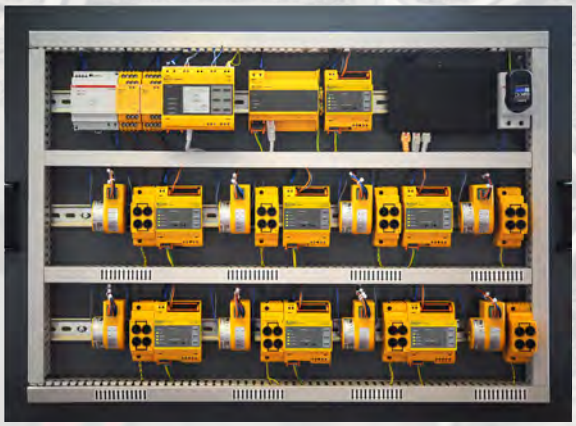
Network Rail approval for Bender RS4 Tier 2 Intelligent Insulation Monitoring System

Network Rail has awarded full product acceptance (PA05/07464) of Bender UK's RS4 Tier 2 Intelligent Insulation Monitoring System after numerous live trials of the equipment. Bender's rail signal power monitoring technology is designed to pinpoint and locate earth faults on the UK's rail infrastructure.

RS4 Tier 2 system measures insulation resistance and leakage capacitances to individual feeder levels on rail IT electrical systems up to 690V, in addition to delivering the overall system resistance and capacitance provided by the RS4 Tier 3 system.

Comprehensive data readings and information on the status of miles of networked cables enable operators to make a clearer overall assessment of the system condition and plan predictive and preventive maintenance to prevent downtime.

RS4 Tier 2 is the most cost-effective solution for upgrading previous generation Bender rail technology and can be installed with simple mechanical and wiring modifications onsite.



Tier 2 compliance is achieved through the incorporation of Bender Type B current transformers (CT) and Bender COM465IP condition monitor to enable complex individual feeder measurements. It is also fully upgradeable to deliver a Tier 1 solution.

RS4 was developed collaboratively with Network Rail in response to standard NR/L2/SIGELP/27725 Tier 1, 2, and 3 designed to reduce maintenance, service failures and improve staff safety by minimising trackside intervention, termed 'boots on ballast'.

For over two decades Bender has pioneered the development of rail signal power monitoring in the UK, with thousands of Bender systems already installed and proven in use on the UK's rail network. The roll out of RS4 Tier 3 began in early 2020, following full Network Rail product approval.

Bender UK offers a full range of managed support services designed to offer the best strategic fit and greatest value for money for the rail industry, balancing benefits with affordability to improve the efficiency of rail network maintenance, enhance safety and reduce operating costs for the network.

For more information contact industrialsales@bender-uk.com

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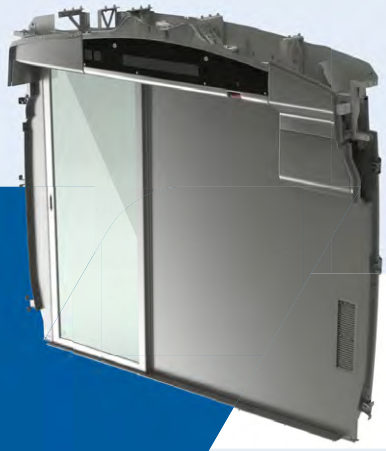
Polarteknik

Metro aluminium E20 Fire partition wall with automatic door, chrome finish



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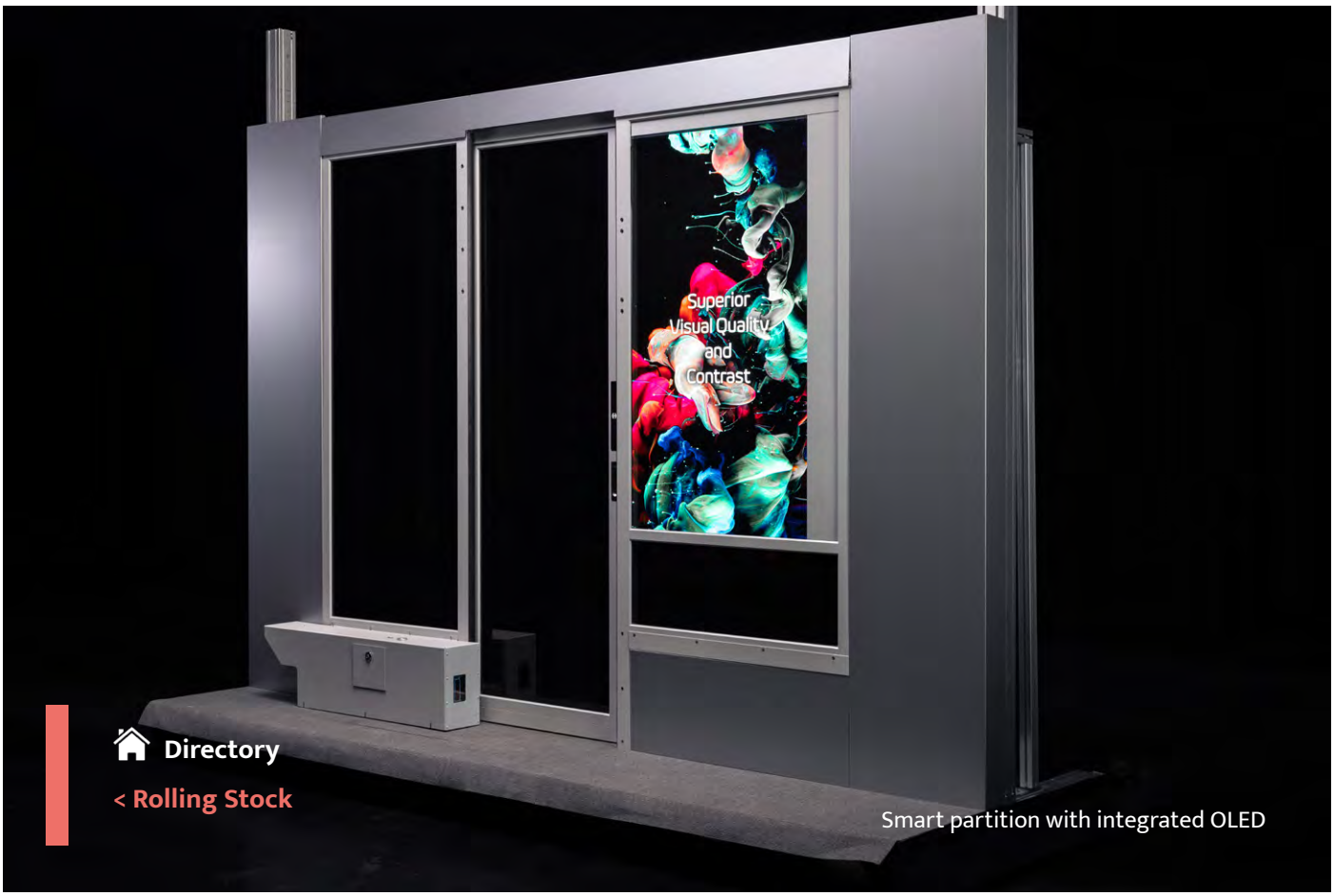

Smart partition with integrated OLED

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The Polarteknik Door Systems product range includes:

- complete fire barrier walls
- automatic single or double leaf sliding doors
- automatic telescopic doors and curved doors
- manual doors

All our products are tailored to customers' specific needs. The service portfolio includes design, installation and commissioning support, maintenance, modernisation, spare parts and technical support during the lifetime of the fleet.

Polarteknik, a company well known for its expertise in interior door systems in intercity, high-speed and very-high-speed classes of railway rolling stock, is strengthening its position in metros to increase driver comfort and safety.

"We are happy to tie up at all tier levels to make sure the latest technology from new trains e.g. predictive maintenance, cyber security and TSI-PRM are available for refurbishments, overhauls and fleet upgrades."

Polarteknik has a very large number of different products that we have made for customer projects over 25 years. All of the key components have a strong

return on experience and are shared across all product platforms. Polarteknik is in full control of the design, manufacturing, testing and validation of the products and the customers can benefit from the consolidated sourcing made regarding key components and obsolescence management that draws from the legacy design data.

"We have over the years experienced the challenges of high mix-low volume production and made some considerable investments in production and in-sourced some of the key activities that help us reach our customers OTD requirements" says Tomi Ojala, Managing Director.

Polarteknik is involved in all of the benchmark new build train projects in Europe such as ICE4, IEP, Italo Evo, Smile, Regiolis with a strong view for the future and will strengthen our focus on service, renovation and overhaul to help keep older fleets on lease with new technology.

We are looking into new materials, components and have just finished developing a new control unit to facilitate cyber security requirements, predictive maintenance and IoT needs even better.

"We have had data collection for years in new fleets but now we want to provide the same value to older fleets by offering a system that can be retrofitted into older doors as an upgrade or overhaul. We have more than 80.000 Polarteknik built doors out there that could benefit from an upgrade" says Mika Korhonen, Business development director.

In addition to supplying what has been Polarteknik core competence, the door systems, the company is now one of the leading suppliers of partition walls and body end walls for rolling stock. Whether it is a highly complex motor car partition with high level of fire integrity and sound insulation requirements or a delicately designed saloon partition with open feel full glass surfaces Polarteknik can provide the solution from design to manufactured, easy to install product that is fully tailored to customers' requirements and quality controlled according to IRIS certified quality system.

Polarteknik is ready to launch a brand new collaboration with a high quality display manufacturer by integrating a 55" OLED display in a partition structure.

Polarteknik Smart partition is Cyber ready in terms of the door operation, communication and maintenance capabilities with the NEW D56 Door controller. The door drive is the same high quality, low LCC unit Polarteknik customers have enjoyed for years.

The OLED display has some wonderful features that make the trip enjoyable. Polarteknik can bring on augmented data from the door unit on top of the visuals the customer decides to show on the display.

It will be displayed in brilliant OLED quality, 55" size, 178 degree viewing angle, 1920x1200 resolution and Optical brightness of 150/400 nit (APL 100/25%).

With pixels off/black the glass is 38% transparent and looks like a tinted glass. The whole structure is EN61373 shock and vibration compliant.

Discover Polarteknik innovations and connect with us at **www.polarteknik.fi**

Gangway fire partition

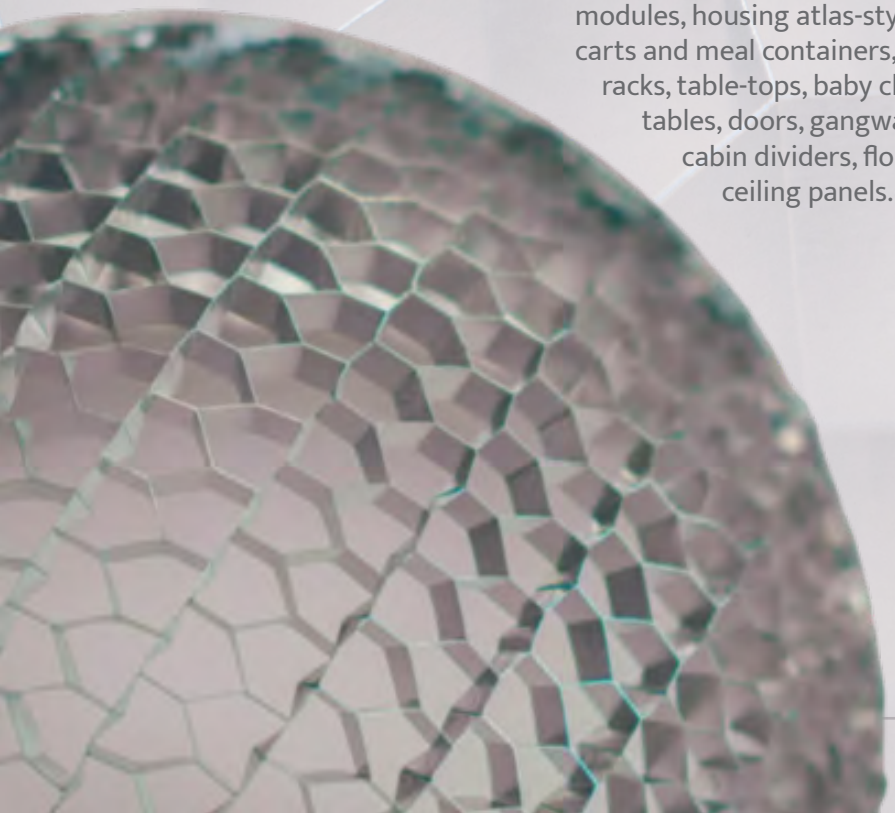
D56 Cyber secure door control unit

Corex Honeycomb

BCP and Corex Honeycomb Supporting Innovation in the Rail Sector

BCP has been designing and manufacturing aluminium honeycomb composite panels for more than 30 years and has a reputation for working with customers to solve their engineering problems.

Composite panels and structures offer a lightweight and durable alternative to conventional materials, such as plywood and metal fabrications, when used for external and internal train components. They can be used for a variety of applications including galleys, universal access toilet (UAT) modules, housing atlas-style aisle carts and meal containers, luggage racks, table-tops, baby changing tables, doors, gangway panels, cabin dividers, floor and ceiling panels.



The panels are made of aluminium honeycomb core sandwiched in between two aluminium alloy skins. The layers of the panel are bonded together with an extremely strong engineering adhesive and pressed together until the adhesive cures. The lightweight aluminium core keeps the two skins in position, resists shear forces, and provides insulation as well as removing weight, while the two skins provide durability, weather and impact resistance, and resist in-plane forces of tension and compression. The result is a complete aluminium composite panel.

Panels can be painted in customer colours or finished with a high-pressure laminate (HPL) for a durable and visually appealing finish in the train operating company's

brand RAL, and laminated with an anti-bacterial surface where required.

As well as flat aluminium composite panels, BCP also produces lightweight and durable curved panels. They can be engineered to be extremely strong and supportive, yet not add excess weight. Their durability also means they are able to withstand a large amount of interaction with external forces while still remaining in good condition.

Aside from their lightweight properties, there are several benefits of using aluminium honeycomb composite panels for train infrastructure and interior products. They include:

- Durability and strength
- Less re-work due to tighter tolerances
- Lower energy consumption (lower weight is the key advantage to saving energy)
- Enhanced surface finishes
- Lower maintenance and refurbishment costs
- Better whole-life cost compared to alternatives
- Easier installation due to lightweight properties

The core used in BCP's panels is manufactured by its sister company, Corex Honeycomb – the UK's only manufacturer of high-quality aluminium honeycomb.

The Corex Honeycomb range can be supplied in a variety of

forms including expanded or unexpanded, full blocks or cut slices, perforated or unperforated, corrosion-treated or untreated, using aluminium alloy grade 3000 or 5000. The core, which is fabricated using a complex manufacturing process, is available in a choice of cell sizes.

The range also includes a flexible aluminium honeycomb (SuperFlex) and non-metallic honeycomb including Cormaster (Nomex® and Kevlar®) and polypropylene. SuperFlex has excellent formability, retaining its cell shape and therefore its strength when used to manufacture curved panels.

Corex Honeycomb has been supplying the rail sector for over 20 years, with many tonnes of aluminium honeycomb used in parts made for the rail industry through European manufacturers.

Rail projects Corex Honeycomb has been involved with include: The personal rapid transit pods at Heathrow Airport, the Hitachi Class 800 and 801 series trains and the Eurotunnel vehicle shuttles.

With a unique combination of properties, aluminium honeycomb composites are increasingly becoming the preferred material for a wide variety of refurbished and new build rolling stock applications. The BCP and Corex Honeycomb teams have extensive experience in the manufacture of a variety of train infrastructure and interior products and the multi-disciplined team of engineers offer expertise in consultancy, design, simulation, prototyping and full-scale production.

For more information about BCP and Corex Honeycomb visit: **www.bespokecompositepanels.com** and **www.corex-honeycomb.com**

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Many tonnes of our honeycomb and related composite products are used in parts made for the rail industry through European manufacturers

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Lantal

Lantal Textiles Innovations 2021 – "Innovation Is What Keeps Us Going"

1. Antiviral Solution for Fabrics

With passenger wellbeing always in our minds, we have been developing new and innovative products for our customers over the past few months.

Since the start of the pandemic, passengers and operators have been requesting solutions to minimise the spread of SARS CoV-2. This demand became even more acute as we all are slowly starting to return to our normal lives and more and more people are regaining confidence in using public transportation.

Since 2018 Lantal has been offering anti-stain and antibacterial solutions, making them available for all markets. Now, with a new demand, comes a new solution.

We have now added an antiviral finishing based on textile facemask technology, which is designed to kill off bacteria and viruses on textile surfaces. With this new and certified technology (ISO 18184) we achieved an impressive 97.4% efficiency against the virus.

Not satisfied with these results we have managed to combine all three of our solutions into one, making it 98.8% efficient against SARS CoV-2 and also 100% vs. bacteria.

For more information about these finishes, please contact us at salesground@lantal.com.

2. Recycled and Sustainable Carpets / How Can Old Fishing Nets Be Used Inside a Modern Train? Lantal Tells You How

The Lantal brand stands for high-

quality products and services for transportation interiors. We recognise possible future factors today and integrate them in ongoing business activities. Being sustainable is a part of Lantal's culture – and therefore part of production, products and services. Over the past years we have been developing highly innovative products aimed to reduce CO2 emissions and to support our customers in reducing their environmental footprint.

The incorporation of polyamide Econyl® yarn in the production of our polyamide carpets was a way to provide more sustainable solutions to our portfolio. The use of polyamide filament yarns reduces the weight of the carpet without impairing abrasion resistance and service lifetime. Polyamide Econyl® yarn is made from 100% recycled resources including fishing nets, yarn discards and fabrics. The use of Econyl® reduces the consumption of oil, water and energy during the production of the fibres.

Our Polyamide Econyl® carpets are available in the following pile structures – loop, loop printed, velours, velours printed.

For more information about this product, please contact us at **salesground@lantal.com**.

3. Printed Carpets 2.0

In 2018 Lantal presented a special printing process that made it possible to directly apply signature motifs, patterns and high-definition designs to rail vehicle carpets. With these possibilities, customers could implement their creative ideas and design a highly customised product for a train interior that reflectes their brand.

Now, three years later, Lantal presents its self-adhesive and ready-to-install printed carpet technology. This new product is more cost and time-effective, taking up to 80% less time for installation, while the protective film allows for optimised positioning of the carpet therefore simplifying laying operations. Carpets with Lantal self-adhesive coating are easy to remove without leaving traces on the floor. The removal process requires only a minimal cleaning of the panel surfaces and does not expose workers to noxious fumes.

The compelling advantage of this technology is very short sampling and production times; the premium carpets are also available in small minimum order quantities.

The printed polyamide carpets come in three different qualities: a hard-wearing loop carpet, a velours carpet with a velvety look, and a velours carpet with noble optics and high footfall comfort. They share high abrasion resistance, a very long service life, and the use of regenerated polyamide in the production process.

For more information regarding this product, contact us at **salesground@lantal.com**.

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Website | www.axminster-carpets.co.uk/rail

Axminster Carpets

– Beautiful to Travel with...

With more than 250 years of expertise and over 20 years of experience in supplying the rail industry, Axminster Carpets is proud to be the largest supplier of sustainable, woven rail carpet in the UK.

Supplying beautifully bespoke carpets to some of the UK's biggest rail operators, Axminster carpets can be seen on hundreds of rail services across the country, including Northern, TransPennine Express and South Western Railway as well as on the luxurious and historic Belmond British Pullman. Careful design and expert craftsmanship were woven into each carriage's carpet, ensuring true resilience and comfort.

Our British origins remain at our core; from sourcing to weaving. The finest raw materials are selected from within the UK, allowing us to closely oversee quality and care, whilst supporting local British

farming. Expertly crafted, all our rail carpets are designed and woven in Axminster, Devon – where our in-house team create bespoke, distinct carpets. Due to the cooler climate, British wool offers more benefits in carpet manufacturing – giving us even more reason to remain rooted in the UK.

Wool carries a host of benefits for carpets, from environmental to personal. Natural, renewable and biodegradable, wool carpets absorb VOCs and aid in supporting healthier living. Carrying environmental peace of mind, we are proud that each Axminster carpet is manufactured with a very low carbon footprint. Wool's natural fire retardancy allows us to boast enhanced safety credentials – with every carpet carrying the highest fire certification. Always striving for eco-conscious crafting, we offer an undyed wool option – to give a truly natural, authentic wool feel to our designs.

Alongside the household benefits of a wool carpet, Axminster carpets are perfectly suited and beneficial for the rail industry. We carefully ensure that our carpets offer more than just an aesthetic benefit; understanding the comfort of passengers is key in the design of each carriage. Wool is naturally hypoallergenic, meaning that the carpet creates a clean and improved air quality. The dedicated, quality craftsmanship of each carpet ensures long-term appearance, retention and performance to keep carriages looking pristine for longer. Wool's natural acoustic absorption abilities help to reduce noise carried throughout carriages, whilst our carpets are also lighter, thicker and more luxurious than nylon counterparts, creating a truly comfortable and elite passenger experience.

Overjoyed with their refurbishment, **Neil Drury, Engineering Director for South Western Railway says**:

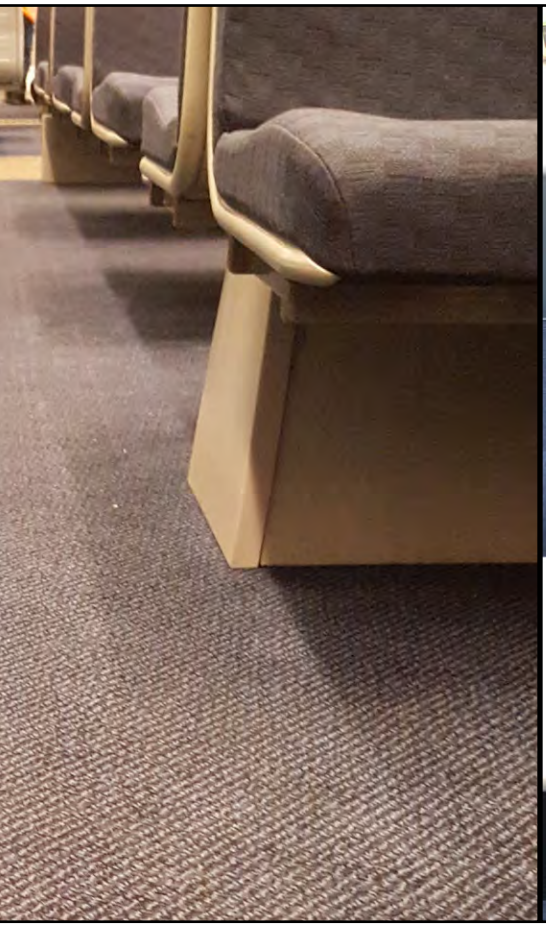
"We've had really positive feedback on the quality of the new Axminster carpets on board our refurbished trains. The quality really makes a difference to the customer experience which is what we were confident we would get when we first commissioned these wool carpets from Axminster".

Dedicated to our craft, we pride ourselves in offering efficiency and reassurance to rail operators. We are the only carpet manufacturer with the ability to weave full-width rail carpets with no joints, allowing for fully bespoke designs

to seamlessly flow throughout each carriage. Supporting this, our tailor-made kit service means that each carpet is woven to order, to the desired width, creating an efficient fitting process with little to no waste. For final peace of mind, our carpets carry end of life sustainability benefits; being made from natural biodegradable materials, an Axminster carpet can be removed without the worry of environmental damage, making an Axminster carpet truly beautiful to travel with.

For more information please call Axminster Carpets on **+44 (0)1297 32244** or email **transportinteriors@axminster-carpets.co.uk**

www.axminster-carpets.co.uk/rail



SENOPLAST

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INSIDE THE TRAIN IS OUR PART.

High quality products and an ecology-minded production are the main items of our company. Our flame retardant PC/ABS sheets offer new opportunities for railway interior designers.

MAIN ADVANTAGES OF SENOSAN C60FR-5

– flame retardant **(halogen free)**
– matt appearance
– ductile breaking behaviour (no shiver)
– good recyclability
– chemical resistance
– good insulation properties

Antibac®

Hygiene is more important than ever. **senosan®** sheets have a special surface coating which reduces germs and bacteria by 99.9%.

senosan®

Senoplast

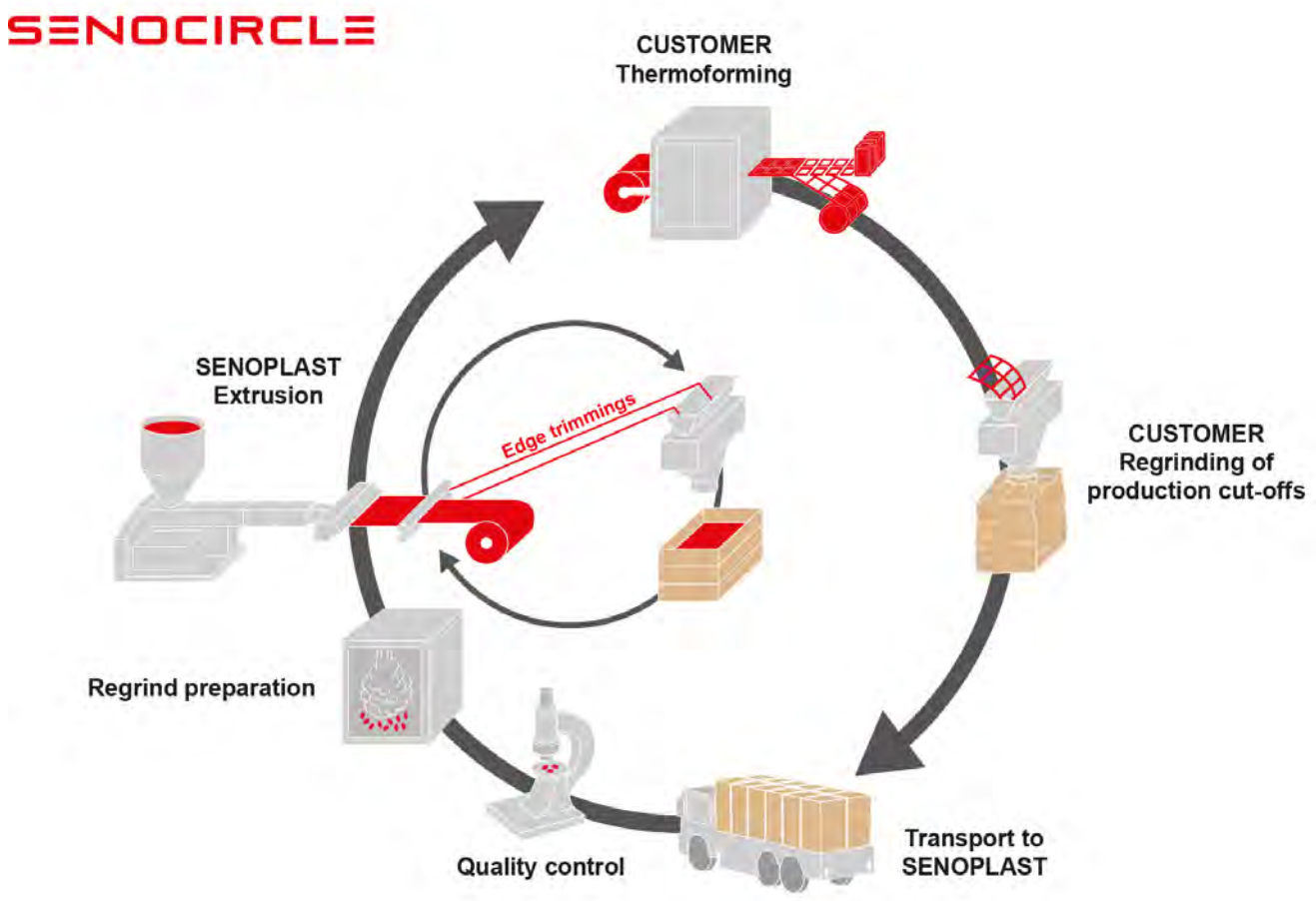
Sheets and Films for Thermoforming and Lamination

Senoplast is a leading company in producing sheets and films for thermoforming and lamination.

Senoplast Klepsch & Co. GmbH, founded in 1956 and having its international headquarters in Piesendorf, Austria, is a worldwide specialist in the production of coextruded plastic sheets and films for thermoforming. The family-owned company focuses on the coextrusion of multilayer sheets and films; the field of application of the produced senosan® products ranges from the automotive to the sanitary, the furniture and the transport vehicles industry.

Every year, around 50,000 tons of senosan® sheets and films are delivered from the main site in Piesendorf/Austria and the production facilities in Querétaro/Mexico and Suzhou/China to around 60 countries worldwide. In 2020 the family-owned company achieved a turnover of around 200 million euros and was internationally successful with an export ratio of over 90%. The companies employ 530 people in Austria and 740 worldwide.

The trademark senosan® does not only stand for high-quality plastic sheets and films but also for an ecology-minded production. The innovative and high-quality plastic



sheets and films made of ABS, ABS/PC, ASA, PMMA, PS and PC offer a wide range of applications. Senoplast delivers high-quality surfaces according to specific needs and offers customised solutions for the railway industry.

Thermoforming: A Very Economical Way to Provide Precise Parts for the Automotive Industry

Thermoforming is a process for forming thermoplastics under the influence of heat and with the aid of compressed air or a vacuum. The process has increasingly found applications in the industrial sector.

As an alternative to injection moulding, it is characterised by favourable mould costs and is particularly economical for small and medium-sized series.

Flame Retardant Thermoformed Material for Interior Transportation Applications with senosan® C60FR-5

For the rail sector with its strong fire safety regulations Senoplast developed a material offering new opportunities for railway interior designers. The product senosan® C60FR-5 is a halogen-free flame retardant PC/ABS sheet with a matt surface and meets the European regulation EN45545-2, applications R1-HL2 and R6 HL2. The main advantages of the material are:

- **High thickness range** from 2–5 mm
- **Lower density** – only 1.3 g/cm3 (weight and cost reduction)
- Almost double impact strength compared to the competition
- Fulfils smoke density and surface flammability requirements for American rail applications **(Docket 90-A and NFPA 130)**
- Material fulfils **EN 45545-2, R1-HL2 & R6 HL2** requirements with regrind – even if material is painted
- **Antibacterial version** (ISO 22196)
- Matt surface appearance with light embossing or smooth

Example 1: Roof panels – painted

Example 2: Seat shells in Antibac version

Example 3: Wall cladding with LARGE window openings – offcuts can be reused in recycled material – material called senosan® C58FR-5 (also meets EN45545- R1, HL2)

- **Big sizes** possible (sheet formats for example 2.2m x 6m) – limited only by what can be transported
- Even with included recycled regrind the material reacts with more ductility than other materials
- **Halogen free**

Sustainable Management and Recycling

As a family business, Senoplast stands by its responsibility towards society, nature, the environment and the people who work here. Senoplast has chosen the Green Spirit as its motif. He stands for the way we think, our idea of what tomorrow's world should look like, and how we use the resources given to us. Senoplast sees itself as a pioneer of environmentally friendly industrial production methods and has received many awards for this.

At Senoplast, sustainable management has a particularly high priority. The recycling concept developed by Senoplast ensures that almost all production and processing waste can be reused in the manufacturing process. In addition, the company has invested in a new regrind processing plant. This allows plastic recycled materials from the market to be processed accordingly and also used in production. The senocircle recycling system has been in use for more than 20 years. Unique in the plastics industry is the CO2 balance of the main plant in Piesendorf: the production of one kilogram of plastic sheet only produces 5.6 grams of carbon dioxide. In addition, the company has been using a heat recovery system since 2003, which helps to save energy costs. For about five years, Senoplast has been purchasing electricity exclusively from renewable energy sources. For these activities, Senoplast was awarded the 'Umweltblatt Salzburg' prize for special environmental commitment in 2018.

For more information please contact:

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p: +43 6549 7444 10220

SENOPLAST

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RIX Industries

M2H2: Hydrail's Fast Track to Clean Energy Fuel Cells

Leveraging mobile hydrogen generation systems to power today's trains for tomorrow's decarbonisation mandates

Diesel fuel, the standard for powering trains the world over, contains air pollutants, including CO2 – a greenhouse gas that causes global warming – as well as NOx, SOx, and particulate matter (PM), which pose health risks to passengers and train personnel.

It's an outdated approach to propulsion and a critical global challenge yet to be solved, even as addressing climate change has reached fever pitch. Governments around the world are facing mounting pressure to clean up the environment and have responded with mandates that include international net-zero carbon emissions by 2050.

Understanding the benefits of swift action, the UK's rail transportation authority has imposed its own deadline for zero emissions industrywide, culminating in the elimination of all diesel-only trains, or the transformation thereof, by 2040. This is a full ten years before the national (and international) carbon deadline; many other countries are expected to follow suit. Certainly great news for the environment and its inhabitants, but quite the conundrum for an industry that has relied heavily on diesel for nearly a century. Fuel cell technology, which uses clean hydrogen (H2) as its energy source, is poised to play a critical role in cleaning up the industry and getting trains on track for a greener, carbon-free future.

Fuel cells: From H2 to 'Where to?'

Powered by hydrogen, today's fuel cell (FC) technologies give train manufacturers and rail operators a readily available yet environmentally friendly source of propulsion, now known as hydrail. FCs generate clean, renewable energy and have been touted as key to decarbonisation and reduction of greenhouse gases.

Currently, there is a lack of infrastructure for distributing hydrogen, based on a very limited amount of hydrogen pipeline in existence. Transport by high pressure gas tube trailers and by liquified tankers is also very costly. Today, new breakthroughs in hydrogen-on-demand address these challenges and provide a clean alternative to diesel-based propulsion.

- With no moving parts and plug-in modularity, FCs are low maintenance
- Unlike diesel or liquified natural gas (LNG), hydrogen is truly zero emission
- Hydrogen refuelling is quick – with just 20 minutes of refuelling, an FC electric passenger train with multiple units can run for more than 18 hours
- An FC's range is longer, allowing hydrogen fuel cell trains to travel up to 1,000 kilometres before refuelling
- FC locomotives can be deployed on diesel locomotive service routes
- Existing locomotives can be retrofitted with hydrogen FC power

Historically, FC solutions have presented a challenge based on the potential for large-scale storage and transportation of the hydrogen required as the fuel source – no easy feat for a variety of reasons. Hydrogen has a higher energy density than diesel, and since hydrogen is the lightest element on the periodic table, it is difficult to store. For instance, 1kg of hydrogen gas at standard pressure and temperature conditions occupies over 11 cubic meters (388.5ft^3).

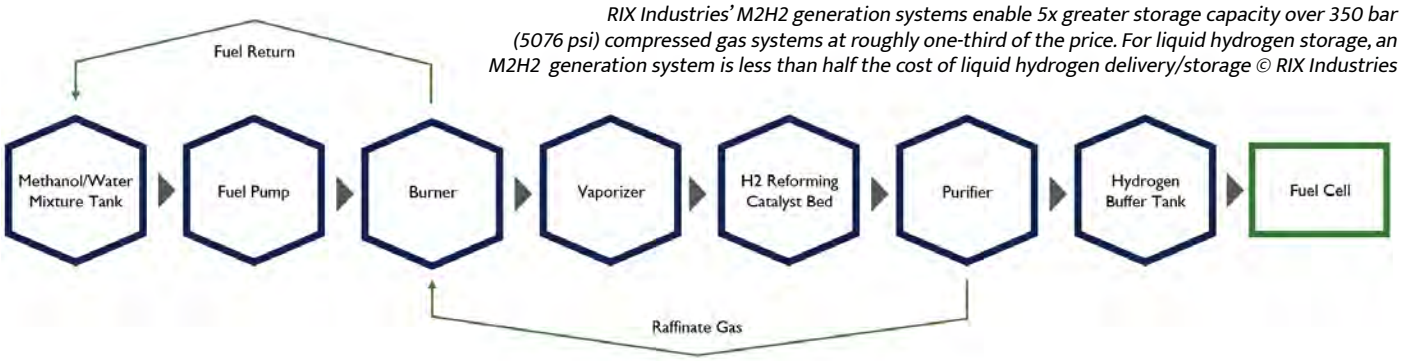
High-pressure compressed hydrogen solutions have been gaining popularity, but they have inherent risks and limitations and require considerations of space and cryogenic temperatures. In these systems, hydrogen is stored in either gas or liquid form. High-pressure H2 must be kept in costly composite overwrapped pressure vessels (COPVs), which may leak and need to be re-certified every five years. COPVs are generally designed to be stored on top of or within carriage, which can make passengers wary. Liquefied H2 is costly to produce (energy-intensive) and transport. For hydrogen to be economically viable, its storage density must be increased, costs reduced, and logistics improved.

The Infrastructure Impediment

Unfortunately, there are not enough hydrogen producers in existence today to fill the needs of the burgeoning hydrogen fuel cell industry at scale. Even if there were, there are significant costs and ecological difficulties in producing and transporting the gas.

There is also a lack of hydrogen infrastructure for distributing hydrogen onboard trains and even at depots, stations and rail yards. And although the US, EU, and China each have proposals on the docket or initiatives in place, mass deployment of hydrogen fuel cells as a clean energy source could be adversely affected by the execution of said proposals and initiatives.

Methanol, on the other hand, is already widely produced and accessible for transport to wherever it is required, making hydrogen production – and subsequent FC refuelling – simple, quick, and cost-effective.



RIX Industries' M2H2 generation systems enable 5x greater storage capacity over 350 bar (5076 psi) compressed gas systems at roughly one-third of the price. For liquid hydrogen storage, an M2H2 generation system is less than half the cost of liquid hydrogen delivery/storage © RIX Industries

The Golden Ticket

Methanol-to-hydrogen (M2H2) reforming technology addresses the hydrogen storage issue by offering the highest volumetric density while providing the lowest cost-generation and best logistic storage solution compared to high-pressure gas or liquid hydrogen options. M2H2 generation systems enable 5x greater storage capacity over 350 bar (5076 psi) compressed gas systems at roughly one-third of the price. For liquid hydrogen storage, an M2H2 generation system is less than half the cost of liquid hydrogen delivery/storage.

With the capability to generate pure hydrogen (99.97%) onboard and on-demand, these systems offer users a safer and smaller onboard volume requirement as compared to high-pressure compressed hydrogen solutions. They also eliminate the heavy and costly footprint of cryogenic liquid hydrogen storage.

The M2H2 methodology incorporates proven methanol fuel reforming technology to generate hydrogen. As self-contained containerised power systems, methanol-to-hydrogen generation technology is integral to the proton exchange membrane (PEM) fuel cell – providing a high-efficiency, minimal vibration and noise, low-emission solution for power-critical applications including rail and other transport applications such as marine and air. With container-based systems for hydrogen generation, manufacturers have the means to address design challenges that can vary based on type of vehicle, routing, geographic conditions, and availability of technology and infrastructure.

The M2H2 power system is also scalable and supports 30kW up to MW fuel cell solutions. Deployment does not require major retrofit of station-based rail infrastructure; existing diesel tanks can instead store liquid methanol at ambient conditions as a feedstock. This removes the complexities and trepidations of onboard hydrogen management, which have long been a roadblock for the rail industry. These highly efficient power systems provide train manufacturers and rail operators with a path to next-generation performance – eliminating the impact of environmentally damaging diesel-based engine systems.

Diesel Is Out – Hydrogen Is In

While diesel fuel has powered the rail industry for nearly one hundred years, its days are numbered. Steam reforming of methanol to fuel cell grade hydrogen via M2H2 provides a low-emission solution meeting strict environmental fuel regulations – no NOx, SOx, or PM. Additionally, the M2H2 emits 30 to 50 percent less CO2 than diesel engines. (The M2H2 can achieve net-zero emissions using renewable methanol.) Methanol is relatively less harmful to the environment than diesel fuel. A clear, colourless liquid, methanol is fully miscible in water. If the train were to leak methanol on a bridge over a river, for example, the fuel would completely dissolve and biodegrade in the water. In contrast, a diesel engine in a similar scenario would set off an environmental crisis.

Mobile hydrogen generation gives train manufacturers the edge in meeting green initiatives ahead of schedule. It simplifies the transportation, storage, management, and deployment of onboard hydrogen – a breakthrough in the quest for clean power and one that can be implemented in existing rail vehicles and those built in the future.

About the Author

Bryan Reid, CSO (Chief Sales Officer), RIX Industries

Connect with Bryan at **breid@rixindustries.com** or via **LinkedIn**.

From hydrogen fuel cells to clean diesel and remote engine monitoring, Cummins keeps you at the forefront of rail technology. Our Hydrogenics™ fuel cells are already powering trains in Germany and Austria, and, by the end of 2022, 27 of these trains will be in service. We've optimized our high-efficiency, space-saving diesel engines to meet both Euro Stage V and EPA Tier 4 emission standards. Plus, our PrevenTech® prognostic system is monitoring engine health in real time and providing railroads with alerts before small issues become big problems. With Cummins, you'll find advanced technology at every turn.

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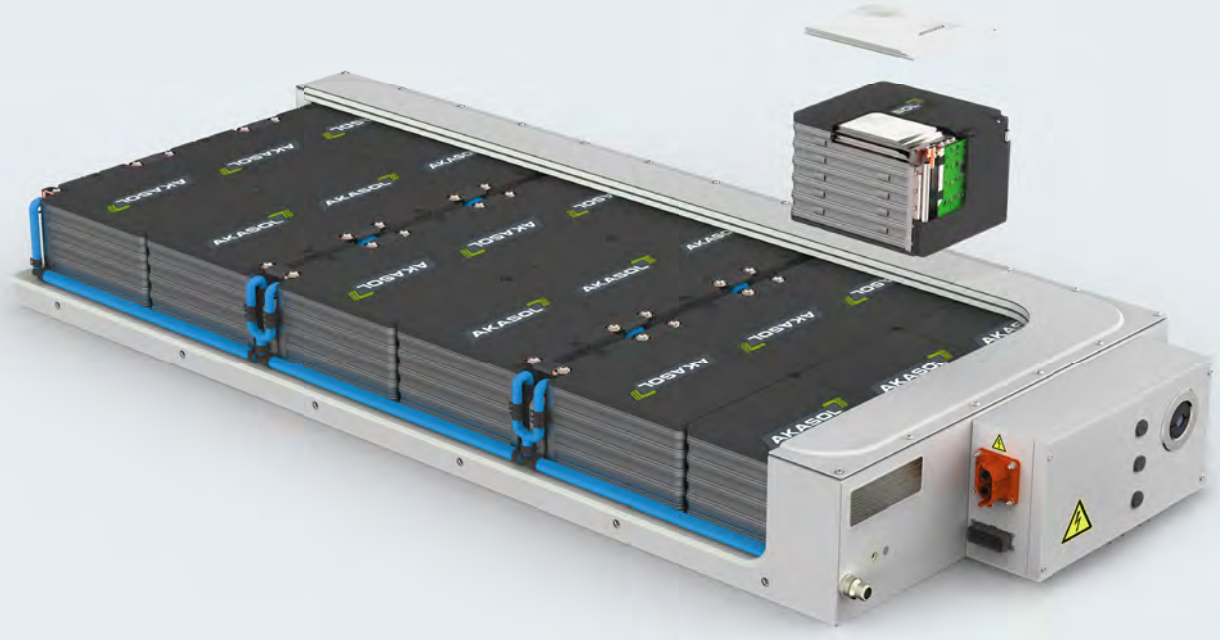
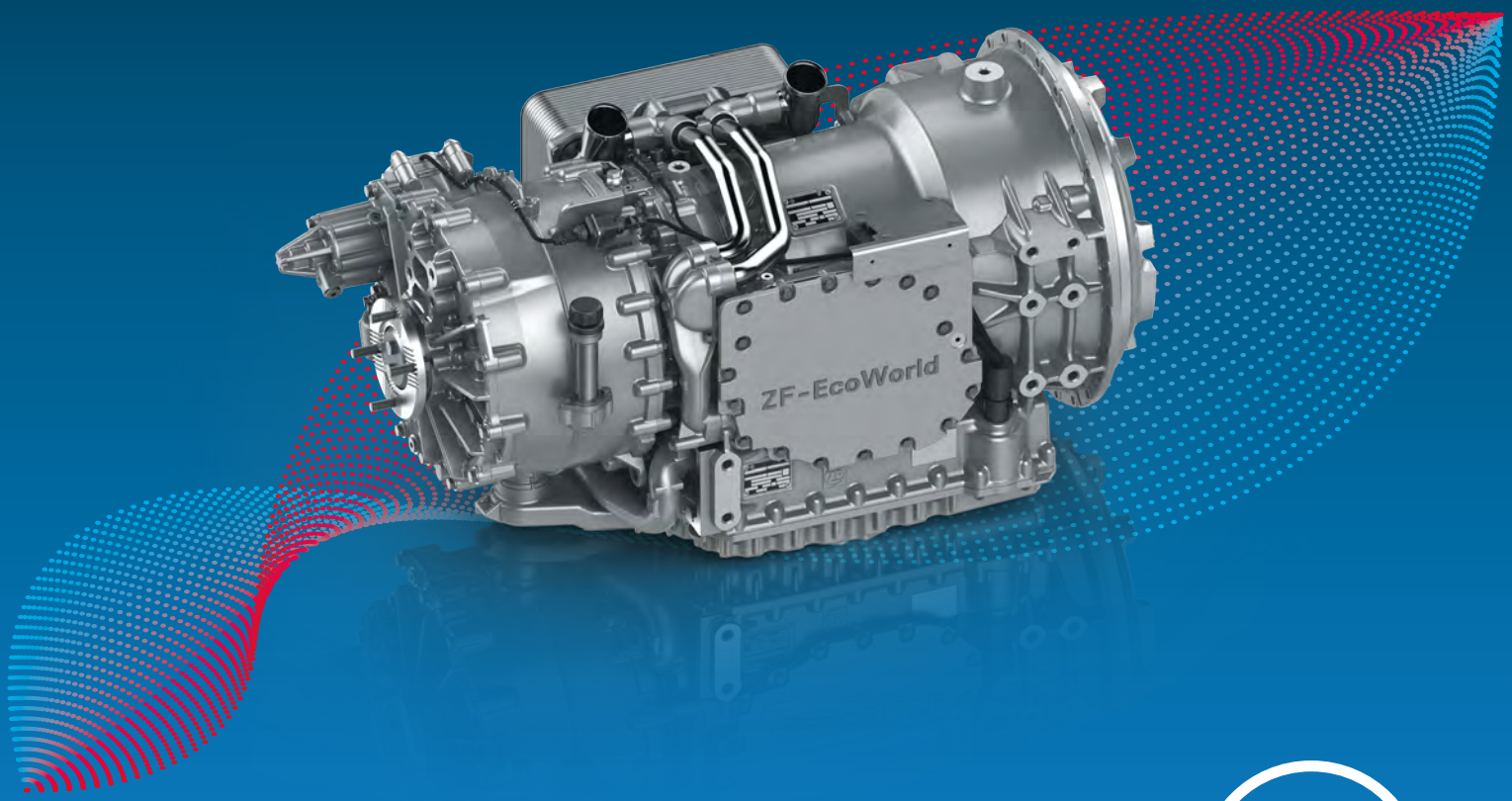


The Future of DMU Drive Systems with ZF EcoWorld

The new 6-speed powershift transmission is particularly economical: It achieves up to 20 percent fuel savings in comparison to hydrodynamic transmissions. The system maximizes efficiency and is equipped with a powerful torque converter as well as an integrated reversing function. It enables an unrestricted towing and sailing function which can save an additional five percent in fuel depending on the route, engine type and load condition.

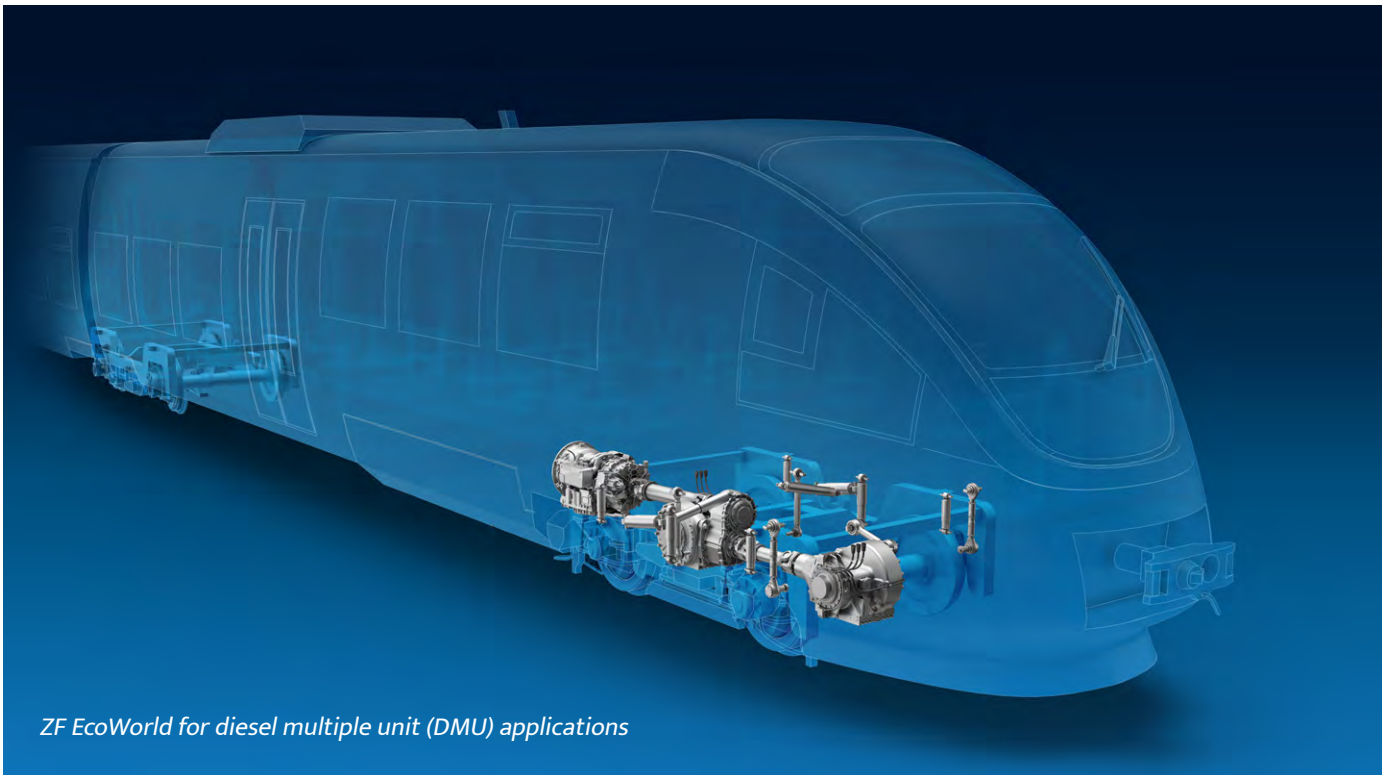
A new wheelset gearbox with drive shafts allows EcoWorld to be combined with various axle ratios, which opens further application fields. It's also perfectly suited for repowering in existing trains where it prolongs the vehicle's service life and reduces operating costs.



Visit www.zf.com/rail

ZF Friedrichshafen AG

ZF EcoWorld – Powerful, Compact and Cost-Efficient



ZF EcoWorld for diesel multiple unit (DMU) applications

ZF is one of the world's technology leaders in the area of driveline, chassis and safety technology for rail. It offers components and systems that make railway traffic more powerful without neglecting passenger safety and comfort.

Based on over 90 years of the Group's experience, manufacturers and operators of rail vehicles can profit from innovative and sustainable solutions for the mobility of today and tomorrow.

The Future of DMU Drive Systems

Modern drive systems that contribute to saving fuel and increasing vehicles' life cycles while reducing maintenance cycles are becoming more and more important. With EcoWorld, ZF has now combined these important features: a cost-efficient and fuel-saving powershift transmission for DMUs.

The six-gear powershift transmission ZF EcoWorld features an integrated reversing function, which will be integrated directly in the transmission.

A newly developed wheelset gearbox completes ZF's drive solution. The result is a new drive system that can be combined with a range of axle ratios. This makes it suitable for slow-speed operations as well as for fast rail vehicles in long-distance transport. At higher ratios, EcoWorld also handles steep gradient routes without difficulty.

Powerful, Compact and Cost-Efficient

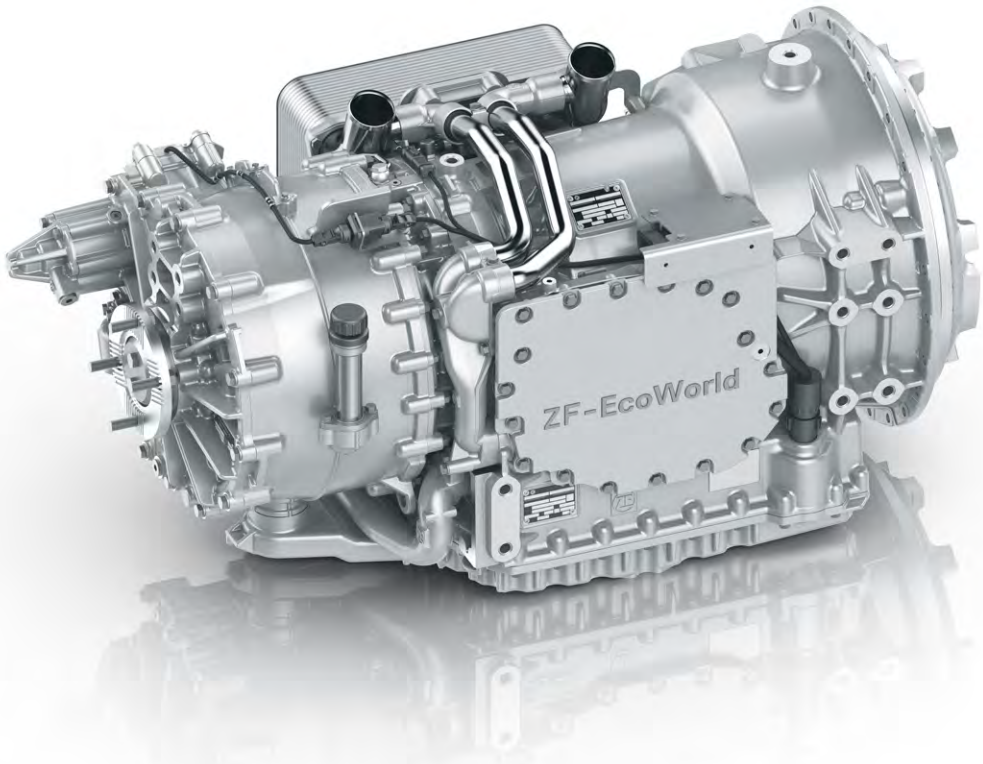
EcoWorld is designed for a drive power maximum of 600kW and an input torque of 2,500Nm. It is also equipped with an optional advanced coasting function, which allows additional fuel savings of up to five percent depending on the route, engine type and load condition.

At the same time, travel comfort is improved for passengers, as there is less noise in the railcar's interior. This is made possible by its increased degree of efficiency and the transmission ratios of the hydromechanical transmission, which allows the compound to rotate at a significantly lower speed. In addition, the transmission is prepared for various optional condition monitoring functions.

Repowering – Up to 20 Percent Fuel Savings Possible

ZF's EcoWorld can also be integrated into existing trains where it can deliver the previously mentioned benefits. Using this procedure, known as repowering, operators do not have to replace the entire driveline to extend the trains' usability. The engine and existing bogie with its axle drives are not affected. Prolonging the vehicles' service life significantly reduces operating costs.

The ZF driveline also reduces waste heat, improving the train cooling system capacity and at the same time generating substantially less CO_2 emissions.



Economical and efficient: up to 20 percent fuel savings in comparison to hydrodynamic transmissions.

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ABOX-5210-M12X

ABOX-5210-M12X is specifically designed for railway rolling stock applications that guarantee reliable performance, withstanding environmental disturbances such as severe shock and vibration in railway vehicle applications. It features 8 x M12 X Coded Connectors for GbE and certified Rolling Stock EN 50155 & EN 50121-3-2 that cater to rolling stock's application including traffic safety systems, passenger information systems, broadcasting systems as well as surveillance systems and so on.

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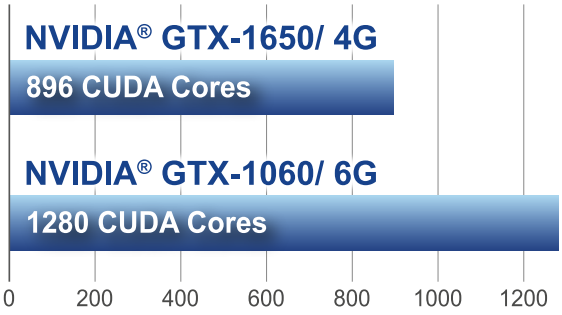

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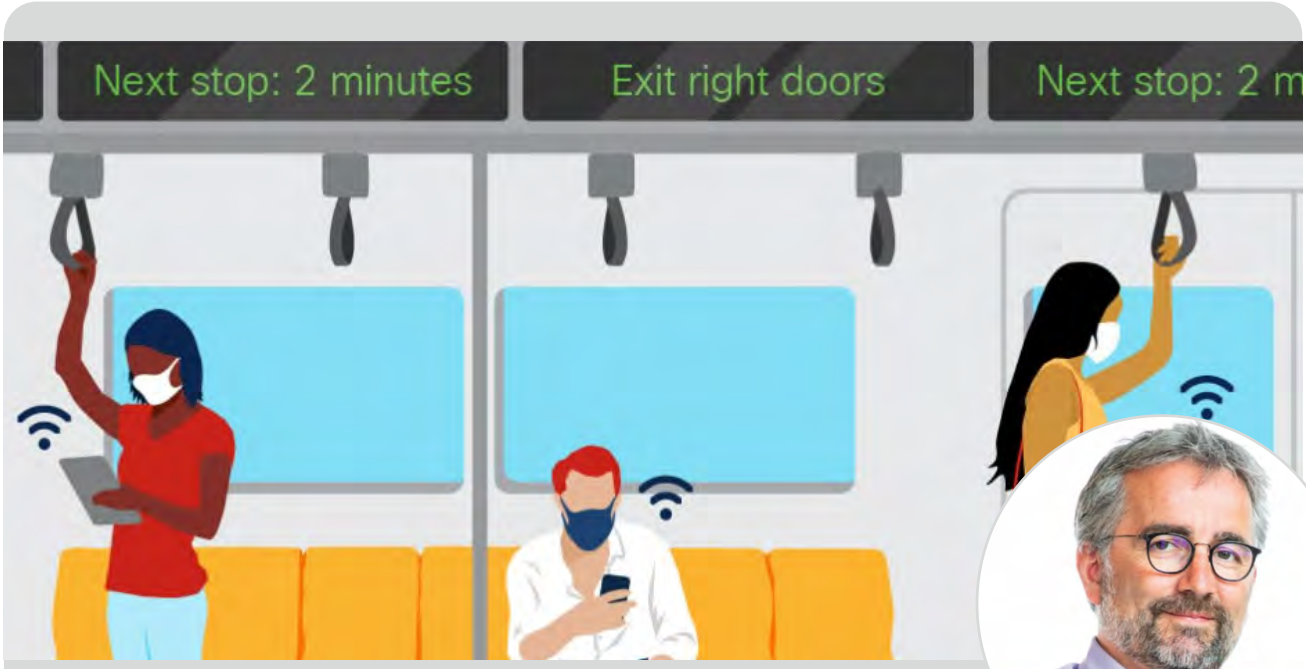
Cisco

How Cisco DNA Is Helping CFL to Build the Future of Public Transport in Luxembourg



By Christian Kettmann

Freedom of movement is something we all tend to take for granted. In any large transit station, everyone is rushing to get to their destinations.

All aspects of this system need to run smoothly, which means it relies heavily on coordination and networking.

Few of the world's transit systems can call themselves cutting edge—their clunky legacy systems are difficult and frustrating to manage. These systems are also an impediment to the ultimate goal of public transport: resolving issues immediately and getting passengers to where they need to go quickly and efficiently.

I have spent 25 years of my career working with the **Société Nationale des Chemins de Fer Luxembourgeois (CFL)**, the past several of which in the role of Chief Information Officer (CIO). CFL is the backbone of public transportation in Luxembourg. With a population of almost 625,000, Luxembourg is one of the smallest countries in Europe, yet we still experience some of the world's worst traffic jams due to all the cars on the road. This has led to a steady increase in the use of public transport year over year.

A Broad Base to Support

Our strategy at CFL consists of several key pillars: safety, quality, and innovation as well as know-how and performance. Our IT team supports these pillars and covers standard IT services for our home office and departments such as HR, finance, legal, and more.

At the heart of our work, however, we manage the IT needs for the whole CFL group. This includes our train company and, for example, everything related to train infrastructure—but not on the operational industrial side. In Luxembourg, we are still an integrated train company, much like it is in Switzerland.

Our IT department manages IT networking and operations for both the infrastructure side as well as the needs of train and bus passengers. Supporting multimodal train transport, including freight, is another one of our responsibilities. We also have several other subsidiaries, which include: CFL Immo, our real estate company; CFL Evasion, our travel agency; CFL Mobility, our car-sharing company; and more.

A Clear Destination: Full Speed Ahead Toward Digital Transformation

When I became CIO in 2016, there were many legacy processes and positions throughout CFL. There were two separate and distinct IT departments, comprised of 50 people who managed 1,400 laptops and PCs. It was inefficient, and the overall image of IT at CFL wasn't very positive. The first thing I did was a presentation for our entire board on the importance of digitisation. By the end of the meeting, everyone was clear about the two options before us: disrupt, or be disrupted. I was given the resources I needed to commence digital transformation at CFL.

But it wouldn't be a quick fix. One year later, I returned to the board to initiate the consolidation of the IT teams into a single cohesive unit. By 2018, with the reorganisation, the budget, and the support from the entire board behind us, we could really get started on digitisation and pursue our new targets.

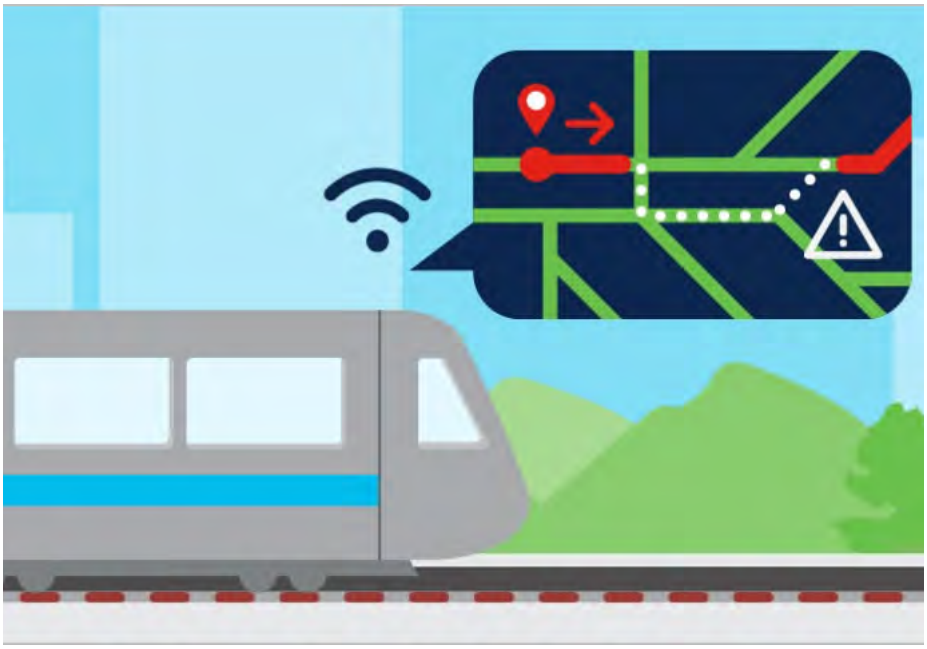
We essentially reinvented ourselves, planning 32 initiatives around management, governance, and collaboration. We conducted a self-analysis through **Gartner** and found that our digital maturity was a Level 2 and our target is to reach Level 4 by the end of 2021. Internally, we were eager to face the future and embrace digitisation. The bigger challenge was figuring out how to change a system that everyone thinks is running well from the outside—unaware of the ways it could be improved.

Externally, our network is quite complex, and there is dark fibre that runs all over Luxembourg. We actually had two different networks managed by our two separate IT teams before they united. There were even layers of networks managed by departments other than IT, that independently purchased and connected switches for their own needs.

In every station, we have many buildings and locations where we have to install networks. Some buildings had five switches for five different networks, where the switches were only using seven out of 48 ports. It was inefficient, to say the least. Even managing just two networks in the old way was quite stressful because we also had to configure all the routers manually. Automation wasn't the norm.

Our layer 2 network was reaching the limit of its capabilities. It was getting even more complex to manage because we had to manually configure new routers. It was also getting increasingly difficult to manage its segmentation. To move forward with our digital transformation, we needed to choose a different architecture.

It was time for us to consolidate into a single network for the entire



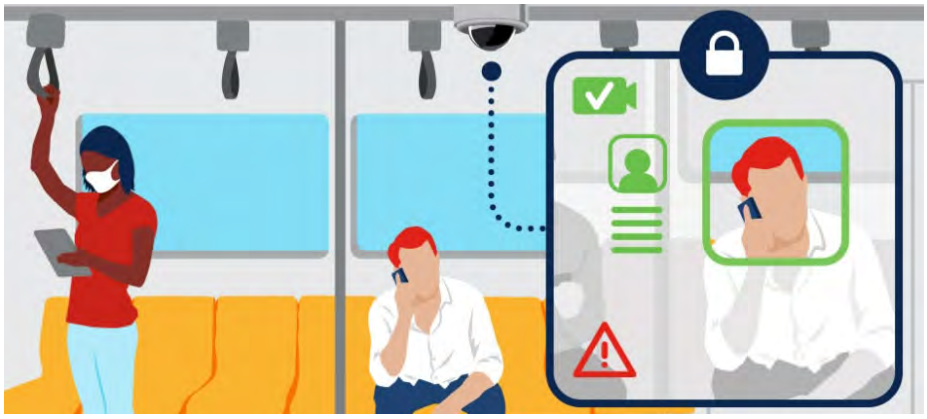
Group that would cover all needs and necessary situations.

A First-Class Ticket to Innovation: Early Adoption

CFL has been a Cisco customer for many years, but we don't see Cisco as simply a vendor or a technology supplier. To us, Cisco is a trusted partner that provides solutions to our IT challenges. They provide us with customer care through solutions, configuration, implementation, and ongoing support. And when they introduced us to the **Cisco Digital Network Architecture (DNA)**, a new solution at the time, it was clear this would be a perfect fit. We were glad that DNA was about as plug-and-play as it gets, and it also allowed us to keep some of our existing Cisco configurations.

As great as it sounded, the fact that the technology was so new in Europe was initially a big hurdle for our teams. There weren't really any Cisco partners, local experts, informal support networks, or help forums that we could turn to. Because of this, the support we received from the Cisco engineering team was critical, especially for a small team such as ours. We relied on a Cisco engineer to assist us with internal testing, which began in early 2019.

The first rollout of **Cisco SD-Access** in our company was somewhat unorthodox. We started with a passenger-focused project, putting a digital passenger information system in place at our train stations. Besides being more accurate and reliable with the correct information, the system also allows us to broadcast voice messages on multiple platforms.



Rolling out the passenger information system led to more internal discussions about how to expand and maintain the entire IT network, who would lead those projects, who the network would belong to, and what type of governance policies would have to be created as a result. We now have a plan to renew all our network components over the next three years. We started this process at the end of 2018 in our older buildings, and we're on schedule to be ready for a complete rollout by the end of 2021.

Being early adopters of such a new system has had its fair share of challenges, but it has also already given us some quick wins and other positive outcomes. For example, we're already well-versed in Cisco SDA (Software-Defined Access) and have a lot of in-house expertise about the solution. Early adoption also means that we don't have to worry that we're working with technology that will soon become obsolete. Being a little ahead of the curve means that our investment will serve us well for years to come.

Embracing Automation, Reducing Overhead, and Seamless Configuration

Cisco DNA Center also helps us with automation, particularly when it comes to deploying switches, which used to be an almost entirely manual job. Despite Luxembourg being a small country, it was an inefficient use of our IT technicians' time to drive almost two hours to a site, install and deploy a switch, and then drive two hours back. It was also very expensive.

Now, we have unconfigured switches that we can install right out of the box. We give them to teams from other departments who solely provide maintenance all around the country. These teams install the switches by plugging them in, and then the rest is configured automatically by us or by the system. Now it's much faster to roll out new switches across the network.

This has allowed us to be able to grow: over the past four years, we have doubled workstations from 1,400 to 2,800. The workload on our network is increasingly more intensive, but we can handle the increased demand without a problem. Even with our small team managing operations 24/7, Cisco DNA Center gives us a better overall view of the network so we're able to handle any incidents immediately and reduce any downtime. With this improved view, our maintenance and operations are becoming more efficient every day.

The increased visibility of our network using Cisco DNA Assurance

and Cisco SD-Access with ISE also means that we can spot problems more easily, which allows us to provide service to our customers that's better and faster than ever before. DNA has become a complete management and operations system for our network. It's really an integrated platform. Cisco DNA has redefined the meaning of quality of service, which is key because it's at the centre of everything we do. The needs of our passengers are always at the heart of our operations, including operations that happen behind the scenes and away from their direct experiences.

Our initial investment in Cisco DNA was the largest financial IT infrastructure investment ever presented to CFL's board of directors. It had to be validated and justified, of course, and that process showed that Cisco DNA gives us more abilities and opportunities than we could've imagined—including creating virtual networks, VoIP, Cisco telephony, and more.

Eventually, we want to create a network operations centre (NOC) in conjunction with the teams that administer those additional CFL networks. This will allow us to centralise teams and operations, and support the entire network as one entity. And further in the future, we hope to be able to allow other companies to rent part of our network as we span the entirety of Luxembourg.

On Track to Internal Harmony and an Improved Passenger Experience

CFL has undergone many changes in just a few years, and we have no regrets. In three years, IT, which had a poor image when I took over as CIO, is now a key player in meetings to which the department had previously been disinvited. We are an important part of this company.

Our relatively flat management structure means we can move more quickly with more unity, harmony, and efficiency. In fact, my colleagues in IT Infrastructure Team, have been instrumental in every step of the way. We're a very collaborative team, which is a benefit of the flat management structure, and we rely on each other to ensure we are all informed.

We are seen as the trailblazers of the company, leaping forward through trial and error to not only modernise CFL and its operations, but to also work toward our collective goal of serving and prioritising our customers. And when we know that we're on track to internal systems harmony while we improve our passenger experience, we're able to enjoy the journey as we speed toward digital transformation.

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SINTRONES

Sintrones' On-Board Computers Help PESA Enhance the Quality of Its Trains

Sintrones developed a customised multifunction on-board computing system with Ledatel local support to meet the needs of Polish train manufacturer PESA.

When looking to upgrade its on-board computers, Polish train manufacturer PESA Bydgoszcz SA turned to in-vehicle computing pioneer Sintrones and channel partner Ledatel local support.

With years of engineering and product design experience behind it, the Taiwanese company is renowned for its ability to create bespoke on-board computing systems that meet customers' technical requirements.

Multifunction System Requirements

PESA was looking to upgrade its on-board computers in order to enhance the quality and customer experience of its rolling stock, and had a number of system requirements that any potential solution needed to meet.

Requisite capabilities included isolated digital I/O design to protect against environmental noise and transient signals and ensure system reliability, and on-board network video recorder (NVR) functionality that could provide real-time recording, analysis and tracking.

PESA therefore required a system with a rugged design, wide operating temperature range, wireless capabilities, power over Ethernet (PoE) and RAID to protect against data loss.

The Polish train manufacturer also wanted the computer to be able to connect with a WiFi router in order to provide a reliable on-board internet service to passengers, in addition to functioning as the on-board display control system.

Tailor-Made Solution

Sintrones began this project three years ago with its channel partner Ledatel, and has continued to work closely with PESA to develop a customised solution that meets the manufacturer's needs.

Sintrones' VBOX solution, a railway-certified on-board computer, integrates multiple features into one unit, saving cost, space and physical wiring overheads, and compatibility issues and maintenance efforts across different devices.

Work started on this project with the standard model VBOX-3600, which was customised to provide isolated digital I/O and named the VBOX-3600-ISO.

From here Sintrones' experts designed a custom-made, next-generation unit that would meet PESA's exact requirements.

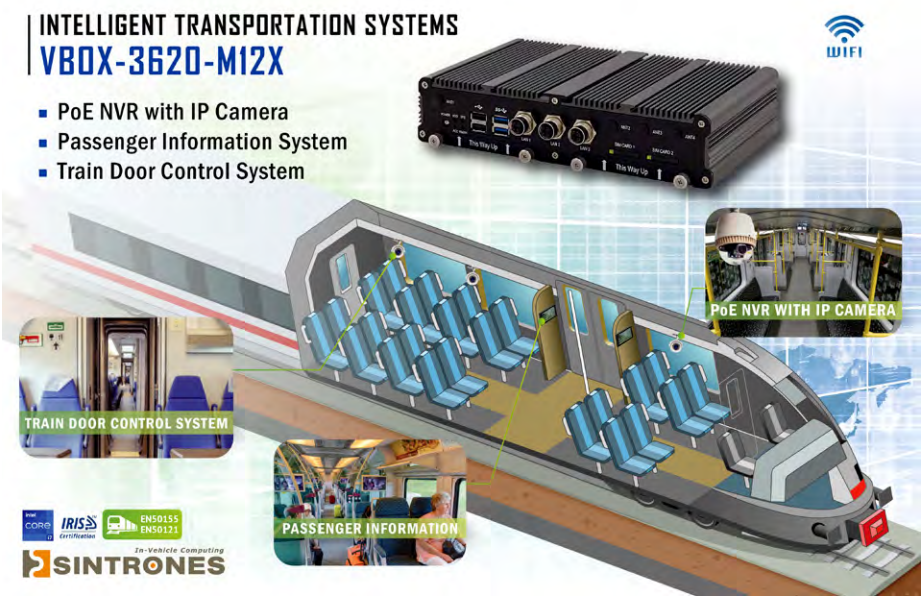
"*When we begin a new project, we first analyse the customers' requirements and pick a standard model that is the closest to their required specifications. From here our engineers will work on specialised the solution until it meets 100 percent of their requirements,*" says **Alan Yao, Managing Director of Sintron Technology Corp**. "*In this case, the outcome was the VBOX-3620-M12X.*"

Sintrones' VBOX-3620-M12X offered PESA:

- A variety of isolated digital inputs and outputs, used to control devices such as cabin lighting, air-conditioning, door sensors and smoke detectors
- Three GB Ethernet ports with M12X connectors – a requirement for the rail sector, a power-over-Ethernet switch connected to the ethernet port, plus several IP camera connections so the system can function as an NVR
- Three physical storage options – A SATA DiskOnModule (DOM) sits securely within the VBOX for the main operating system and software, while two 2.5" bays are available for solid state disk or hard disk drives to store video data (these support RAID 0, 1 and 5 to prevent data loss)
- Connection to WiFi routers in order to provide on-board WiFi connectivity for passengers
- Functionality as a passenger information system, with the VBOX connecting to the training signage display

Mass production of the VBOX-3620-M12X is now underway, and PESA has ordered over 1,000 computers for its new trains with full delivery expected this year.

To find out more about Sintrones and how its customised solutions could meet your rail needs, please visit **https://www.sintroncorp.com/** or email **sales@sintroncorp.com**.



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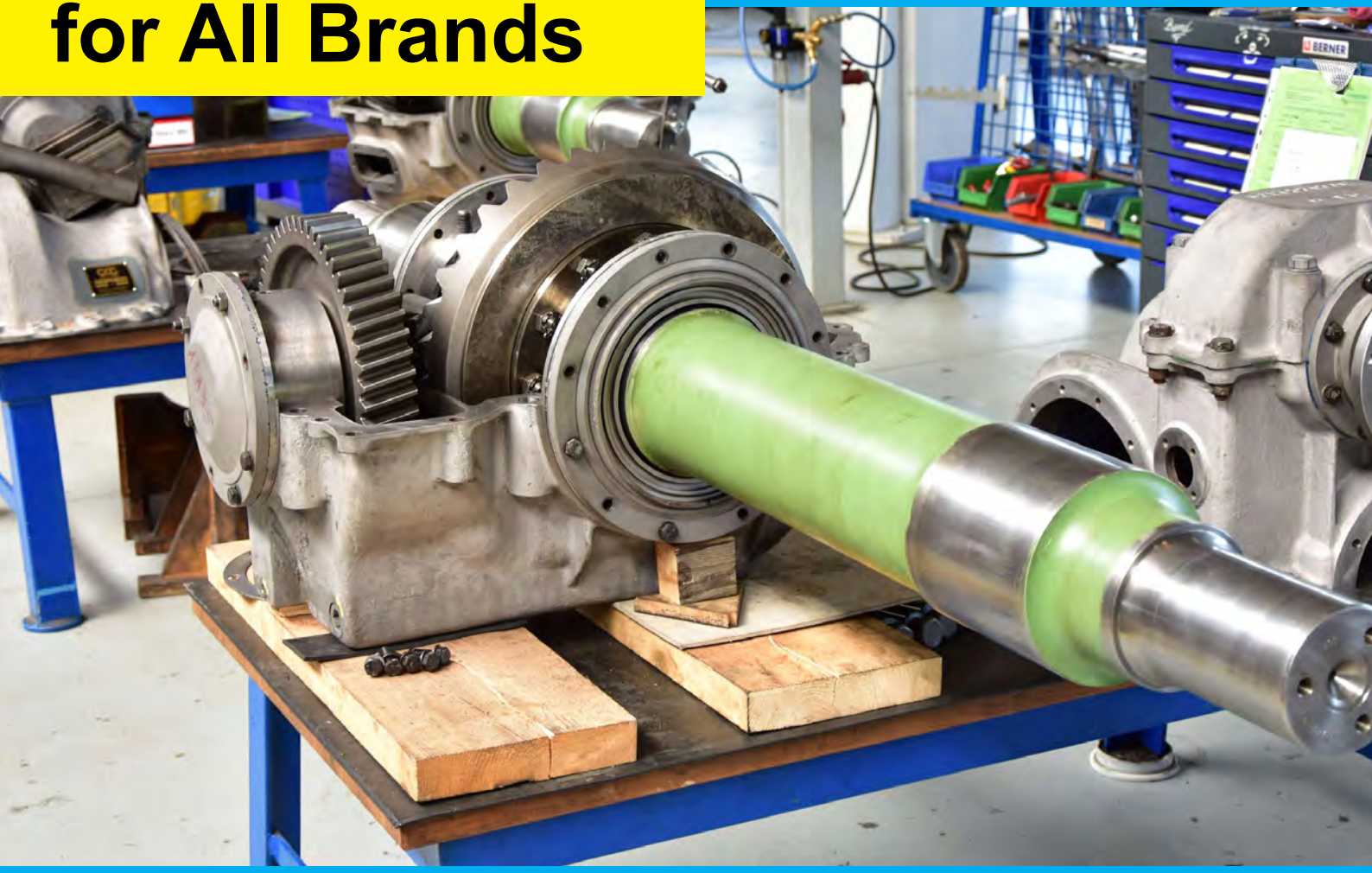

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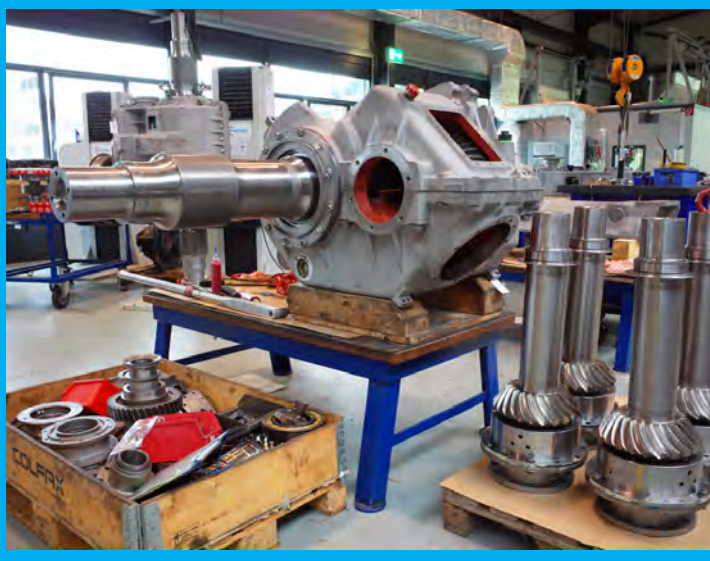

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Gmeinder

The GGT GearSaver® – Gearbox Condition Monitoring System

As an established and long-standing manufacturer of gearboxes, GGT GMEINDER GETRIEBETECHNIK GmbH has already contributed to many innovations and changes in the railway industry.

The challenges of climate-neutral passenger and freight transport and the operator's desire for increasing service life and the lowest-possible maintenance costs represent a major challenge for all manufacturers in the industry, in which we are breaking new ground to make our products more durable and low-maintenance. With the GGT GearSaver® we combine our immense experience in railway gearboxes with particularly reliable and accurate measurement technology for a completely new approach to continuously monitoring the condition of railway gearboxes.

The GGT GearSaver® system has been designed to monitor and evaluate the condition of the gear oil and to not only detect any damage as early as possible,

but also to prevent it, if possible. The overwhelming majority of all damage to gearboxes is caused by missing or incorrect lubrication, which can be avoided by continuous monitoring and timely replacement of the oil. As a multi-criteria sensor, the GGT GearSaver® monitors a large number of relevant physical quantities that provide information about the condition of the gear oil.

Monitored parameters:

- **Operating temperature of the oil**

To prevent excessive ageing of the oil due to excessive temperatures

- **Relative humidity of the oil**

To prevent contamination of the oil by water or any corrosion damage

- **Oil level in the gearbox**

To avoid damage caused by insufficient lubricant in the gearbox

- **Oil conductivity**

To prevent any damage due to operation of the gearbox with old oil and contamination by foreign substances

- **Measurement and binding of ferromagnetic particles**

To prevent any damage caused by abrasion particles and for early detection of damage symptoms

The comprehensive data collected by the GGT GearSaver® not only prevents damage, but also simplifies and monitors periodic maintenance processes. For example, inspection effort can be spared and condition-based maintenance planning can be implemented by specifying the exact oil levels in the gearboxes

Thanks to the comprehensible and clear reporting of the GGT GearSaver® system, all measuring data are visually displayed to the operator. A specialist at GGT GMEINDER GETRIEBETECHNIK GmbH evaluates these data and gives recommendations for action. In addition to the comprehensive reports, important measured variables are available at any time in an online portal.

By means of the GGT GearSaver® system, GGT Gmeinder GETRIEBETECHNIK GmbH provides operators with a completely new and measurement data-based solution for preventive maintenance, which saves valuable resources, minimises or even prevents damage incidents, and reduces maintenance costs.

Contact:
Gmeinder Getriebe Gruppe
Anton-Gmeinder-Str. 9-19
74821 Mosbach
Germany

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info@gmeinder.de

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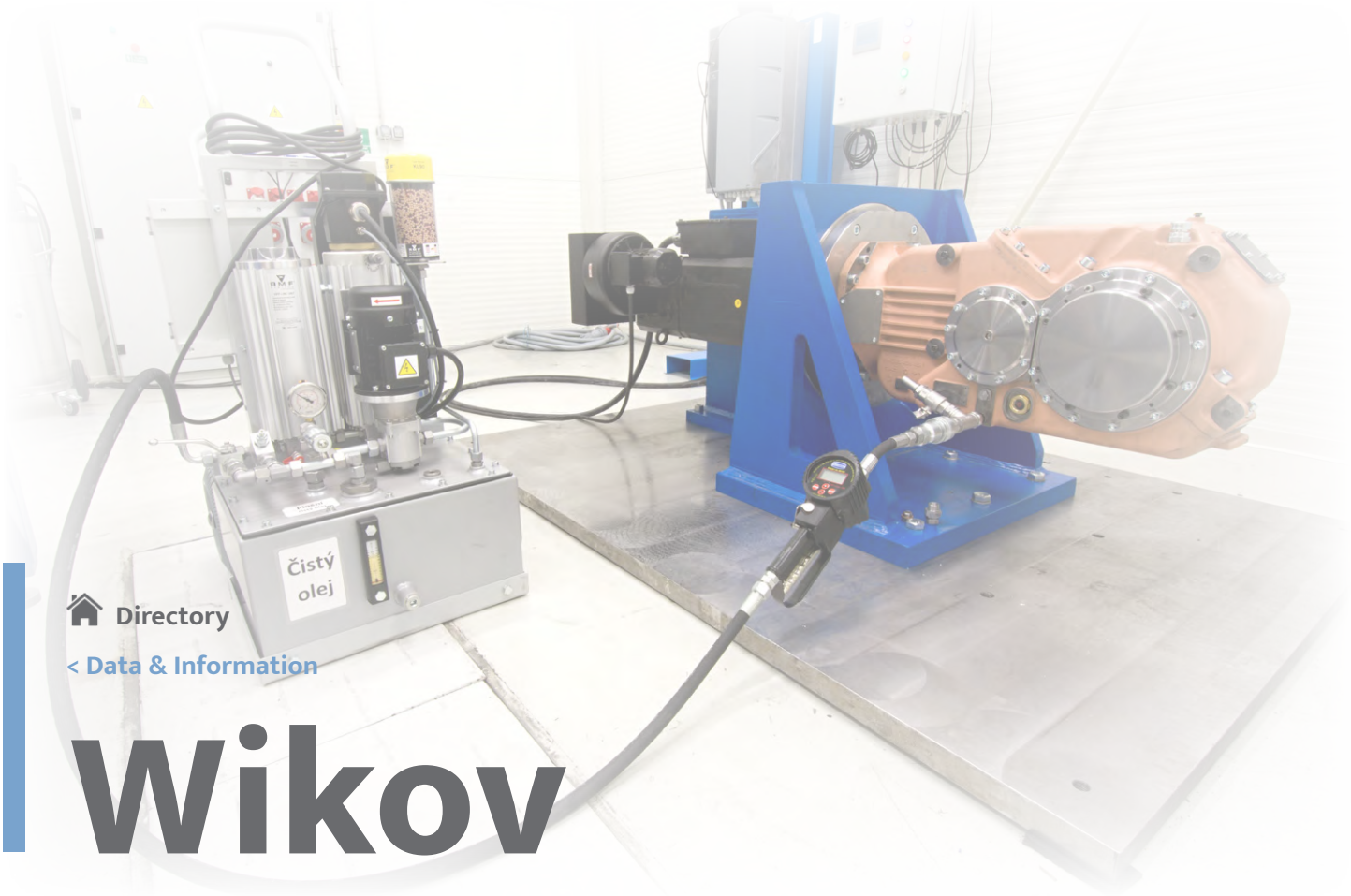


Wikov

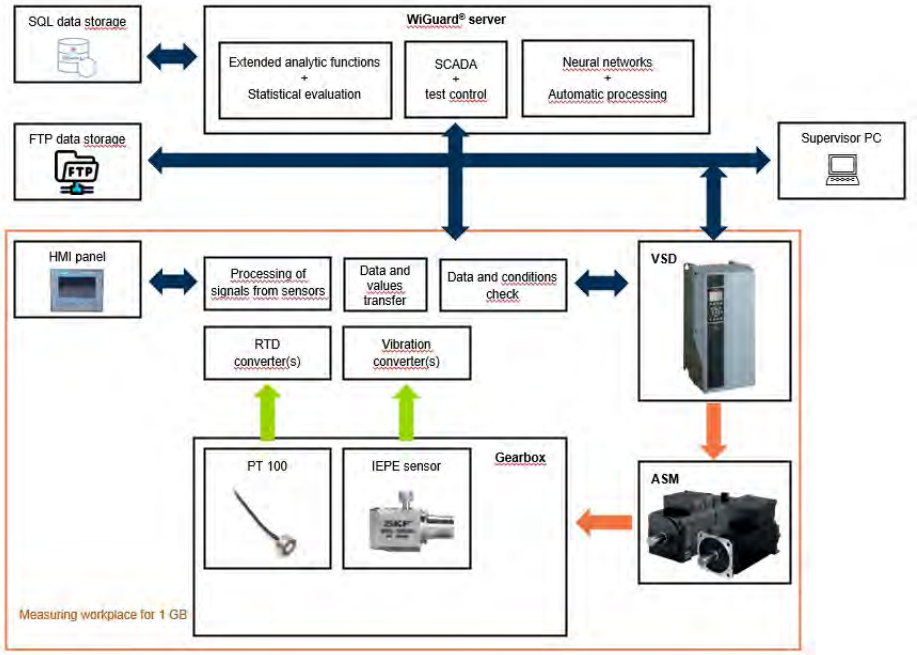
No-Load Series Testing of Rail Vehicle Gearboxes with Artificial Intelligence

For the efficient series manufacture of rail vehicle gearboxes, it is also necessary to ensure that there is sufficient capacity for the no-load testing of every gearbox.

For the last 18 years, Wikov has built up its position as a key European manufacturer of gearboxes and drives for rail vehicles. It has a strong development workplace with experimental test stands, including those with dynamic loads; Wikov further has a cooling chamber for cold climate tests at its disposal. Up to now, no-load testing has been performed according to the current needs of individual projects within a big test room, in which gearboxes for trams or underground units used to be in the immediate vicinity of industrial gearboxes for rubber mixers or mobile recycling crushers. These days are over. Wikov has opened a new test room exclusively intended for rail vehicle gearboxes, utilising state-of-the-art elements of present-day testing, including the integration of artificial intelligence.

Concept Behind the New No-Load Test Room

The site for testing rail gearboxes is equipped with two mutually independent test beds. According to the test being performed, these test beds are mechanically arranged by means of prefabricated unified devices which are able to cover the entire range of gearbox types, from spur-gear, through bevel-spur-gear, up to special planetary-bevel ones. At the same time, to minimise the influence between the first and last gearbox of any given series tested, the test room is equipped with an



automated system for oil filtration and heating. Thanks to this system, gearboxes are filled with clean, pre-heated oil of a constant quantity and temperature, which is ensured by a special filling device with measuring.

With regard to the run unit, every workplace is equipped with an asynchronous motor (ASM) which is able to rev up the input shaft of the gearbox to up to ±7500 rpm. Thanks to this, the test aggregate does not necessitate any additional step-up gearbox or belt transmission to meet the input speed parameters for gearboxes of the extensive portfolio of modern rail vehicles. In coupling with a frequency converter (VSD), an ASM features sufficient power for the required dynamics of no-load tests. The tested gearbox is connected to this motor through a flexible coupling, enabling the quick replacement of the tested gearbox with another one.

Proprietary Online Monitoring and Artificial Intelligence

The entire driving block is supplemented with online monitoring – WiGuard®, developed right in Wikov, used for the recording and automatic evaluation of temperature and vibrations within the prescribed test specification. The system has been created for measuring and evaluating up to eight temperature points on the gearbox (bearings + oil) and up to four vibration sensors. The temperature sensors can be located in prepared holes (if the gearbox is also equipped with temperature monitoring on the vehicle itself) or used through special contact magnetic sensors. The vibration sensors are fastened to the tested gearbox by means of screwed fixtures at places specified by the designer.

The system identifies the gearbox according to its type and series number. From the server, it automatically downloads the limit settings of the individual sensors, intervals for the individual records and the timeline of the rotations tested, on the basis of which it then sets up the requirements for the frequency converter.

During the test, the values of the measured variables and selected characteristic quantities from the frequency converter are then saved in the server storage. Simultaneously, these values are continually verified within the given test phase limits. Currently, the time recording of vibrations for the individual sensors is put through FFT analysis; the evalution of the vibration state is made on the basis of artificial intelligence.The AI is preset to recognise gearbox defects in relation to the gearing, bearings and/or imbalance by means of neural networks.
If the system detects a serious error, the given test is suspended prematurely.

If the entire test proceeds without serious error, it is completed; the data is saved and then evaluated. Moreover, the data collection system enables the additional evaluation and comparison of gearboxes within the tested series. This comparison is based on the statistical processing of the given gearbox series data saved on the server.

CableGuardian - **is the only Network Rail approved cable monitoring system that offers adherence to Tier 3, Tier 2 & Tier 1 of the Network Rail standard NR/L2/SIGELP/27725** - Insulation Monitoring and Fault Location Systems for use on Signalling Power Systems.

NetworkRail APPROVED
Product Certificate no: PA05/06538

JOIN THE REVOLUTION

to improve signalling resilience

Proven Trackside Technology Since 2018: This advanced system has been proven in operation since August 2018, with multiple UK regions already benefiting from the technology and further installations scheduled across the network this year.

- ☑ Tier 3 Approved
- ☑ Tier 2 Approved
- ☑ Tier 1 Approved

Key Benefits:

- Fewer boots on ballast fault finding and cable testing.
- Quickly and accurately locate cable faults and cable theft.
- User friendly web portal for fault diagnosis and location.
- Allows trending of insulation resistance and insulation capacitance at a cable section level.
- Technological alternative to the 5 yearly manual cable testing requirements.

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Viper Innovations

Efficient Maintenance, Effective Safety and Transformational Asset Management for Signalling Power Supplies

In looking to build back better from the impact of Covid-19 on the rail network, it's important to ensure that we focus on delivering more for less – making the best use of the combination of technology, asset and process knowledge to enable outstanding safety and reliability. We must deliver this whilst providing the best operational performance at the lowest cost to get the railway back on its feet. It will be vital for Network Rail and TfL to work collaboratively with the wider supply chain to deliver the principles of best available technology at the lowest lifecycle cost. We all have a part to play in this.

Whilst the rail industry has proven itself to be the backbone of Britain during Covid, with its focus on essential freight and keeping key workers moving, it is now entering unchartered waters with respect to passenger usage. It's entirely possible that numbers will recover as people get moving again post-lockdown; the reality is,

however, that no one really knows what demand there will be once lockdowns are a thing of the past. There is increasing talk of winning over the leisure passenger with the end-to-end service; offering carnet tickets to support commuters not wanting to come to the office five days a week; and the role of rail in targeting net-zero carbon – but whatever the future holds there will always be the evergreen requirements sitting beneath all of these scenarios, which is to operate a safe, punctual and affordable railway.

Affordability is where the pressure point is right now. In advance of the Williams-Shapps Plan for Rail and its strong call for rapid project cycles and digital innovation, Network Rail has worked hard to develop agile procurement processes and win the benefits of engaging the SME market. The day-to-day challenges of balancing affordability with agile, collaborative development and cutting-edge innovation is why the SME market exists, and Network Rail has done much to bring the market on. Shortening the innovation lifecycle to provide rapid collaborative development with clients, users and process experts to bring science and technology expertise to solve problems is the root of reducing costs. And having the decision-making so close to the client means that we, the SME, can mould products and services to deliver precisely what the client needs when they need it.

An example of this is Viper Innovations' CableGuardian product and service offering. When Network Rail Engineers approached Viper to develop a system that would remotely monitor signalling power supplies – based on our innovations in insulation resistance monitoring and automated cable failure locating technology – Viper's agile development and deep technical know-how met decades of client process knowledge and application experience. The result is a premium, tailored remote condition monitoring system that delivers real improvements in safety, reliability and performance for signalling power supplies at a target price that really works for the client.

CableGuardian allows the client to tailor a condition monitoring solution that works for them in terms of layout, price, performance and safety. The client can choose a tier 3, 2 or 1 system, or hybrid tier 2 with manual tier 1 service, to deliver a layout that gives the best return for the lowest investment. The ability to monitor cable insulation resistance from the Gigaohms range down to Ohms and provide alarms set by the client will provide significant benefits in predicting and preventing signalling power supply failures, and gaining unprecedented insight into cable performance over time.

The added benefit from this collaboration with CableGuardian is the provision of long-term open rail data that will boost Great British Railways' ability to improve weather resilience, deliver long term asset renewals strategies and provide the ability to align information with other rail data services to gain additional insights into performance, reliability and availability of a wide range of assets across the network.

Our ongoing open collaboration with clients is allowing us to tailor a service and technology provision, with full ongoing support, to ensure that the system performs its duties now and in the future, ensuring an outstanding return on investment. This ongoing liaison is enabling clients to not only have the ability to attack the underlying causes of performance problems and electrical safety management; it also opens the opportunity to implement risk-based maintenance, should the responsible engineers wish to. Therefore, this enables the industry to remove boots from ballast and bring about a corresponding reduction in road traffic incidents, and deliver carbon reductions and efficiency savings to ensure the constant requirements of a safe, punctual, efficient and low-carbon railway are embedded for years to come.

For more information visit **www.viperinnovations.com/cableguardian**

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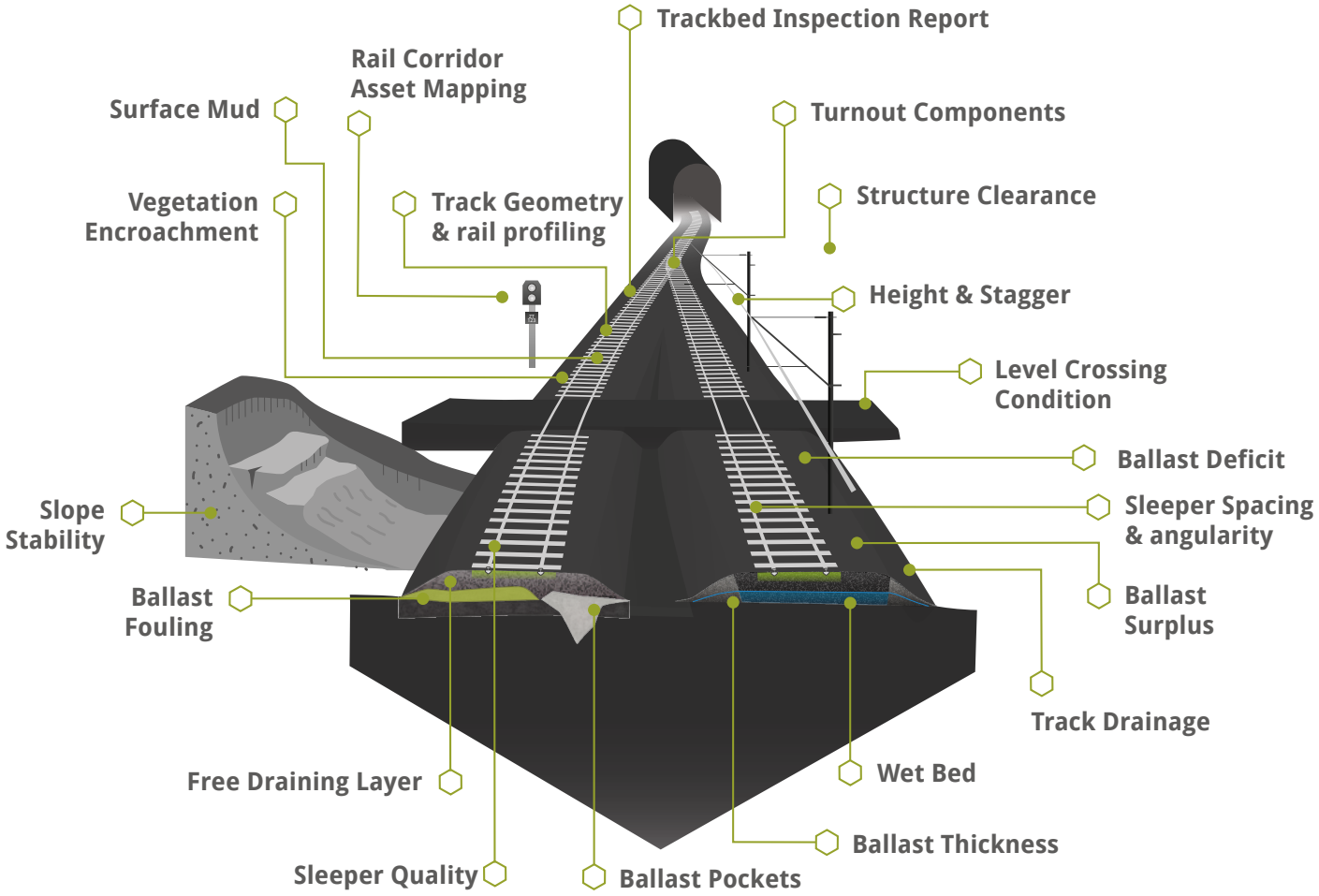
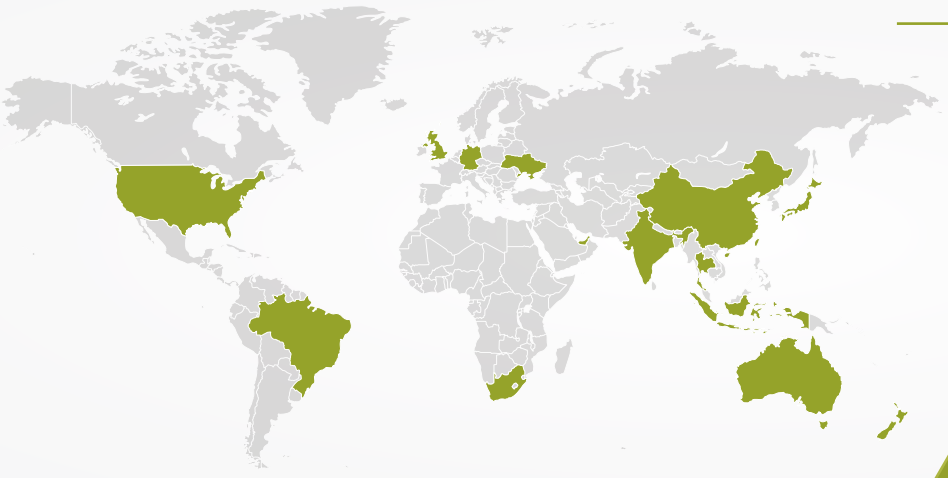
Trackbed inspection for condition-based maintenance planning





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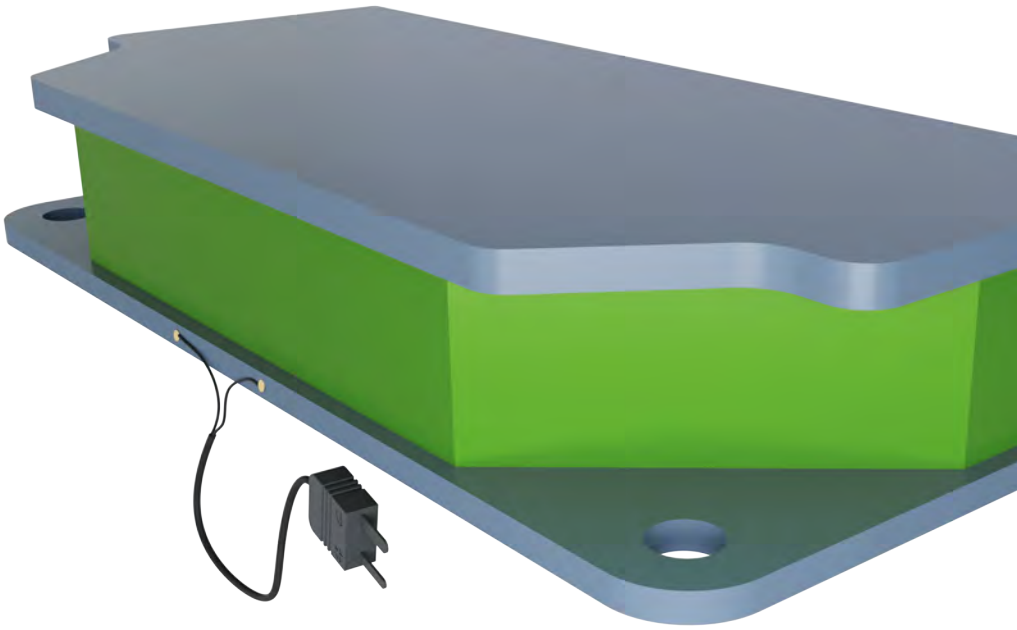


Jörn 4.0: Condition Monitoring

Condition-based maintenance planning for dynamically loaded rubber-metal parts

Our condition monitoring system is capable of reliably predicting the usable remaining life of rubber-metal parts.

It enables maintenance based on the actual condition of the components.

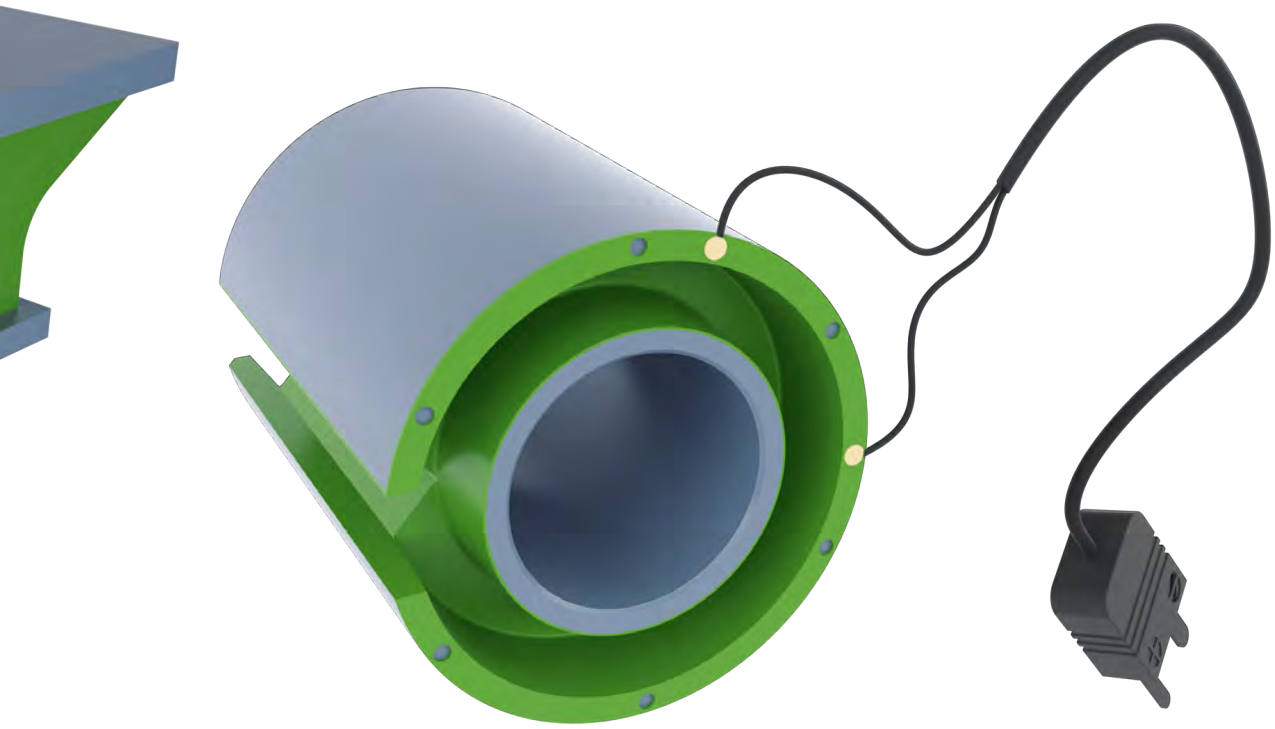
This lowers costs and minimises downtimes.

The influence of singular overloads can also be recorded and evaluated.

In case of the imminent failure of components, suitable measures can be taken, such as stopping a train in a controlled manner or switching off installations.

Benefits:

- Prediction of usable remaining life
- Actual condition-based maintenance
- Measures taken in case of imminent failure



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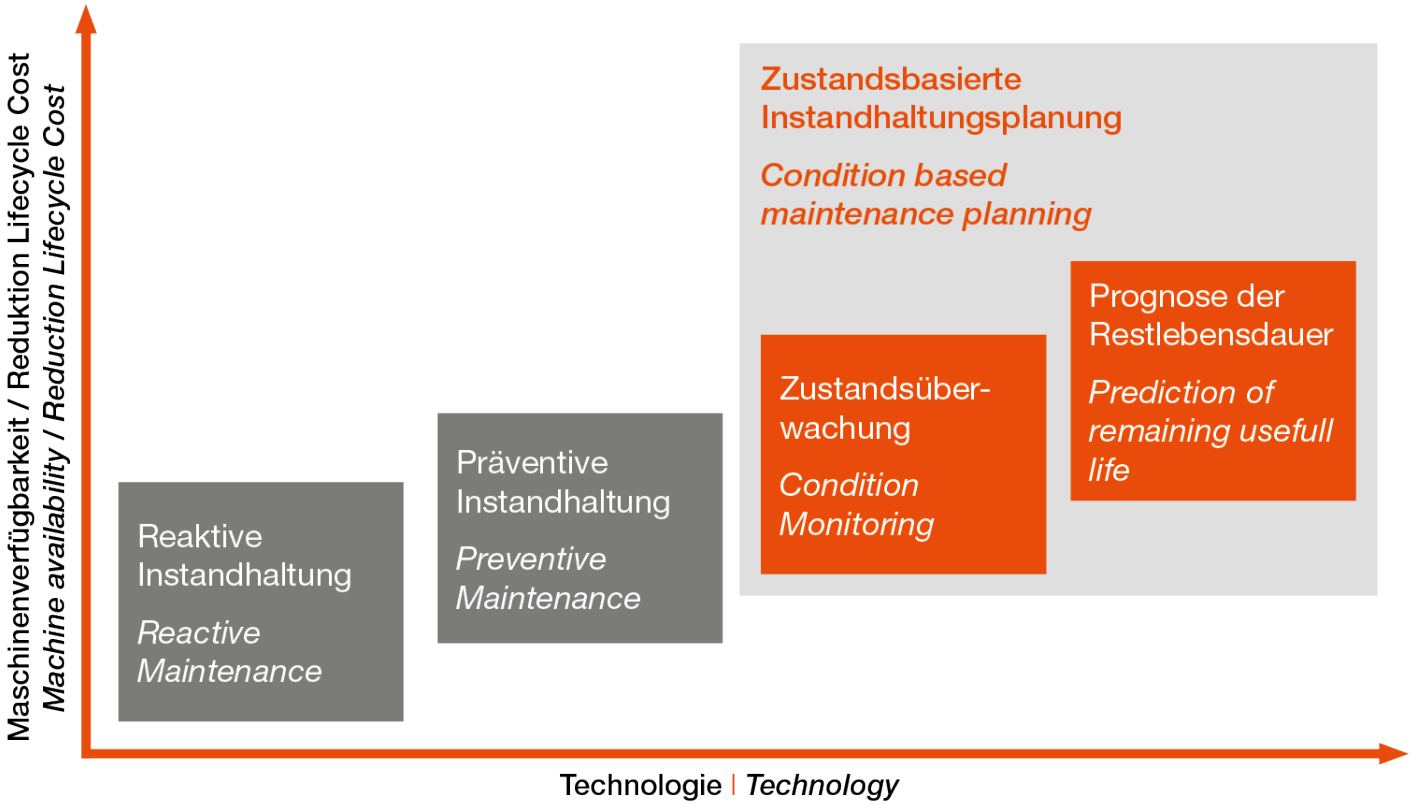
Maschinenverfügbarkeit / Reduktion Lifecycle Cost
Machine availability / Reduction Lifecycle Cost
Reaktive Instandhaltung
Reactive Maintenance
Präventive Instandhaltung
Preventive Maintenance
Zustandsbasierte Instandhaltungsplanung
Condition based maintenance planning
Zustandsüber-wachung
Condition Monitoring
Prognose der Restlebensdauer
Prediction of remaining usefull life
Technologie | Technology

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200+ CUSTOMERS

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EXPERTS IN IoT SOLUTIONS

Yeltech design and manufacture bespoke remote monitoring products; offering practical and cost-effective engineering solutions. Using expert experience and advanced IoT (Internet of Things), AI (Artificial Intelligence) technology, we strive to create a partnership where we are trusted to deliver solutions that aid and produce solid results to suit each individual need.

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Yeltech

NEW: Tension Monitoring with OLE Balance Weight Monitoring System

Yeltech introduces an intelligent, ultra-light, compact, and easy to install device which monitors the movement of the weights, transmitting the real-time data to their smart hub. Setting the bar for predictive and preventative smart monitoring.

Proactive Maintenance

Founded In 2004, Yeltech have succeeded in understanding industry needs and advanced in creating innovative solutions, becoming a market leader for all monitoring needs. Using wireless data transmission capabilities, Yeltech create a seamless communication between product-to-engineer, enabling for maximum monitoring benefits. With a unique, cloud-based system, their products can provide accurate, real-time updates for effective asset management.

Yeltech Offer practical and cost-effective engineering solutions for an expanding range of industries; including rail, buildings and structures, water, drainage, and environmental management. Their portfolio is an array of proven, established and, dependable technologies, that keeps safety and

adaptability at the forefront. The newest attribute to their product line is the Balance Weight Monitoring Device (BWMD) for OLE maintenance.

Overcoming Challenges Together

Overhead Line Equipment – or OLE – is the name railway engineers give to the assembly of masts, gantries and wires found along electrified railways. The steel and cable have only one purpose – to supply power to make electric trains move.

The catenary and contact wires are installed in lengths that are tensioned at either end to keep the contact wire still, so that a good contact with the pantograph is maintained. Both wires are tensioned with the tensions either being made to be constant (auto tension) or fixed (fixed termination), causing the tension to vary with temperature.

Fixed termination lines will expand during hot weather, reducing the tension in sections of the OLE environment. This can lead to a risk of passing trains damaging the contact wire, eventually leading to dewirements and significant delays to services on the network.

The conventional tensioning mechanism consists of a braced mast and iron weights. These weights move up and down according to the ambient temperature which affect the tensioning and can cause service disruptions.

Wirelessly, Remotely, Accurately

The Balance Weight Monitoring Device (BWMD) Yeltech have developed uses advanced IoT technology, monitoring the movement of the weight and the ambient temperature continuously, logging all real-time data onto YelCloud; an intelligent hub created for meticulous monitoring and data analysis.

The innovative system features smart alarming capabilities; allowing pre-determined thresholds to be specified, and when the thresholds have been met or exceeded, the device will send an alarm to notify the end user, implementing further safety measures to be put in place and/or maintenance is required.

Effectively reducing manual monitoring, visits to track and fulfilling the goal of less boots on ballast.

How It Works

The BWMD is programmed to transmit the data on specific instructions with an internal threshold of a given movement (i.e., +/-20cm). The BWMD will wake up every 30 minutes to read and record the values of temperature and the measurements of A & B (see diagram opposite).

The device has 2 transmissions modes –

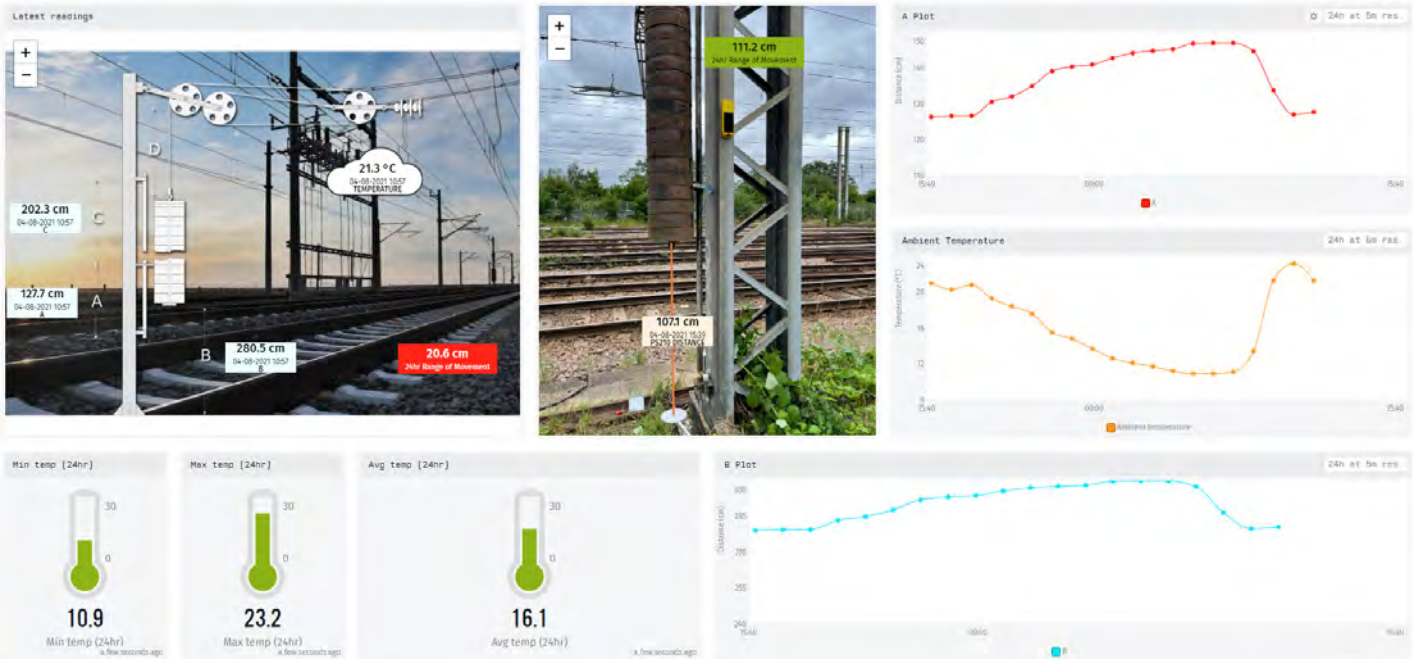
Normal transmission rate of the BWMD means the device will store the data collected every 30 minutes if the measurements do not exceed thresholds set. The data/readings will then be sent to the server every 12 hours.

Fast Transmission rate of the BWMD is when the movement exceeds the threshold (i.e., +/-20cm - this threshold will be set by the end user). When the BWMD wakes up, if the weights have moved more than 20cm, then it will transmit data to the server every 30 or 60 minutes, maintaining the operation in Fast Transmission Mode until the distance is below the 20cm set.

Key Features and Benefits

- Ultra-Lightweight design and easy to install - Installation can be carried within 10 minutes.
- Long life battery (up to 3 years) – Avoiding to regular site visits.

Balance Weight Monitoring Device in use in Bedford for Network Rail.



- Early Identification of potential tension issues - Alarms will be sent when a predetermined threshold has been reached.
- Readily available App – View real-time data and measure devices on the go.
- 24/7 Technical Support.

EMERGENCY WARNING BOARDS

RAIL TEMPERATURE MONITORS

RAIL WEATHER STATIONS

Technology you can Trust

Yeltechs leading technological and engineering capabilities do not end there, continually refining their range of products and services within Transport Infrastructure to meet evolving customer requirements. Striving to work with an expanding group of customers and industries, both in the UK and in several key international markets – including the United States, Europe, and the Middle East. Yeltech has the proven track record in the railway and transport sectors.

Yeltechs expert team have delivered a wide range of solutions to the industry, including sophisticated track temperature monitoring, wireless safety signalling solutions as well as track/bank-side structure surveying. Also developing and supplying custom applications for testing vibration and void at track points. All can be managed within their cloud based IoT system.

With an impressive skill set covering the development of bespoke solutions in addition to comprehensive mechanical, electrical and electronic capabilities, Yeltech has the complete range of necessary skills in-house.

Reliable Customer Support

Their multi-project teams work closely with our customers to deliver advanced and cost-friendly installations for the utilisation of reliable data or the manufacture of monitoring products. Full technical support is offered for the use of all products and their expert team is available to provide ongoing training and assistance.

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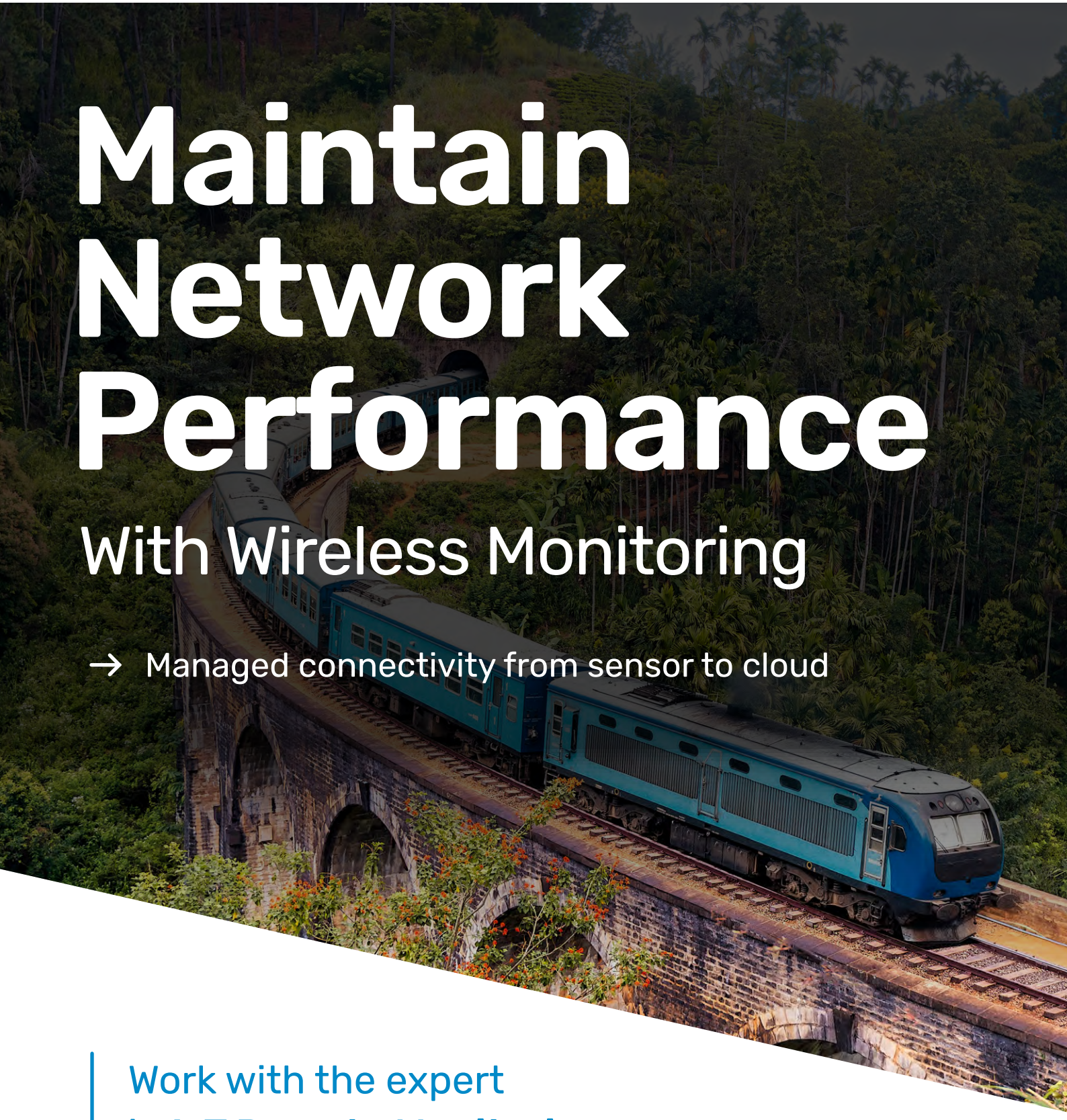

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A line of EN 50155 compliant AI-enabled platforms offer rail solution providers with a high level of flexibility to select the configuration best suited to their use cases, and help them achieve railway digital transformation

AVA-5500

Rugged, fanless AIoT platform with NVIDIA Quadro GPU embedded for real-time video/graphics analytics

AVA-5600

19" 2U rackmount rugged, fanless AIoT platform with high performance GPU for compute-intensive applications

AVA-RAGX

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ADLINK

How AI Is Transforming the Rail Industry

Today's artificial intelligence (AI) powered systems and applications boost productivity and safety across transportation sectors, including the railway.

The rail industry has long needed modernisation, particularly in autonomous operation, which is made possible through AI. In order to compete with the transition to autonomous vehicles in road transportation of both cargo and passengers, the rail industry needs to integrate AI into its modernisation to benefit areas of operation.

Contributing Trends and Factors

Legacy onboard and wayside systems have worked for decades and continue to do so. However, the nature of competition and the need for growth makes AI as attractive to the railways as every other industry. Organisations adopting AI can expect an uptick in revenue, including AI-driven revenue increases, and reduced costs. AI stands to give the railways an aggressive bottom-line boost. However, other complementary trends and factors also make AI adoption well-suited to the railways.

Smaller Form Factors

In the rail industry, space is limited,

so the physical dimensions of computing infrastructure can be key. The rise of AI within the rail industry is due in part to today's computer systems moving to smaller form factors and being much more powerful and space efficient, allowing the integration of AI.

More Data from the Masses

The amount of data produced in the rail industry continues to grow exponentially from devices and services, such as sensors, smart phones and servers. This volume of data gives ample reason to use AI in rail to improve efficiency, safety, customer approval, and profits.

The Internet of Things + M2M

Internet of Things (IoT) and machine-to-machine (M2M) devices generate large amounts of data for AI analysis, including logs, alerts, time stamps, and video — much of them mission-critical for rail. M2M are a subset of IoT devices that communicate directly with other connected services.

Boost from GPU

GPU-powered deep learning accelerates the performance of neural network systems. By incorporating GPUs into compatible platforms, rail companies can run AI-based workloads and applications at speeds practical for near-real-time utility.

Pandemic Protection

By using AI, rail station and on-train surveillance feeds can be monitored for face mask usage and other health & safety guideline compliance, flagging potential human-based hazards, reducing risk, and protecting the public.

Potential AI Applications for Rail

AI is a new, rapidly evolving technology and its prevalence and influence in the rail industry are growing. The following are examples of AI applications to expect within this market.

AI-Powered Customer Service

From chatbots on social media to humanoid robots servicing high-traffic stations, AI will dominate how customers get their questions answered. AI-based technologies such as speech-to-text and natural language processing will provide answers in real time at lower costs freeing up staff members to address other needs.

Automatic Train Operation (ATO)

Rail autonomy with increasing degrees of driving and operating responsibilities transferred from a human crew to an operational safety enhancement system is already in use in several countries. With improved AI-automated rail systems, rail transport will benefit from better rail synchronisation thanks to real-time information and data exchange.

Biometric Ticketing

Ticketing based on biometric data including body scans (facial, fingerprint, vein, and retina recognition) and voice verification will streamline onboarding processes and bolster security. AI algorithms accelerate biometric pattern processing and increase accuracy.

Crowd Control

Face and crowd detection video analytics monitoring ticketing and boarding locations improve staffing efficiency, security management, and traveller safety.

Delay-Time Prediction

Delays can be expensive for rail companies and annoying to customers. By analysing historical data, an AI-powered system can predict how long a delay is likely to last and inform rail operations and customers.

Freight and Infrastructure Monitoring

AI combined with IoT will improve how freight rail companies monitor their facilities, assets, systems, and shipments in real time. Metrics like network velocity, labour utilisation, delay avoidance, productivity and customer satisfaction will improve.

Rail Usage Pricing

AI can enable a real-time market for rail usage rights, letting supply and demand dictate pricing and utilisation of routes. Rail operators could offer unused rail space to other parties, optimising transport resource management.

AI and ADLINK: The AVA Series

Built and certified for the rail industry, the ruggedised, fanless ADLINK AVA Series is a line of graphics engine-focused COTS platforms. The AVA family leverages ADLINK's Elite partnership with NVIDIA to create AI-powered solutions specially designed to help rail solution providers achieve digital transformation, and differentiate their rail-specific applications such as:

- Passenger information systems
- Railroad intrusion detection
- Train station surveillance
- Onboard video security
- Railroad hazard detection

The AVA line offers integrators a range of configurations to suit their use case. ADLINK's AVA-5500 is powered by 6th/7th Gen Intel® Core™ i7 Processors and MXM 3.1 Type A/B module based on NVIDIA® Quadro® Embedded RTX 3000. This CPU/GPU combination can drive higher levels of AI computing in applications such as predictive analytics and facial recognition. An EN 50155-compliant platform, the AVA-5500 follows strict guidelines, ensuring its certification for use in a variety of rail system environments.

The ADLINK AVA-5600 packages the primary components of the AVA-5500 in a 19" 2U chassis for rackmount deployment and steps up to NVIDIA Quadro RTX 5000 MXM graphics. The RTX 5000 has a larger power profile than the RTX 3000 (110W vs. 80W), and supports 16GB of RAM compared to 6GB, making it a better fit for more GPU-intensive applications.

Powered by a low power consumption high performance NVIDIA Jetson AGX Xavier module, the ADLINK AVA-RAGX rounds out the AVA Series by addressing the needs of deployment in space-restricted environments. The AVA-RAGX measures just 288x190x72mm yet still offers the required I/O ports for railway applications. Beyond EN 50155 compliance, the AVA-RAGX adds support for smart ignition control, which helps prevent data loss or corruption due to improper system shutdown.

Conclusion

AI will not only benefit rail businesses, but also the passengers who rely on rail systems for travel, work, and commerce. ADLINK's AVA Series of COTS platforms, with its compute power, ruggedness, compact size, and reliability, are AI-ready solutions that will modernise the rail industry today.

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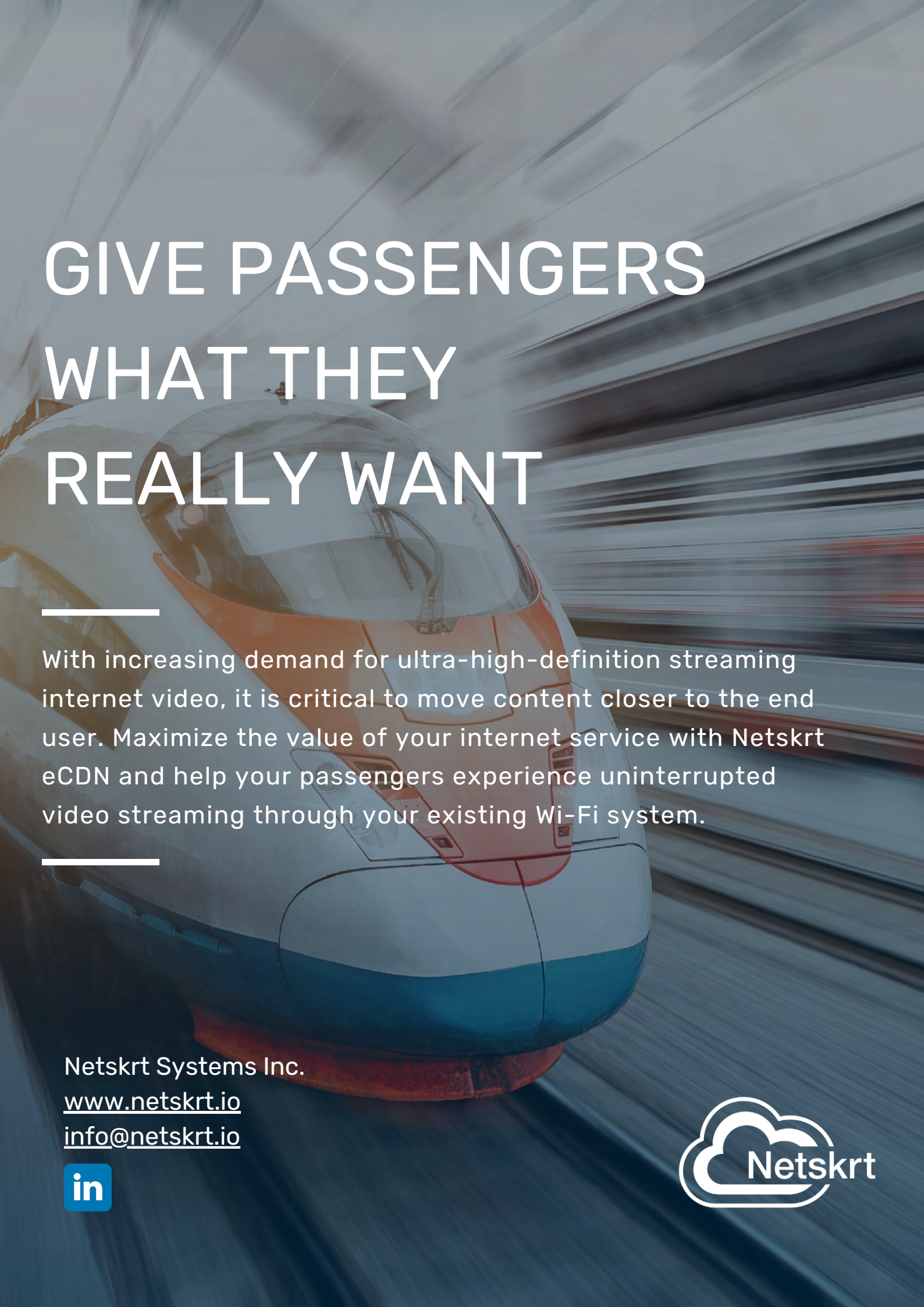

GIVE PASSENGERS WHAT THEY REALLY WANT

With increasing demand for ultra-high-definition streaming internet video, it is critical to move content closer to the end user. Maximize the value of your internet service with Netskrt eCDN and help your passengers experience uninterrupted video streaming through your existing Wi-Fi system.

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Netskrt

Netskrt

Give Passengers What They Really Want with the Netskrt eCDN

Let's take a pause and reflect on how our lives have been transformed since 2019.

Pre-Covid, did you expect that the world would be hit by a massive pandemic that would usher in a 'new normal' for everyone? The current situation has altered many lifestyle habits that will impact our preferences for years to come. Clearly, given the dramatic reduction in commuting time imposed by work-from-home edicts, people have been able to spend more time on personal indulgences such as fitness, cooking, safe outdoor activities etc.

But research shows that a majority of our newly spare time during the lockdown has been spent watching streaming video. According to a recent report, among all over-the-top (OTT) capable homes, streaming video accounted for **25%** of the total television viewing minutes in 2020, up from 19% in the fourth quarter of 2019. The cumulative weekly time spent on streaming video in the second quarter was 142.5 billion minutes, an increase of a whopping 75% from the 81.7 billion minutes recorded during the second quarter 2019. These statistics are proof enough that the video streaming trend is accelerating.

Need for Improving the Passenger Travel Experience

It's no surprise that providing a seamless streaming video experience is difficult without stable

internet connectivity. Although most are equipped with fast internet connections in our homes and offices, there is an enormous connectivity challenge when we are on the move. Even the rapidly expanding 5G connectivity does not provide enough capacity to fulfil the rising video streaming demand, especially in mobile environments.

While a majority of rail operators provide onboard Wi-Fi to their passengers, the internet capacity is insufficient, by orders of magnitude, to support streaming video to all passengers. Because of this, most rail operators explicitly block streaming video sessions. To compensate for this shortcoming, many transportation providers offer walled-garden video-on-demand (VOD) systems; but these typically have limited, infrequently changing libraries that pale in comparison to the infinite trove of content already available from streaming video providers. This puts transportation providers/rail operators in a challenging position as limited internet connectivity and outdated entertainment choices result in high expense levels but poor customer satisfaction.

Netskrt eCDN: Delivering on the Promise of a 'Connected Future'

Delivering on the promise of streaming internet video everywhere, Netskrt Systems has developed the ground-breaking eCDN (edge content delivery network) that extends CDN technology, which has been part of the internet landscape for decades, to the train. eCDNs combine cloud-based machine learning with network-aware edge caching to deliver a streaming video experience similar to what passengers enjoy at home.
The cutting-edge eCDN technology shines a light on internet dark spots and delivers on the promise of the ubiquitous streaming video. With eCDNs, rail operators can fulfil the increasing demand for streaming internet video and enhance the capabilities of their existing onboard Wi-Fi services.

The Netskrt eCDN technology has been developed with a futuristic vision to give passengers what they really want: unfettered access to ultra-high-definition streaming video content they already pay for. By providing them the ability to stream video from their favourite providers using their own subscriptions, rail operators can now offer passengers a memorable travel experience and help reduce perceived journey time. And by adopting the eCDN innovation, they can set a new benchmark for passenger entertainment on the go.

Please visit our **website** for more information.

The market leader for your intelligent journey

Visit us at Railtex on stand P69, hall 11

Nomad Digital is the world's leading provider of passenger and fleet-management solutions.

The integration of Nomad's solutions into the on-train environment improves levels of passenger satisfaction, connectivity, journey information and entertainment, whilst increasing operational efficiency of the fleet.

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The Intelligent Journey

Reliable connectivity has become an 'expected norm'. When people are away from their home or office, being constantly connected is simply expected. Digital technology is all around us, covering all aspects of our everyday lives, and the perception is: 'why should it stop when we step on to a train?'

Enabling the Connected Vehicle

The connected vehicle combines a shared and secure network infrastructure to which all authorised onboard systems and passenger devices may connect and interact. The Internet of Things is a driving force behind new innovative technology. The idea of onboard devices communicating with each other and with the outside world while maintaining a seamless passenger experience is key. By adopting industry standards, operators can be assured of a functionally rich, future-proof platform to deploy new applications and services for their passengers while collecting and exchanging data, allowing everyone to be more connected than ever before.

The Vision Remains Relevant Today

Now, the opportunity is not just to connect the passengers but also the operators, maintainers, and onboard staff. Connecting to a wider base of stakeholders plays a valuable role in enriching the passenger experience by responding to market needs and solving connectivity challenges. Passengers are crucial to the operating companies, yet vehicle guards, drivers, conductors, caterers, and maintainers all enhance the passenger experience too. Bringing together passenger connectivity, information and entertainment will transform a passengers' experience.

A Real-Time End-to-End Solution

New onboard infotainment and **rail entertainment** solutions can greatly enhance the passenger experience by integrating real-time journey information and media entertainment, on a single platform, for a new experience in passenger information delivery. Providing rail operators with a real-time end-to-end solution – which integrates numerous onboard systems – is an ever-increasing priority. This enables operators to perform real-time analysis onboard, automatically issue alerts of impending equipment failures and feed the relevant information in real-time to their passengers. Keeping passengers informed with the latest journey information is still considered one of the top three biggest challenges facing operators. It also remains high in passenger complaints when things go wrong.

Increasing and maintaining customer satisfaction through communication is key.

Investment in the Latest Technology

Over and above journey information, other digital services are increasingly becoming more important, from both the providers of such services and the passengers themselves. Live news, weather, infotainment, commercials, media programming etc., delivered directly to passengers as part of their journeys presents huge opportunities to improve customer experience.

Nomad has invested heavily, using the latest technologies and insight from its market-leading position, to bring about the next generation of digital solutions. Using the connected vehicle as an enabler, solutions can be driven from the same IP platform, providing a seamless integration of content, advertising, and journey information.

Completely Focused on a Seamless Experience

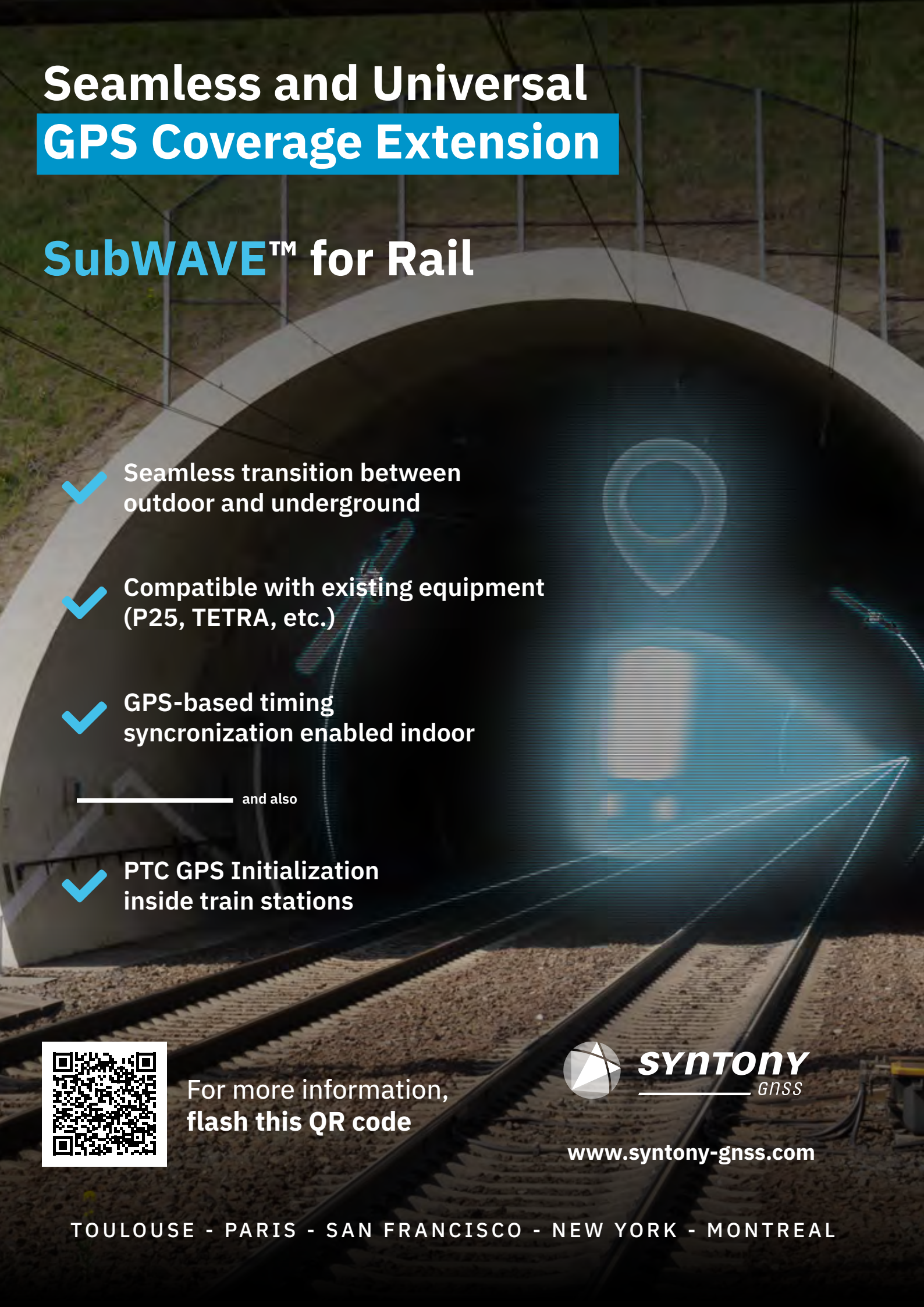
Nomad is completely focused on a seamless, straightforward customer experience and passenger journey. Our expertise and knowledge allow passengers to receive world-class connectivity regardless of location and the number of users. This can range from a simple connection to a fully-managed, prioritised service.

What's Next?

Nomad Digital is the world's leading provider of passenger and fleet-management digital solutions. Offering a comprehensive solutions portfolio to both operators and builders that facilitates a significantly enhanced passenger experience. The integration of Nomad's products and services into the on-train environment improves levels of passenger satisfaction. Nomads mission is: *'to be the world leader in connected transport, renowned for continuous innovation of technology and provision of quality solutions to deliver the intelligent journey.'*

The capabilities of onboard connectivity are endless, and coming out of the pandemic will allow boundaries to be pushed with technology. Nomad is excited to see what the future holds.

nomad-digital.com



Seamless and Universal GPS Coverage Extension

SubWAVE™ for Rail

- Seamless transition between outdoor and underground
- Compatible with existing equipment (P25, TETRA, etc.)
- GPS-based timing syncronization enabled indoor

and also

- PTC GPS Initialization inside train stations

For more information, **flash this QR code**

SYNTONY GNSS

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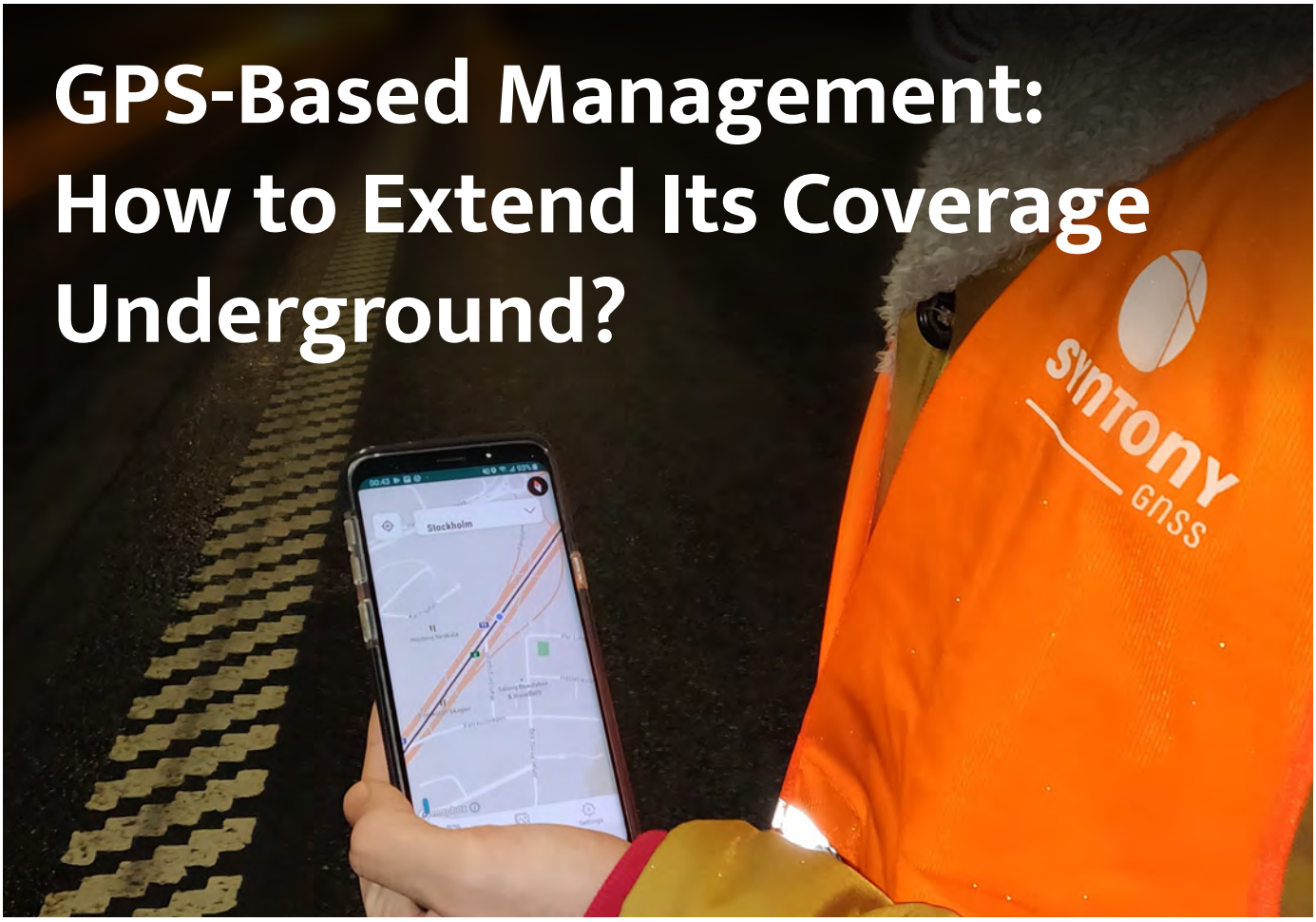

When operating a large network used by thousands of collaborators, knowing the position of every asset is essential.

For traffic management of course, and even more for safety reasons. Therefore, GPS offers the largest RF coverage to the outdoor world and is a global standard for location. GPS is universal and cheap and the data is easily sharable to optimise management. One problem remains though when entering a tunnel: the signal cannot penetrate underground, and all GPS-related technologies then become unusable.

Extending GPS Coverage

To meet the expectations of indoor location problematics, many solutions have been developed, from Wi-Fi signals in urban areas to creating a network of antennas using beacons. While those solutions answer some specific use cases, none of them completely answer all indoor problematics at once: compatibility with existing systems and receivers, scalability, compliance with all location-related use cases, and so on.

GPS had already solved that issue a long time ago: the only remaining challenge was to extend its coverage to underground areas: GNSS expert Syntony has been working on a GPS coverage extension solution: SubWAVE™. Thanks to high-precision GNSS simulators, it is now possible to emulate synthetic GNSS signals in real-time, providing all GPS receivers with seamless indoor location.

Safety for Everyone

One of the main advantages of GNSS coverage extension underground is the ability to keep an eye on the location of workers and trains to prevent potential accidents. With SubWAVE™, GPS positioning is guaranteed even when entering a tunnel. This continuity of service allows operators to use outside technologies for location within their entire network, increasing everyone's safety.

Meanwhile, workers' locations can be monitored as well, on the whole network, with GPS positioning. Both train conductors and workers can be aware of a close encounter and take appropriate measures.

In addition, since most rescue forces around the world use GNSS technologies to monitor their teams on the ground, rail tunnels equipped with SubWAVE™ GNSS coverage extension will get back on the grid. This universally accessible solution enables more efficient intervention time, saving precious lives and efforts.

Traffic Management and Maintenance Is Improved

Knowing the exact position of every train on the network, tunnels included, drastically improves traffic management. Immediately, operators can remotely spot a stopped train, even if it is in the middle of a block. Providing precise positioning on moving blocks also allows denser traffic, with a better return on investment at stake. In addition, by passing along this information, passengers can access better and more accurate information to plan their journeys, hence increasing their satisfaction.

GPS coverage extension is also a major maintenance asset. One example is track geometry operations, which can be drastically improved by positioning geometry cars and defaults with GPS co-ordinates. Indeed, GPS positioning offers accuracy, and more importantly, it is easily sharable with the teams going on intervention. Using a simple navigation app (i.e. a Google Maps-like indoor app) would cover most maintenance use-cases (e.g. maintenance defaults spotting, etc.).

Those operations can be automated with GPS-driven trains monitoring the network autonomously, reducing the risk of human errors. Using SubWAVE™, GPS positioning of those trains is accessible in real-time to all other assets in the tunnels, guaranteeing safe and optimised operations.

Finally, the lack of a GPS signal inside train stations generates safety challenges with regard to PTC navigation systems. The SubWAVE™ technology is also used to create reliable point of initialisation for locomotives inside the station, and doesn't have the drawbacks of GPS repeaters.

About SubWAVE

GNSS simulation technology transferred to the transportation industry.

SubWAVE™ is a GNSS simulator operating in real-time which uses existing telecom infrastructures (e.g. leaky feeders) to broadcast synthetic GNSS signals. Depending on the geometry of infrastructures, different modes can be offered by SubWAVE™, each answering different sets of needs.

SubWAVE™ Modes

- Zone mode: a static position is provided for an entire area – every asset in that area computes the same co-ordinates, corresponding to the configured SubWAVE™ zone.

- Continuous mode: the receiver's position moves as the user does, along the axis of the leaky feeder cable (whether it is a straight or curved cable). Augmentation software enables high-accuracy positioning.

Adapting GNSS Simulators to Real Environments

One single SubWAVE™ simulator can cover up to 12 different SubWAVE™ zones, or six SubWAVE™ continuous/extended areas.

It has been designed to match existing telecommunication infrastructures, using existing leaky feeder cables (or antennas) to emit synthetic GPS over the area.

Compatibility with All GPS-Enabled Systems

Systems that were already working outside, using the genuine GNSS signals, will now work transparently when going inside. For example, radio communication sets like TETRA or P25 (which are GPS-enabled), only need a GPS signal to provide positioning. SubWAVE™ brings this emulated GPS signal, in real-time and with a seamless transition between outside and inside. Without changing anything in the TETRA/P25 system, adding SubWAVE™ underground will extend GPS coverage to previously unreachable areas where the corresponding assets were not able to provide a position because of the absence of GNSS signals.

A Proven System

SubWAVE™ has been providing GPS in the metro of Stockholm since 2017. It is currently being implemented by major road tunnel operators, as well as large subway operators in Europe and the US.

About Syntony GNSS

Syntony GNSS designs and manufactures positioning, navigation, and timing (PNT) solutions and products. Specialised in simulating global navigation satellite system (GNSS) signals from all available constellations (GPS, Galileo, GLONASS, QZSS, NavIC IRNSS, BeiDou), Syntony also develops high-end and low-consumption receivers.

The company is headquartered in Toulouse, France, and has offices in Paris, San Francisco, New York, and Montréal. Its products also benefit from a large distributor network all around the world.

Request more information about Syntony's products and solutions at **contact@syntony.fr**.

Or visit **https://solutions.syntony-gnss.com/gps-coverage-extension-rail**

TIPRO

Configure the Right Console for You

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TIPRO

Voice Communication Is an Important Part of Rail Traffic Control – Why Choose TIPRO?

With such critical infrastructure devices it is equally important to consider the product and the producer. This is why we think we stand out from the competition:

Modular Voice Communication Devices

The complete product range is designed with easy-to-integrate, easy-to-use and ergonomics as important factors.

TIPRO voice communication modules secure reliability and longevity with carefully selected suppliers and components. Qualified partners are chosen not only for the quality of their components but also for secured long-term availability. Competence and responsiveness are also of great importance.

Own design and essential know-how enable us to follow the progress of technology as well

as constant improvement of the products.

The modular concept allows configuring optimal functionality for a dispatcher position while the possibility for later changes or upgrades is still open. Additionally, programmability and setup enable personal adjustment for every operator.

Relying on open standards rather than proprietary ones is making integration with various applications and solutions easier and simpler.

The product range includes various consoles from compact all-in-one BF07 to

comfortable BF22, add-on or standalone handset, intercoms and their combinations. Modular add-on functional keyboards additionally extend the possibilities while customisation is the option for further personalisation of the product.

Typical use is for a voice communication system in rail traffic control centres as well as in public addressing systems.

About TIPRO

Established back in 1991, Tipro is this year celebrating its 30th anniversary. With 35 employees it is a small-size private limited company, based in Slovenia with headquarters and production in its own facility.

Since the very beginning TIPRO designs, manufactures and markets computer terminals and peripherals for various reliability-critical applications. The commitment to quality and environmental regulations has been acknowledged by ISO 9001 (since 1996) and ISO 14001 (since 2012) certificates.

The complete business process from design, engineering and production is in-house. We strive to keep TIPRO a reliable supplier to our customers, reliable customer to our suppliers, reliable employer to our employees and responsible member of our social community. We rely on our own capital and loyal and motivated employees.

Customers from Europe, North and South America, Africa, Asia and Australia have relied on our products for several decades, proving our direction is the right one.

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There's a saying that "things get better with age" and we like to think exactly that about our business in Manchester. We've been making cables here in Blackley since 1895 and during the last 126 years we've grown to become the largest specialist cable manufacturer in the UK. Our vast range of cables are specified by electrical professionals for applications in Telecommunications, Building Management Systems, Data Networks, Railway Infrastructure, Fire Prevention and Security Systems. And now, thousands of electrical contractors can also benefit from a range of high

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Radionika

Radio Technology for the Rail Industry

The cabin radio – an on-board device for radio communication between the driver and traffic controller – is a required fitting for every locomotive or train. Radionika Ltd, with headquarters in Kraków, is the Polish leader in the field of train radio communication terminal production.

The Koliber GSM-R/VHF train radio terminal, the best-known cabin radio amongst train drivers in Poland, is a highly universal solution. It is capable of operating in several radio standards – analogue (VHF or UHF UIC) or digital (GSM-R or GSM). This rich functionality of the Koliber GSM-R/VHF radio is essential and required by railway operators who work in railway networks utilising different radio systems. At a time of migration from analogue to digital GSM-R systems, this solution is the most anticipated by users. The company has in its offer a number of variants of the product construction (modular – flexible, popular in modernised vehicles; or the variant in the rack 19" chassis, installed in new vehicles), which enables the radio telephone to be adjusted to the optimal configuration for the operator's needs.

Since 2008, Radionika has been supplying its solutions to every rail vehicle manufacturer in Poland. It has since then installed more than 6500 of Koliber units in the vehicles of practically every single railway operator in Poland. The radio appliances of Radionika have been installed in almost every type of diesel and electric vehicles in Poland. Many years of close co-operation with Polish national train operators like PKP Cargo, PKP Intercity, Polregio (regional passenger divisions) have demonstrated the high quality and reliability of Radionika products. Every train driver in Poland knows what a Koliber radio is and where it has been designed and manufactured.

Polish railway infrastructure has been under intensive reconstruction and modernisation since the early 2000s. This includes the vehicle fleets operating on almost 20,000 km of track. Analogue train control systems, including radio, will be replaced with digital solutions coupled with GSM-R. Poland is at this moment at a stage of migration and flexible, dual-mode radio solutions offered by Radionika suit the Polish railway industry perfectly. This dual (digital and analogue) mode of operation is quite common in every country. Interoperability across the Europe has not been completed yet and analogue radio systems will have to exist alongside new ones. Most of the railway infrastructure authorities across Europe still use and maintain analogue radio systems.

Radionika supplies cabin radio terminals for almost every new train (or rail vehicle) produced in Poland. For the past few years our

design and development team has gained a lot of experience in co-operating with Polish and foreign (e.g. Stadler, Alstom incl. formerly Bombardier) manufactures of rail vehicles. We are absolutely convinced that our products and services will be attractive for any radio railway user operating anywhere.

Radionika, apart from cab radio telephones, also manufactures essential accessories, supplied together with the appliance, such as the GSM-R/GSM/GPS train antenna type AT2S or the micro-telephone set type KMT-01 for the cabin radio. In addition, the company has in its offer a wide-ranging assortment of mechanical elements which simplify the installation of radio telephones in every type of vehicle.

Stationary despatcher radio systems (remotely controlled) produced and installed by Radionika for Polish railway infrastructure have been implemented on more than 3,500 km of track. Radionika is also responsible for servicing and maintaining these systems. It demonstrates Radionika's level of reliability and scale of operation.

Radionika was founded in 2000. We are very focused on radio technology and the railway is our main and only area of business activity.

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KfW IPEX-Bank

Designing Regional Mobility: A Model for the Public Transport of Tomorrow

By Dr Carsten Wiebers
Global Head of Aviation, Mobility & Transport – KfW IPEX-Bank

Increased Commitment to the Rail Sector

KfW IPEX-Bank has been steadily expanding its financing in the rail sector over several years. There are many reasons for this. However, a major driver is the bank's desire to make a significant contribution to the mobility transition and climate change mitigation. Around 20% of global CO2 emissions originate from the transport sector. A significant proportion of these emissions is accounted for by individual passenger transport and freight transport by road. Helping to shift these shipments to rail is therefore a key objective for KfW IPEX-Bank. Furthermore, the current crisis has shown the stability of freight transport by rail, which accordingly poses a comparatively low risk for the bank.

High Demand for Rail Financing – Trend to Leasing

Banks' increasing interest in the rail sector also coincides with higher demand for financing. Railway companies are continuing to replace rail vehicles they own with leased locomotives and rail cars from leasing companies. The leasing rate in the European rail sector is still comparatively low – at 30% of the total fleet, compared to a leasing rate of 50% for aircraft or container ships. Due to the high efficiency gains through leasing, we predict that this trend will also continue in the rail sector.

Liberalisation of Local Public Transport

In contrast, rail vehicles for local public transport, or public transport vehicles in general are almost entirely owned by public or private transport operators. With the liberalisation of local rail passenger transport, we are seeing the first examples of rail vehicles being leased or rented by the transport company from the vehicle owner, for example in the UK. For local public transport (e.g. busses and trams), however, this is still the great exception in Europe as well as internationally. Yet this area also stands to benefit a great deal from separating operation from ownership.

Local Public Transport Benefits from Separating Operation from Ownership

The two functions, operation and ownership, require different skillsets, contracts and approaches. In fact, combining both functions in one company seems almost detrimental. Ownership of the vehicles has very little to do with an operator performing operational tasks in their transport company. But if the vehicles are owned by a separate company, ownership is independent from vehicle operation. This also results in entirely new organisational opportunities for local public transport.

Organisational Model for the Local Public Transport of Tomorrow

For local public transport, KfW IPEX-Bank has developed a model that enables a municipality or district to transfer ownership of the vehicles to its own vehicle company. The vehicles are then made available to the operator of the local public transport system through leasing, renting, transferring or similar means. This model has various advantages for the municipalities:

- The municipality has control over its vehicle fleet and thus more extensive possibilities for shaping its mobility
- Since the bank no longer assumes the risk for operation, the financing conditions are more favourable
- The companies that own the vehicles could co-operate in procurement and thus achieve economies of scale

KfW IPEX-Bank finances examples of this model in Germany in central Saxony and Baden-Württemberg, and internationally in Norway, India and Chile.

About KfW IPEX-Bank

Within KfW Group, KfW IPEX-Bank is responsible for project and export finance. It supports German and European companies operating in key industrial sectors in global markets by structuring medium and long-term financing for their exports, funding infrastructure investments, securing a raw materials supply and by financing environmental and climate protection projects worldwide. As a specialist bank, KfW IPEX-Bank has extensive industry, structuring and country expertise, it takes on leading roles in financing consortia and actively involves other banks, institutional investors and insurance firms. KfW IPEX-Bank operates as a legally independent group subsidiary and is represented in the most important economic and financial centres across the globe.

In the rail sector, KfW IPEX-Bank finances leasing companies and vehicle lessors, but is also active with operators, infrastructure companies and public authorities. After decades of investment backlogs, many countries around the world are once again investing in rail infrastructure. KfW IPEX-Bank has committed a total of 2.16 billion euros in financing to the rail sector in 2020. This corresponds to 9.8% of the bank's total commitments of 16.6 billion euros in 2020.

Examples of KfW IPEX-Bank's Rail Financing

- At the end of December 2020, KfW IPEX-Bank financed 570 freight cars from Greenbrier for the Swiss freight car lessor Wascosa, worth 47.7 million GBP (55.2 million euros), for lease to Network Rail
- The Bank contributed 80 million euros to the financing of new electric railcars for the Austrian Federal Railways (ÖBB) passenger transport company in November 2020
- KfW IPEX-Bank is financing the establishment of a freight car fleet for intermodal transport at the newly founded Swiss rail car lessor MFD Rail with 105 million euros and the option for another 100 million euros
- The bank contributed a significant volume (540 million euros) to the refinancing of VTG AG in May 2020. VTG AG has concluded new financing agreements for around 2.9 billion euros with an international banking syndicate led by KfW IPEX-Bank, which is also the largest lender in the financing arrangement
- The bank is financing 20 new battery-powered electric multiple-units for the Ortenau network with 77 million euros. The borrower is Nahverkehrsgesellschaft Baden-Württemberg
- In January 2021, KfW IPEX-Bank participated with a total of 37.5 million euros in the 150 million euro financing of the locomotive leasing company Railpool for the procurement of new rail vehicles
- Aves One AG, owner of freight cars leased via Wascosa, has received a 75 million euro financing line from KfW IPEX-Bank for further investments

KFW IPEX-Bank

Wheelabrator

For cleaning and peening railway components, shot blasting delivers the highest productivity and quality.

Shot blasting and peening are central to railway manufacturing and refurbishing, with everything from wheels to whole carriages requiring cleaning or surface enhancement. Compared to manual working with power tools, shot blast machines (air or wheel blast) offer incredible productivity combined with predictable quality.

Blasting lots of complex parts is a challenge that Wheelabrator helps operators like SNCF meet. Whether you're cleaning new railway lines or peening springs, processing lots of small components or just a few large ones, there is a solution to fit. Here's a round-up of typical applications and the state-of-the-art technologies available to handle them.

Don't Get Derailed

Shot blasting is the most efficient way to descale new tracks as they leave the factory and to clean up used ones prior to other operations like profile regrinding or milling.

Roller conveyor wheel blast machines rapidly clean rails in a continuous feed-through process, either as a standalone unit or integrated into a larger production line. Wheelabrator offers many roller conveyors for different applications and work speeds, with the Type G a popular choice with large operators like Deutsche Bahn.

The Type G handles through-feed widths from 600mm to 3m, with up to eight blast wheels ensuring full coverage of every part of the rail profile.

Working with Wheelsets

Wheelsets define safety-critical components; regular inspection and periodic refurbishment are vital. Shot blasting provides a fresh, clean metal surface for ultrasonic or magnetographic crack detection, as well as the correct surface roughness for grip on the rail.

Blasting is also good preparation for any lathe re-turning required to

remove larger surface defects and restore the desired wheel profile. Installed at one Paris-based rail and metro operator, Ventus 350 PR cabinets can clean an axle in around 30 minutes. Specialised tooling is available to support the axles (minus wheels), with a carriage to move components in and out.

Automation Handles Whole Fleets

Where there are more axles to blast, companies including a large Swiss national rail operator pick equipment like the new Ventus 350 PR AXT. This semi-automatic, 2-axis machine can process an axle in 25–30 minutes. As well as greater throughput, automation delivers more consistent surface quality – perfect for these vital components.

Operators like SNCF and SNCB clean lots of complete wheelsets using the larger MC 2200 A. Fully automated, the base version can clean 30 standard wheelsets in an 8-hour shift. Larger again, the top specification MC 2200 A drives down cycle times below 15 minutes.

Both MC machines feature sophisticated pass-through processing, with axles on carriages entering and leaving the cabinet through automatic doors. The machines automatically recognise each part and select the relevant treatment programme, further enhancing throughput.

De-Stress Your Wheels

Train wheels are at serious risk of fatigue failure. By adding compressive stresses to the wheel surface, peening helps prevent cracks forming.

Specialists like MG-Valdunes trust Wheelabrator's fully-automated, high-capacity, in-line shot-blasting machines like the Railway Wheel Peener. It offers fine process control, able to monitor and control variables such as blast velocity, blast media size and media flow rate.

Springier Springs

Leaf and coil springs are vulnerable

to fatigue failure too. Shot peening increases their fatigue strength and lifespan, raises the maximum working load and prevents sagging.

The exceptionally productive Wheelabrator RDS is purpose-built for coil spring peening. Parameters like throughput speed, blasting time, discharge speed, shot size and distribution can be controlled with absolute precision, letting the user deliver exactly the right peening intensity and coverage.

Shiny Bogies

A blasting booth with one or more operators controlling open-circuit airblast nozzles is the typical way to process small numbers of bogies but, where larger volumes are involved, a robotised solution offers the highest capacity.

Within an air-tight cabin, a robot arm directs an airblast nozzle which fires media like steel or corundum to blast away accumulated rust, dirt and old paint. Bogies are carried on trolleys which can simply be pushed through the loading door into position, while a pit collects used media that is automatically recycled for re-use.

Blast a Fishplate or a Whole Carriage

Some rail components don't fit neatly into a certain blasting category. Smaller cast parts are best processed using fixed airblast cabinets while larger components may require blasting in situ.

The latter case requires mobile blasting, with portable pressure-fed, closed-circuit airblast kits offering extreme flexibility plus much higher productivity over conventional power tools. Powerful, easy to use, compact and manoeuvrable, these machines' recovery systems continuously reclaim dust and debris while recycling reusable abrasive back to the gun, removing dust or disposal problems.

At the other end of the scale, closed-circuit machines are also perfect for refurbishing very large assemblies like carriages either off-site or within a custom-built booth where multiple operators stand on access platforms and operate the blast nozzles manually. Wheelabrator also builds large pass-through wheel blast machines for whole carriages.

These airblast rooms can be made to any size, feature honeycomb floors for abrasive recycling and cut cycle times by half or more compared to manually directed airblasting.

Boost Your Productivity, Capacity and Quality

With more railway miles, wear and maintenance on the way, rail's need for better, more efficient cleaning and peening is set to grow. If you intend to serve this market or improve your offering to clients, highly automated, precision shot blasting is the best route to profit.

Save time and money with highly efficient shot blast processes

We offer a full range of shot blast solutions for the rail industry – from cleaning track to peening springs, from processing wheelsets to blasting whole carriages.

Increase your capacity, improve your productivity, stabilise your process.

For more information, please contact:
Wheelabrator Group SAS (Charleville)
T: +33.3.24 33 63 00 or E: contact.fr@noricangroup.com

www.wheelabratorgroup.com/rail

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NEXTSENSE

How China's Metros Are Benefitting from Faster, More Reliable Profile Measurements

With its innovative CALIPRI technology, Austrian company NEXTSENSE is the world leader in mobile profile measurement.

Its innovative measurement technology finds use in the wear measurement of wheelsets, rails and tracks. Its customers include numerous major international railroad companies. China's metro companies is one of the markets where NEXTSENSE has established a leading position over the last few years.

There are 44 Chinese cities that have a metro system, with 237 metro lines all in all. 41 of these 44 metro operators make use of the CALIPRI measurement devices – making NEXTSENSE one of their top subcontractors. There are only three smaller metro companies with only one line and these still use mechanical gauges. One of the metro operators that is a customer of the Austrian company is the Beijing Metro with 24 lines and a rail network that extends over an area of 727 kilometres. The Beijing Subway offers an average of 10.544

million trips per day and is therefore known as the world's busiest metro system. Another customer is the Wuhan Metro with 9 lines, 240 stations and a total of 360km route length. With 1.22 billion annual passengers in 2019, Wuhan Metro is the sixth-busiest rapid transit system in the world.

Using CALIPRI in Wuhan Metro's Maintenance Workshops

The maintenance workshops for the Wuhan Metro are currently using more than 40 sets of CALIPRI portable measurement equipment, which perform measurements of wheel parameters such as wheel profile, wheel diameter and defects for rolling stock. According to **Mr Si Chen, Wuhan Metro Workshop Manager**, one of the reasons for using CALIPRI is the high measurement accuracy and repeatability of CALIPRI, which fully meets the requirements of the Wuhan Metro.

"The fast and easy-to-use measurement process as well as the simple and intuitive handling of measurement data help to improve work efficiency. At the moment the raw data are saved on a server and are printed out in PDF format for archival purposes. We are still discussing the implementation of a central database and hope to organise and analyse historical data to have a predictive evaluation on the wear and tear of the wheels which will greatly improve the intelligence level of our company's operation and maintenance," states the Workshop Manager.

NEXTSENSE is working on such a solution at the moment and will be able to offer this customer a tailor-made solution in the near future.

Given that there are various exchange programmes within the industry with other major metro companies in China – in cities such as Beijing, Shanghai, Nanjing, Chengdu and Guangzhou – that were already using CALIPRI as the main equipment for wheel and rail measurements made the decision for Wuhan Metro **easier**.

Before using the unique CALIPRI with its laser light section technology for non-contact profile measurements most metro companies used mechanical gauges to measure and record data manually. Manual measurements can often result in operator errors, inaccurate measurements and an inefficient workflow. Furthermore, the process of reading and transcribing the results manually requires several checks and is very demanding for the operator; it further relies heavily on experience. The non-contact measurements performed by CALIPRI, which automatically corrects tilts and rotations of the measurement device, provides reliable measurement data and fast measurement processes.

"Working with mechanical gauges, the changeover can be challenging at first," states Mr Si Chen, Wuhan Metro Workshop Manager. *"But after a short adaption period, engineers found CALIPRI easier to use and also less time-consuming than conventional measurement equipment. The graphic display is easy to understand, and the modular design allows an uncomplicated expanding of functions such as radial/axial runout, defects and more, which can be measured by the same device. The equipment supplier NEXTSENSE provides timely and good training, technical support and other services which also helps new purchasers."*

Mr Si Chen, Wuhan Metro Workshop Manager, concluded: *"CALIPRI has now been used for almost six years as the main equipment for wheel and rail measurements at Wuhan Metro and there are several benefits for the company. CALIPRI provides reliable measurement data, and also a very fast measurement process. Overall, CALIPRI is a great tool to help keep the vehicles safe!"*

NEXTSENSE

part of **Hexagon**

ORBIS

Bench Test Equipment for Testing Critical Railway Components

Transit authorities rely on bench test equipment (BTE) to ensure critical components affecting train safety and availability are in a state of good repair.

Due to a consolidation of BTE suppliers in recent years, transit authorities are left with few options to choose from and standardised systems provide limited options for customisation.

ORBIS, a US-based veteran-owned small business is disrupting the market and achieving strong growth by offering solutions that are fully customised to the unique needs of each application. ORBIS BTE solutions also provide maximum flexibility and a lower total cost of ownership.

Bench Test Equipment

The term bench test equipment (BTE) refers to automated test equipment used to perform full functional testing of critical components in the rail industry.

Brake controllers, master controllers, operator interfaces (aka hostler panels), and some circuit card assemblies (CCAs) are examples of critical components. These are often labelled as line replaceable units (LRUs) as it is typically more cost-effective to replace rather than repair the units based on time, expertise, or concerns about voiding manufacturer warranties.

Consultative Approach

ORBIS engineers go beyond the testing requirements to uncover the unique needs of each customer

and application. Unlike competitors that offer variations of a standard tester, ORBIS delivers solutions that are purpose-built to help customers achieve complete test coverage while taking into account other factors such as user skill levels and the transit authority's maintenance strategy. ORBIS BTE systems are not configured by choosing from standard options in a catalogue.

ORBIS Flexible Bench Test Equipment

ORBIS's customers agree. The **principal equipment engineer at a major US transit authority described her experience with working with ORBIS** as follows:

"*ORBIS worked well with our supplier to deliver a BTE that fit our needs. It was a rewarding experience and their attention to detail and listening to our needs was evident during our final acceptance of the BTE.*"

Maximum Flexibility

Customised solutions are only part of what makes ORBIS unique. Their solutions also employ a number of state-of-the-art features to maximise flexibility and minimise total cost of ownership.

Customisable Form Factor

Unlike universal test systems, ORBIS BTE solutions come in all shapes and sizes and are designed to maximise functionality while minimising floorspace. A traditional full-height rack mount cabinet, full-size workbench with an integrated instrument rack, or a workstation designed collaboratively with the customer are just a few examples.

Modular Hardware

To minimise dependence on a single vendor and allow for incremental upgrades over time, ORBIS's flexible BTE utilizes PXI modular instrumentation. PXI, which stands for PCI eXtensions for Instrumentation is a modular PC-based instrumentation platform designed for high-performance measurement and automation applications requiring a rugged form factor. There are currently more than 1,500 available modules from multiple vendors such as National Instruments and Keysight.

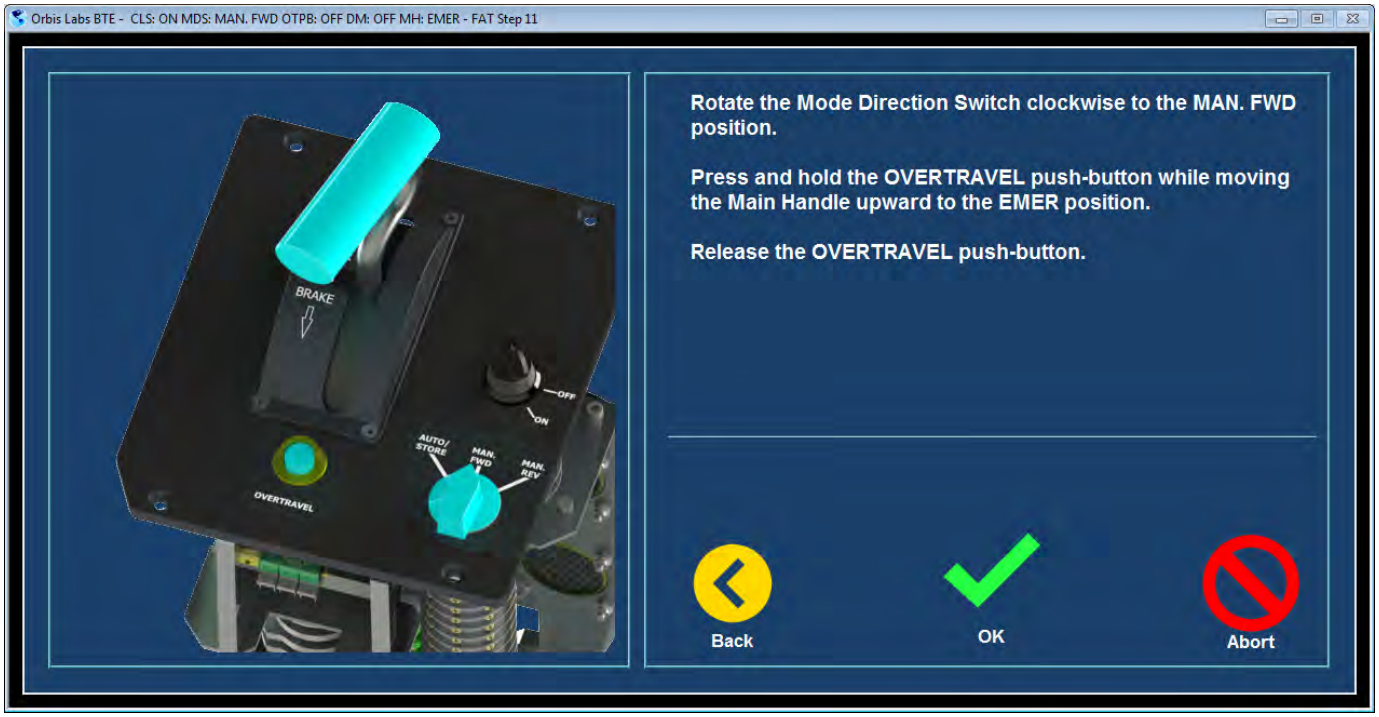
Mass Interconnect

An interface test adapter (ITA) is a mass interconnect solution that provides a reliable connection between the instrumentation and the device under test (DUT). Test fixtures, along with unit-specific cabling and connectors can be swapped out in minutes.

In order to retain the modularity and flexibility of the PXI platform, it is important to match the instrumentation with the right interconnect system. ORBIS utilises the SCOUT interconnect system from MAC Panel, which incorporates PCBs and flex circuits to eliminate custom wiring connections between the DUT and instrumentation.

PXI Instrumentation with MAC Panel's SCOUT® Mass Interconnect Solution

Controls are highlighted in blue to guide the system operator



By utilising an ITA in most designs, ORBIS makes it easy to test multiple LRUs or CCAs on a single BTE system. This approach often reduces the total number of test systems needed, lowering both capital and maintenance costs.

User Interface

ORBIS has developed a modular and flexible software architecture that can be reused, which reduces development time while allowing for a high degree of customisation. ORBIS's flexible BTE software also allows its end customers to modify or create new tests without the need for programming.

ORBIS developed its flexible BTE software with the user in mind. The intuitive user interface guides the user through test procedures with a mix of written instructions and 3D images.

Guided Troubleshooting

ORBIS designs BTE systems with the goal of replacing written manuals and procedures. Existing procedures and domain knowledge is translated into software, helping new and less experienced users to be more productive in less time.

Intelligent sequencing allows the flow to change based on prior test results. For example, a failed test may launch a manual troubleshooting screen along with detailed instructions to pinpoint the source of the failure to the board or component level. Repairing rather than replacing a unit can significantly reduce spare parts costs.

ORBIS's BTE solutions also provide easy access to technical documentation such as schematics and troubleshooting guides when they are needed, saving time and reducing the need for printed manuals.

Exceptional Service and Support

The team at ORBIS is committed to customer success.

All systems are designed and manufactured with strict adherence to their ISO9001:2015-certified quality management system. ORBIS provides ultra-responsive customer support which includes direct communication with project engineers.

Customers agree. **According to an engineer at a Tier 1 supplier**"*ORBIS provided exceptional service and proved to be instrumental in our success. ORBIS consistently went above and beyond our expectations to achieve – and even exceed – the project's requirements and deliver on time.*"

Final Thoughts

ORBIS's commitment to delivering flexible BTE solutions is centred around listening to their customers to determine the best solution for their specific needs. Please visit **www.orbisinc.net/masstransit** to learn more or contact Bryan Nadeau at **BryanNadeau@orbisinc.net** to discuss how they can help you be successful with your next project.

ORBIS
CELEBRATING 20 YEARS
EST. 2000

ONE SIZE DOES NOT FIT ALL

WHAT WE PROVIDE

BENCH TEST EQUIPMENT
ORBIS develops bench test equipment for ensuring critical assets are in a good state of repair.

R&D TEST STANDS
ORBIS helps Tier 1 and Tier 2 suppliers bring products to market faster by providing automated test systems for product verification and validation.

ENGINEERING SERVICES
ORBIS provides reverse engineering and design services to help organizations overcome obsolescence challenges and extend program lifecycles.

CUSTOMIZED BENCH TEST EQUIPMENT (BTE) SOLUTIONS FROM ORBIS

Building on a scalable hardware and software platform, ORBIS Flexible BTE solutions are fully customized for each Line Replaceable Unit (LRU) or Circuit Card Assembly (CCA). Our guided setup and diagnostics reduce or eliminate the need for external documentation and enable technicians to repair units in the field and lower maintenance costs.

SOLUTION BENEFITS:

- Test multiple LRUs and CCAs on a single tester
- Easy-to-use with guided troubleshooting and repair
- Add or modify tests without programming
- Connectivity with enterprise databases and asset management software

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Simplify forward planning

Innovative tools simplify forward planning, helping to book staff training and keep workforce fully operational

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Exciting digital tool uses advanced analytics to assist employers with informed decision making and highlight revenue opportunities for training providers

"CTM will have a hugely positive impact for both large and small businesses alike. CTM's ability to mark out training and provide expiration reminders, all whilst removing the task of finding providers to deliver training, is incomparable to our previous processes."

Emma Hughes, Costain

CTM

CTM is free to use, sign up in minutes at **competencytrainingmarketplace.com**

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Competency Training Marketplace – *powered by Sopra Steria*

The Great British Shake-Up: How Will the New GBR Model Affect the Way You Work?

At the end of May, the government announced a series of changes to the rail industry that has implications across the entire the supply chain.

The new state-owned body Great British Railways or GBR, will replace Network Rail as the manager of rail infrastructure in the UK and will also be given the responsibility over setting timetables, prices and ticket sales. One of the pioneers of this change, Transport Secretary Grant Shapps said GBR would replace an 'overcomplicated and fragmented' system, while the government said a more unified rail system would lead to more 'high-quality, consistent services' from 2023 onwards as well as better connections. So what are these changes and how will they affect the industry and the way you work?

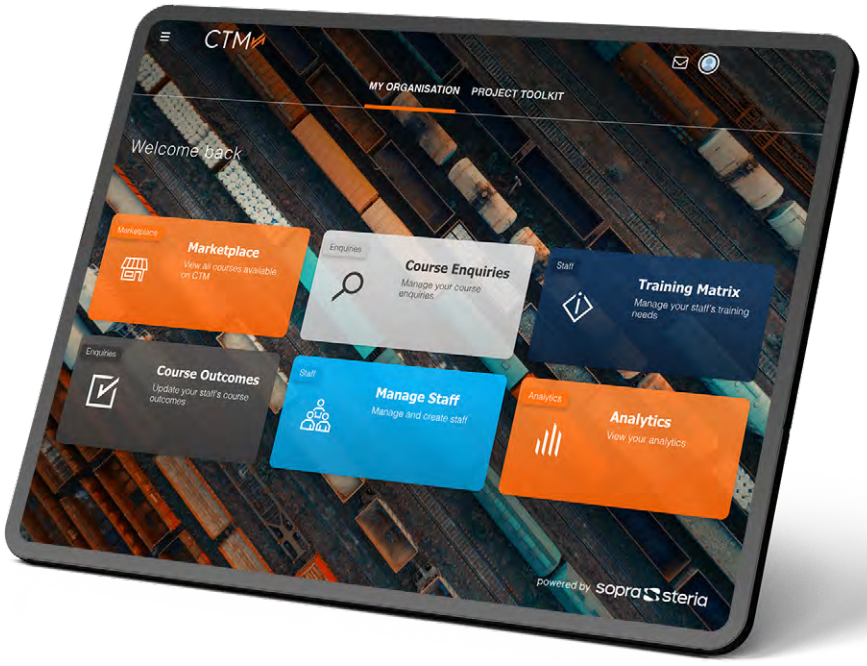
Structurally for the rail industry, the changes mean that GBR is set to create 'one guiding mind' to oversee the industry, according to Shapps, to allow for increased accountability. GBR, will look more like TfL, with multiple operators under one umbrella. Most rail services will still be run by the private

sector but under new 'passenger contracts'; precise punctuality targets will have to be met for the first time. The customer-centric focus of the changes allows for a simplification of ticket purchasing and compensation; a greater digitalisation of the ticketing process; flexible season tickets and increased accessibility.

Given these changes it should be expected that companies all across the supply chain will have to change the way they work to accommodate this shift. Ticketing companies will have to work nimbly to restructure their processes to allow for these changes, while platform operators will have to design new, more accessible features. Ultimately, this means a reskilling boom is likely, as the industry goes into reshuffle. To help companies navigate through these vast changes, a digital solution Competency Training MarketplaceTM, or 'CTM' has emerged on the market.

The platform, pioneered by Sopra Steria, a European leader in consulting, digital services and software development, was designed with the rail industry in mind to combat challenges with finding and managing training. CTM combines a training marketplace with a competency management tool, in one easy-to-use, intuitive system that has been designed to transform the process of reskilling and upskilling employees into a smooth and seamless experience.

The marketplace is home to training providers, with currently more than 1,000 qualifications to choose from; filters allow users to choose training in the right location following an email alert of an expiring competency. This notification comes from CTM's 'training matrix', which users can also log on to at any time.



The training matrix takes the hard work out of tracking staff competencies, by visualising employees' training status and providing clarity over who is the right fit for a project, based on qualification level and location. CTM is completely free-to-use and is expected to grab even more attention with the coming shifts in the industry. As companies aim to integrate GBR's requirements into their way of working, through increased digitalisation, platform accessibility and everything in between, CTM is the perfect tool to make sure staff are fully compliant and sufficiently skilled to smoothly navigate these business changes.

For those interested in finding out more about CTM, including a free demo, please visit the website: **competencytrainingmarketplace.com**

Follow CTM on LinkedIn for news and updates: **linkedin.com/company/competency-training-marketplace-ctm**

Bollé Safety

Bollé Safety's Anti-Fog, Anti-Scratch PLATINUM Coating

Your unique set of skills, knowledge and precision is what makes you great at your job.

Choosing the right personal protective equipment for the task at hand enables you to give your full potential regardless of the situation.

Indeed, your environment may impact your abilities to see clearly, hence impacting precision and increasing the risk of accidents in the workplace, at both your workstation and on your way to work. It is therefore important for you to be confident in your eyewear to protect you from fog-obscured vision.

Temperature variation and humidity may indeed create fog on your safety eyewear, which ultimately blurs your vision. Fogging is indeed

the first challenge met by eyewear users which can ultimately lead to a decrease in your productivity.

The effect is increased as you give your best to your job and your body temperature and perspiration increase, naturally impacting the temperature variation between your body heat and the cooler environment surrounding you

Whether you need prescription or plano safety eyewear, the probability is high that you already experienced the fogging up of your lenses while being focused on your duty, resulting in a slower pace, more approximative movements and overall discomfort.

This phenomenon is even more common when wearing other PPE such as helmets, face masks or respirators, increasing the need for an efficient, simple, and durable solution so that you always stay at your best and ensure visual clarity. PPE eyewear manufacturers have been working intensively over the years to engineer more effective anti-fog solutions, whether as coatings or sprays and ensure both protection and comfort to users in all occupations.

PLATINUM Coating

After optimising every aspect of its coating's technical performance and analysing all of the solutions available on the market, Bollé Safety launched PLATINUM: an exclusive anti-fog and anti-scratch coating applied on both sides of the lens through a dipping process to provide the highest durability and effectiveness. Engineered with hydrophilic properties, PLATINUM uses the natural humidity to create a homogeneous, colourless film of water on the surface of

the lens which acts like a water repellent to ensure optimal clarity. This innovative coating goes beyond all international standards (K & N rated under EN166 standard) to ensure you get the best visibility so that you are in the optimal position to give your best and maintain performance. Four times more resistant to fogging and twice as resistant to abrasion than EN166 requirements, PLATINUM provides exceptional performance, encompassing resistance to both autoclave cycles and to the most extreme temperature to protect you regardless of your work environment.

PLATINUM LITE

Because you don't always require the most advanced anti-fog solution to have a clear vision and be in full capacity of your movements, Bollé Safety developed PLATINUM LITE a simpler version of the coating that provides effective anti-scratch & anti-fog properties for you to always stay alert and maintain visual comfort.

Whichever coating you would use, PLATINUM & PLATINUM LITE coatings are both durable and washable to reduce their carbon footprint while enabling you to use the product all day long and every day with peace of mind.

Available on safety glasses, prescription eyewear, goggles, OTG and face shields, the PLATINUM range of coatings is a must have for every worker. No matter your work environment, it is recommended to use optimal anti-fog coatings such as PLATINUM with sealed/positive safety glasses or with poor ventilated eyewear that reduces air circulation as they increase fogging risks. Indeed, your body heat is often enough to create fog in these circumstances.

As you may be using safety eyewear without a fog-resistant coating, manufacturers have developed anti-fog sprays that create a fog protective layer on to the lens. Bollé Safety's latest product, the B300, is one of the most effective products on the market and was specifically designed to provide the best protection on all lens materials without damaging other coatings such as anti-reflective. The B300 optimal performances make it an asset to your team's results and can be used in all situations, on both your professional equipment and your personal reading glasses.

As visual comfort and performance go hand in hand, you deserve your safety eyewear to show you what they are truly made of. See for yourself and unleash your full potential.

www.bolle-safety.com

bollé SAFETY

SOLIS

GO GREEN

NYLON FRAME MADE OF
RECYCLED
FISHING NET

Proud of our innovative efforts, we launched in 2014 the first ever eco-frame compliant to EN166 standards with SOLIS B-Green. Seven years later, ***SOLIS GO GREEN*** is the new generation of eco-friendly safety eyewear: made of collected and recycled fishing net.

bollé
SAFETY