

Railway-News

M A G A Z I N E

Inside:

**The Role of European Export Credit Agencies in
Financing Rail Infrastructure Development in
Türkiye**

&

**Passenger Experience and
Decarbonisation – The
Same Thing?**

Railway Interchange



ISSUE THREE 2023



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KfW IPEX-Bank

Letter from the Editor



Dear Readers,

For our third issue of 2023, we're hopping stateside to take a look at Railway Interchange, which is taking place in Indianapolis in the Midwest. Indianapolis was actually the first city in the world to construct a union.

These days, it is served by three Amtrak Cardinal services per week, which connects Chicago and New York City. Up until 2019, Amtrak's Hoosier State service connected Indianapolis, a city of around 900,000 people, with Chicago on days the Cardinal did not run. However, the Indiana General Assembly withdrew its funding for the service from the state budget so it ceased operating.

The distance between Chicago and Indianapolis is roughly the same as that between London and Sheffield (a city of a similar population as Indianapolis). The Amtrak service takes almost five hours to connect the two, compared to two hours for the London-Sheffield link where passengers also have many daily services to choose from, as well as two different rail lines (the Midland Main Line and the East Coast Main

Line) and hence different operators. However, Amtrak is not happy with the current state of affairs. In 2021, it published its Vision for Improving Transportation Across America, which envisages new services between Indianapolis and Louisville, as well as new services to Cincinnati and Chicago. There are to be four round trips between Chicago-Indianapolis-Cincinnati and a further four between Chicago-Indianapolis-Louisville "with better-than-car trip-times due to 110 mph speeds for the eight round trips between Chicago and Indianapolis". The trip time between Chicago and Indianapolis is to be 3:35hrs. Speaking of the benefits of service expansion, the report noted that "Travel on Amtrak trains outside the NEC emits up to 55% fewer GHGs than driving alone [...]" These words to anyone reading this publication will sound like Amtrak is preaching to the converted – which leads me to think that the first step in decarbonising transport lies in solid, persuasive PR aimed at sceptics and the unconvinced.

If you would like our rail news straight to your inbox, make sure you're subscribed to us [here](#). If you want to be featured on our site or in our e-magazine, please [email](#) Andrew Lush or call +44 7432 725001.

As always, we hope you enjoy this issue



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STREET

Passenger Experience and Decarbonisation – The Same Thing?



There were two main topics of conversation at Rolling Stock Networking (RSN), which took place in Derby, UK in July this year. The morning session was focused on ‘delivering for customers’ that culminated in a panel discussion entitled ‘How can we improve customer experience in a cost-constrained world?’. The afternoon session, ‘for the environment’, asked ‘How can rail decarbonise more quickly and affordably?’ There were speakers to represent TOCs, rolling

stock manufacturers, the supply chain, ROSCOs, the government and freight, delivering a full spectrum of perspectives.

Initially, I had planned to write two articles – one covering each one of these two topics. However, it is an artificial distinction. By this I mean: improving the customer experience often requires the same measures as decarbonising the railways and if customer

experience is improved such that it brings about modal shift, this will decarbonise transport by shifting away from more polluting modes. Some examples for both of these:

During his talk from a TOC's perspective, Will Rogers, Managing Director at East Midlands Railway, presented a list of the top ten things passengers want for a good customer experience. First and foremost was for the trains to be on time. An associated desire was that passengers wanted to complete their journeys as quickly as possible. A talking point was line speed improvement. Currently, the line speed between Nottingham and Lincoln is poor, making journey times slow. This requires an infrastructure that can accommodate a certain line speed. Having to keep changing line speeds is energy-intensive. Getting consistently good line speed would therefore benefit passengers and reduce energy consumption.

A further example is air quality and noise pollution. Moving away from diesel trains by electrifying track or switching to alternative traction rolling stock will decarbonise rail and improve the customer experience by improving air quality and reducing noise pollution, making the rail environment healthier and more pleasant.

Other aspects desired by passengers are: at-seat power, on-train Wi-Fi and comfortable seats. All of these aspects indirectly decarbonise transport by encouraging modal shift. It was noted during the

panel discussion on passenger experience that rail has traditionally competed against coaches and domestic flights. These days it was competing against Zoom and Microsoft Teams. In the future it might even be competing against the private car. Elon Musk said in one tweet (if they're still called that) that "Self-driving car [sic] will amplify traffic to insane levels, as you won't feel the pain of driving yourself". If people can work with focus in a car or relax and watch movies, this attacks one of rail's USPs.

Private vehicles such as cars also guarantee a seat and this was another item on the list of top passenger wants, along with staff available on board. On my train journey home from Derby after RSN, the train was extremely crowded and even though I had a seat reservation, my seat was occupied by someone who did not get up when asked, instead saying "What are you going to do about it?" There was no staff on board, so no one to ask for assistance. I did eventually find a seat, but I only managed to work thanks to using my phone as a hot spot. The on-board Wi-Fi did not succeed in loading web pages.

The bottom line is, rail has to deliver a better customer experience than its competitors – cars, coaches, planes or Zoom – for passengers to choose it. Instead of asking passengers what they want from a good train service, it might be more indicative to ask people why they didn't choose rail as their transport mode for a particular journey.



The Role of European Export Credit Agencies in Financing Rail Infrastructure Development in Türkiye

Rail is set to play a significant role in Türkiye's transition to a low-carbon future, as it works towards reducing greenhouse gas emissions by 41% through 2030 and becoming net zero by 2053.

Compared with other modes of transport, such as road and air, rail is one of the most environmentally sustainable, which is why the Turkish government has made the development of the country's rail sector a priority.

Plans include increasing the share of railways in transportation to 6.2% by 2053, up from just one percent today, which will reduce the environmental impact of transportation in Türkiye, improve safety, increase capacity and reduce travel times.

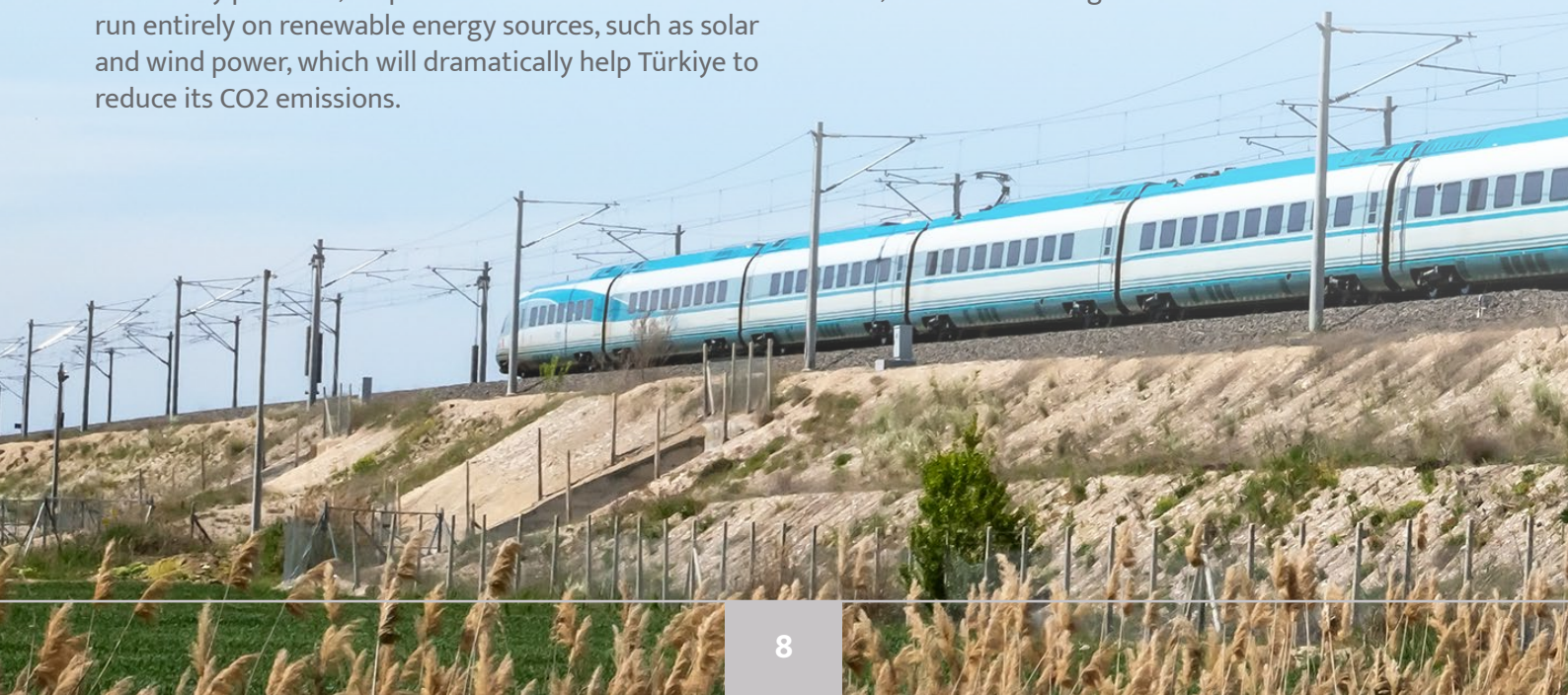
A particular area of focus is high-speed rail (HSR). Electrically powered, it's possible for HSR networks to run entirely on renewable energy sources, such as solar and wind power, which will dramatically help Türkiye to reduce its CO2 emissions.

Developing Türkiye's High-Speed Rail Infrastructure

Türkiye currently has approximately 8,000 miles of railway network, 770 of which make up the country's existing HSR network. The first HSR line began operating in 2009, and the government plans to have almost 3,500 miles of HSR line operational by 2025.

This is no small task however, particularly because of Türkiye's topography, which requires the building of expensive tunnels and viaducts in order to provide the long, straight and smooth paths high-speed trains need to operate.

Capital is also a challenge for the country, which like many others, faces economic difficulties post-pandemic. Furthermore, Türkiye must still rebuild after February's 7.8-magnitude earthquake near the Türkiye-Syria border, which means large infrastructure investments



like railway building might not be considered as important as the reconstruction of houses and ensuring communities have access to electricity and clean water.

Large-scale infrastructure investments also need support from the international market, which can take time to arrange, and require certain environmental and social prerequisites. Such roadblocks have slowed progression down, but mindsets are again refocusing on the development of Türkiye's high-speed rail infrastructure and the benefits it will bring.

Railway Financing and the Role of European Export Credit Agencies (ECAs)

Co-operation with ECAs is extremely important for the financing of Türkiye's high-speed rail projects as, with ECA financing, a bank provides a loan and the government of the exporting nation provides a guarantee to mitigate the bank's risk.

ECA-covered loans have advantages for all parties involved. While the investor or importer can enjoy attracting long-tenor financing from international institutions, the suppliers have the advantage of

mitigation against the risk of non-payment. Decreasing such risks enables European manufactures and European banks to enter markets that might otherwise have been considered too high-risk.

A pre-requisite for the usage of this scheme is the consideration of the right sourcing of equipment and services from the very beginning by the respective engineering, procurement and construction contractor (EPC) as this drives the process with the respective ECAs. The EPCs are advised to build up an understanding of the respective sub-supplier base as early as possible, which ensures the structuring of the debt financing in a timely manner.

A huge game-changer for electrified rail development funding is the modification to the Organisation for Economic Co-operation and Development's (OECD) arrangement on officially supported export credits which came into place this July.

Previously projects in the rail sector had restricted tenors of construction plus 14 years for repayment, but now any green rail projects, which includes electrified railway and infrastructure projects, have seen tenors extended to construction plus 22 years. This can make such projects more viable to many countries.

Background image: istockphoto.com/1001slide



Compared with other modes of transport, such as road and air, rail is one of the most environmentally sustainable, which is why the Turkish government has made the development of the country's rail sector a priority.

Several ECAs already play a key role in the development of the Turkish railway sector. A recent example comes from **the UK Export Finance (UKEF), which provided a 2.1bn EUR guarantee for the construction of Ankara-İzmir HSR.**

The deal obtained reinsurance from international ECAs including Servizi Assicurativi del Commercio Estero (SACE) in Italy, Swiss Export Risk Insurance (SERV) in Switzerland and Österreichische Kontrollbank (OeKB) in Austria.

Another example is **the EUR 39 million SERV-covered loan for the financing of five Stadler locomotives for the Turkish shipping and logistic group Arkas Lojistik.** These are part of Arkas Group's Railport Project, an inland terminal that provides intermodal cargo services in Türkiye.

KfW IPEX-Bank was closely involved in the financing of both of these projects.

KfW IPEX-Bank and Its Role in Türkiye

ECA-covered financings are one of KfW IPEX-Bank's areas of expertise. It currently manages a 25 billion EUR portfolio of ECA-covered loans by working with 20 ECAs worldwide and completes between 2–4 billion new ECA-covered transactions per year.

The bank has proven its ECA expertise by not only arranging ECA-covered financings in Türkiye, but also railway projects in other countries such as India, Egypt and Tanzania.

In addition to having supported ECA-covered financing in these challenging markets, the bank has provided its expertise in compliance with environmental and social standards for greenfield infrastructure projects.

KfW IPEX-Bank has had a representative office in Türkiye since 2004, which is now headed by Yasemin Kuytak, and is supporting European exports to the country as well as financing several sectors. Currently roughly half of its commitments are in renewable energy, while another 11% lie within the transportation sector.

An expert in financing passenger and freight transport projects, the bank is open to share its expertise in worldwide projects.

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KfW IPEX-Bank

Upcoming Rail Events & Exhibitions

September 2023–November 2023



Railway Interchange 2023

Where: Indiana Convention Center, Indianapolis

When: 1–4 October 2023

Railway Interchange is the largest railway exhibition and conference in North America, bringing together professionals from across the globe to exhibit and discuss relevant technologies and services in the industry.

The event is hosted by four organisations: American Railway Engineering and Maintenance-of-Way Association (AREMA), Railway Supply Institute (RSI), Railway Engineering-Maintenance Suppliers Association (REMSA) and Railway Systems Suppliers, Inc. (RSSI). On average, this biennial event is attended by over 8,000 industry professionals from 40+ countries.

Exhibition

In 2023, over 700 exhibitors will be present at Railway Interchange including locomotive, freight car and tank car manufacturers; mechanical systems and component suppliers; communication and signal system companies; railroad shippers; and track safety and inspection specialists, to name but a few.

The exhibition will be divided into three halls hosted by RSI, REMSA and RSSI. These halls will span across a combined space of 340,000 square feet.

Exhibitors in the RSI hall will include suppliers in the following fields:

- Rolling stock manufacturing
- Mechanical systems
- Maintenance systems
- Rolling stock leasing and repairs

Meanwhile, the REMSA hall will feature suppliers specialising in:

- Track safety and inspection
- Track maintenance
- Track machinery
- Track monitoring software and technology
- Track structure
- Non-track-bound products and services

Finally, the RSSI hall will focus on the following categories:

- Communication systems
- Signal systems
- Information technology
- Crossing components
- Wayside information systems
- Power switches

Schedule

Alongside the exhibition, Railway Interchange incorporates a scheduled programme that enables attendees to network and participate in the latest industry discussions. This agenda will include keynote speakers, presentations, panel discussions and breakout sessions.

For example, Coby Bullard, Senior Vice-President of Sales and Marketing at Canadian Pacific Kansas City (CPKC) will deliver a talk on CPKC's perspective on the state of the industry. Bullard will also provide

updates on the Canadian Pacific and Kansas City Southern merger. He will address the key challenges and opportunities for the company moving forward and how these will affect engineering and purchasing objectives in the industry.

Supplementary Events

This year, the AREMA 2023 Annual Conference and the RSI Technical and Educational Conference will be held in conjunction with Railway Interchange. These events will provide attendees with additional opportunities to increase their knowledge and exchange ideas during the Railway Interchange 2023 gathering.

RSI Technical Conference

The RSI Technical Conference aims to explore the latest industry developments while helping companies to connect with innovative minds and hear more about industry drivers.

Specific presentations will focus on topics such as increasing modal share, developing vehicle automation and resolving challenges in the logistics sector.

AREMA Technical Sessions

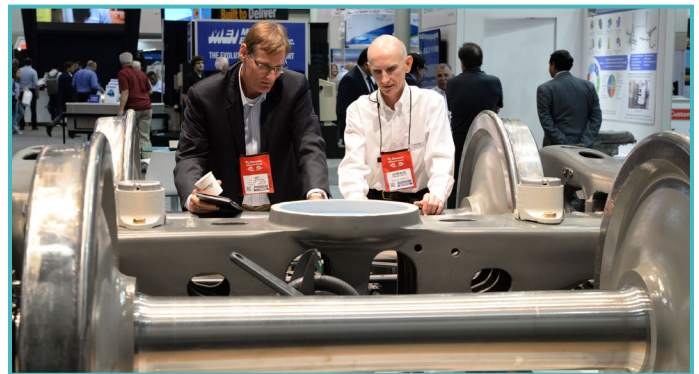
AREMA's Technical Sessions will also provide in-depth discussions on a range of technologies to help enhance the future of the rail industry. These sessions have been divided into six categories: communications, signals & IT; engineering services; maintenance-of-way; passenger & transit; structures; and track.

Topics addressed throughout the sessions will include the significance of GIS & GPS in engineering and surveying; the effect of fixed structures on longitudinal rail stresses and buckled track accidents; innovative approaches for optimising curves for passenger

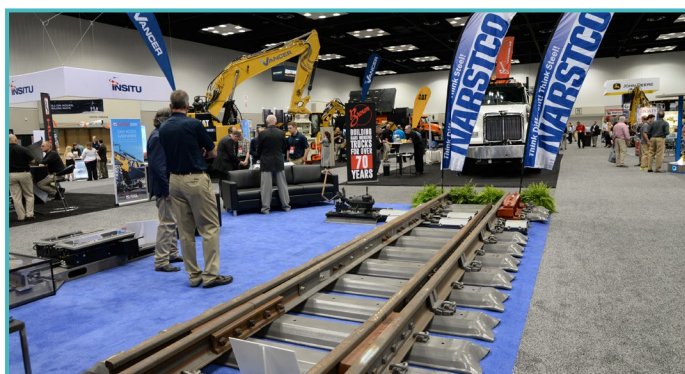
services on mixed-use rail corridors; and the rollout of wireless activation for crossing systems.

In addition, a range of discussions hosted throughout the AREMA conference will explore prevalent challenges in the rail industry. For example, the programme will include a presentation on electrification readiness and what to consider in the shift to electrified intermodal facilities.

Registration for Railway Interchange and the RSI and AREMA conferences is open and [can be accessed here](#).



Click here
for the full
exhibitor list



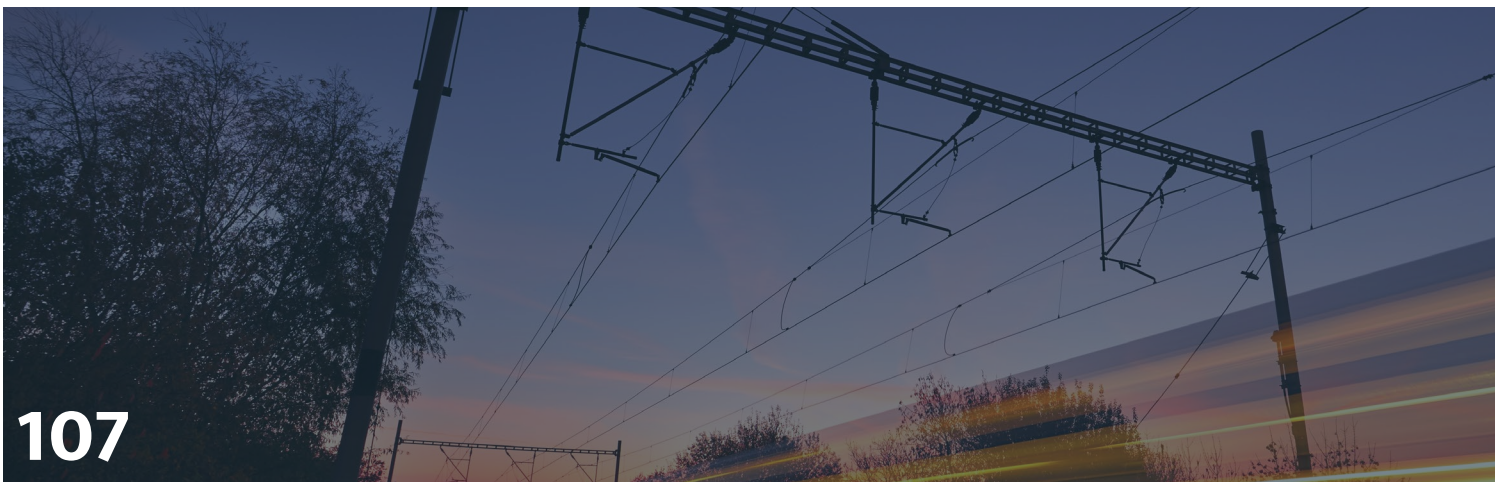
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treadmaster flooring

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- Extremely durable even lasting the full life of the train
- Savings in LCC costs and impact to the environment
- Non toxic and PVC free

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Virtek Vision

Virtek's Iris Spatial Positioning System

Simplified Fabrication for Welded Structures

Using vision-based laser projection you can locate objects in 3D space and rapidly lock on to CAD-specified assembly positions, eliminating the need for expensive tooling.

This cutting-edge system simplifies the fabrication process of complex welded assemblies, making it easier than ever before to visualise your next project before you begin to assemble. With Iris 3D, manual measurement, marking and templates become a thing of the past. The system enables instant alignment of parts or tools, virtually eliminating setup time.

Increase Production

The convenience is unparalleled as there is no requirement to create files in advance. Effortlessly select your workpiece and project the laser template directly onto the weld table within seconds!

Easy to use IRIS(™) Software

Unleash the power of visualisation by seeing your final project before you commence assembly. Experience the convenience of effortlessly assembling complex 3D parts with the same ease as simple parts. The simplified software interface reduces training requirements and minimises operator errors, making operation and administration more straightforward. It eliminates differences between 'as-built' and 'as designed' because assemblers are always working with the most current CAD file.

Superior Quality & High Visibility

Remove operator error and replace manual

measurements and templates with automated laser-guided assembly. The Auto Focus feature, coupled with the brightest, safest laser line ensure quality and superior visibility even in bright work environments.

The system also includes a projected crosshair feature that automatically indicates drill locations, punch locations and assembly positions, working seamlessly on both flat and curved surfaces. Virtek's Iris 3D incorporates field-replaceable components, enabling flexible on-site repairs and reducing the overall cost of ownership. With these benefits, Virtek's Iris 3D optimises precision, efficiency and cost-effectiveness in welded assembly processes.

CAD Visualization allows you to work directly from your digital designs. The user-friendly interface is designed to be simple and intuitive, enabling anyone on the shop floor to utilise the system. This solution is specifically designed for the following industries: welded assembly, agriculture, heavy fabrication, rolling stock and mining equipment.

Applications include 3D-welded stud and bracket placement, component and final assembly, fabrication, table layout and welded assembly.

Laser being projected on to part assembly

How to Reduce Errors in the Manufacturing Process

Find out how a valued customer was able to reduce errors in manufacturing and increasing efficiency to meet increased demand

Komatsu was seeking to reduce errors in manufacturing, while at the same time increasing its throughput and efficiency to enable it to meet increased demand. The company was using aluminium templates to guide workers in welding brackets, stand-offs and studs on large mining truck frames.

These templates were costly to manufacture, design and redesign. Additionally, they were cumbersome, presenting health and safety risks and taking up a lot of space to store. By implementing Virtek's Iris Spatial Positioning System (SPS), Komatsu eliminated templates and significantly accelerated their assembly process, eliminating human errors and upholding quality because items are built exactly as designed.

The Challenge

To remain competitive, Komatsu had to offer its customers more customised, modular, integrated and autonomous solutions. The complexity involved in delivering these solutions has caused an increase of over 300% per frame in the number of assembly components on electric mining trucks.

- Quality: issues led to rework sometimes costing up to 10x more to complete
- Engineering: challenges caused delays in manufacturing throughput as well as quality issues
- Manufacturing: an ever-evolving manufacturing process led to cost and safety challenges

The Solution

At Komatsu, Virtek's Iris SPS helps guide welders in the manufacturing of its large-scale mining trucks by projecting precise laser lines for accurate positioning of assembly components on the frame. Iris SPS uses actual measurements from the real part to align the CAD 3D model to the built part, enabling the user to account for any manufacturing deviations and assembly stack up tolerances. This reduces or eliminates errors caused through the typical assembly process.

By eliminating the use of templates, manual measuring, marking and fitting steps, Komatsu was able to error-proof the assembly process. This led to a 95% reduction in defects resulting in a significant cost savings.

Engineering changes now take hours not weeks to hit production. Specifically, engineering changes for templates went from up to 8 weeks down to 2 to 16 hours.

Manufacturing is performed more safely and accurately. The Iris SPS user interface requires no prior experience. Visual cues guide operators through each action and project text indicators that identify part numbers for accuracy. The operator rarely needs to leave their workstation and set up time is minimal. Manufacturing is performed more safely and accurately.

To read the full case study, please download [here](#).



Laser projection showing part placement with Virtek Iris SPS

Flexible laser solutions for improved productivity

Engineering
Simplicity.



VIRTEK IRIS

Flexible. Reliable. Mobile.

Transform manual measurements, marking and the use of physical templates and automate with ease using laser solutions. Assembly is the final and most critical step, ensure required accuracy and consistent part-to-part quality. Find out how you can create efficiencies, reduce time to market, and dramatically cut costs in your existing manufacturing process.



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MAE.

Safely on Track



MAE technician during calibration of a wheelset press

In Europe, Asia, Africa and very soon also in New York – worldwide, MAE group is increasing the momentum of the transport revolution with its know-how.

The GESCO subsidiary's machines put wheels, brake discs and transmission components for trains on to the shafts. The technology ensures that trains can realise their full potential and reach their destination safely at top speed.

High-speed trains travel at more than 300 kilometres per hour. Gigantic forces are at work here. Inside the carriage, however, little of this can be felt, so quietly and elegantly does it lie in its tracks. Many people

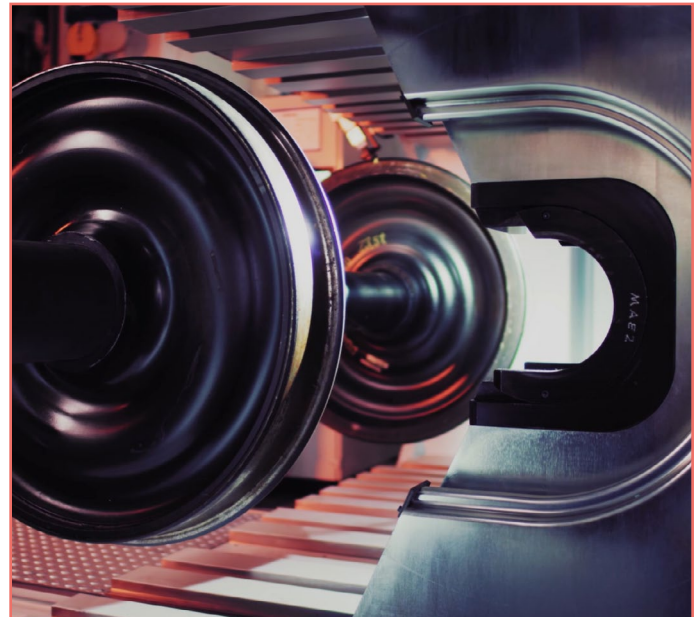
therefore use the train as a mobile office, working in a concentrated manner – while the train rapidly approaches its destination. And in a climate-neutral way. This is exactly what makes trains an elementary component of the mobility of the future. Rail passengers in Germany, Europe and worldwide can rely on one thing: if the wheelset presses from MAE are used on trains, the trains bring their maximum potential to the rails and offer the highest level of safety.

Enormous Pressing Force Required

But how do the wheels get on to the axles? They cannot be welded or bolted, because neither method would withstand the high stresses of everyday life with

millions of kilometres travelled. That is why hydraulic presses are used, like the ones MAE develops and builds at its headquarters in Erkrath. With a pressing force of up to 150 tonnes, these systems press the wheels on to the shafts. The wheels then sit so firmly on the axle that only the machine itself can press them off again.

MAE is the market leader for wheelset presses for rail transport. 95 percent of all trams and underground trains as well as almost all express trains in Germany benefit from MAE's mechanical engineering know-how. The latest commuter trains in Perth and Shanghai as well as railways in Egypt and India also roll on wheels pressed on to shafts by equipment from Erkrath. In addition, the company is currently implementing a major order from New York.



Wheelset clamped in wheelset press

MAE Advances the Mobility Transition

The fast-growing business field of railway technology has become an important second pillar for MAE. The other is straightening: for the automotive industry and mechanical engineering, the company develops and supplies machines with which steering parts and drive shafts for electric motors are straightened. Today, the company generates a good 70 percent of its sales in the business fields of rail and electromobility, and the trend is growing. MAE is thus an agile contributor to the transport revolution. *"We have excellent opportunities to grow further in the field of climate-neutral mobility,"* says MAE Managing Director Claas Jorde.

No More Energy Consumption Than a Kettle

Watching an MAE wheelset press in action, it is surprising how quietly and elegantly it works. The two press cylinders are driven by a digitally controlled hydraulic patented system, which not only presses the wheels on to the axles amazingly quietly, but also highly efficiently. *"Thanks to the intelligent software, the system controls itself so that the maximum pressing force only occurs when needed,"* explains Technical Manager Oliver Kaiser.

This precise use of energy saves hydraulic oil and electricity. The previous generations of MAE wheelset presses already consumed less energy than competitor machines. The new machines have more than halved their energy requirements: MAE's wheelset presses

consume on average no more electricity for a pressing process than a kettle. *"The careful use of resources is more important today than ever,"* says Christian Busch, General Sales Manager at MAE. This efficiency of the machines helps the climate, but also the customer: *"Our machines reduce costs, which is why the investments pay off after just a few years."*

More Transport Companies Are Acquiring Their Own Wheelset Presses

The fact that many transport companies, in addition to train manufacturers, also purchase wheelset presses from MAE is due in part to their convenience in daily use. *"Train maintenance has to be fast so that trains are back on the rails as soon as possible,"* says Christian Busch. *"If you have to take the trains to an external facility to have the wheels pressed off, renewed and pressed on, you lose time and money."*

The environment and climate also benefit from the short maintenance times: rail transport is a key to CO₂-neutral mobility. If the mobility transition is to succeed, trains must be on the rails, not in depots, which is why more and more transport companies are showing immense interest in MAE's wheelset presses. *"Our machines make a decisive contribution to the railways being used all over the world,"* says Technical Manager Oliver Kaiser.

Conquering the US from Erkrath

Managing Director Claas Jorde has just returned from a business trip to the US, where MAE landed the order in question together with its US subsidiary MAE-Eitel: starting in 2024, an MAE machine will bring the wheels of all NYC's underground trains on to the shafts. Rail transport in the US was overshadowed by the car for a long time, but a rethink is now taking place: the United States will also make its mobility more climate-friendly, and rail transport plays a key role in this. Accordingly, railway companies are investing in efficient technologies on a grand scale – like New York City Transit in wheelset presses from Erkrath.

“The order is highly exciting for us,” says Christian Busch. *“One of the most important metropolises in the world relies on our machines – that has a huge appeal.”* The MAE sales manager confirms that the order from New York has already resulted in many new enquiries:

“Since a lot of infrastructure projects will be realised in the USA in the near future, we are optimistic that we will be able to sell many more machines to the United States.” The prospects for growth are excellent.

The example of the order from New York shows MAE's customer focus. *“All our machines are designed individually and in close consultation with the customer,”* explains Technical Manager Oliver Kaiser. In New York, the machine is set up directly in the depot of

New York City Transit, which is why it has to adapt to the local conditions there. *“We are therefore frequently at the customer's site to plan the installation.”* The deal: MAE designs and develops the machine to fit exactly. Once the preliminary planning is complete, the GESCO subsidiary gives permission to proceed and has exactly six weeks from then on to install the new system, set the parameters and finally put the machine into operation. *“Six weeks – and not a day longer,”* says Managing Director Claas Jorde. *“Otherwise, the customer's maintenance will stall, and New York will be short of underground trains.”*

Isn't that a lot of pressure for him and his team? *“No,”* says Claas Jorde and smiles. *“We would feel pressure if we were unsure whether our machines perform what they promise.”* But this is not the case, he says: *“We know how to combine know-how with the will to innovate.”*

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MAE wheelset press with automated loading system

Yellow Window

Yellow Window's Integrated Product-Service-Systems Design (PSS) for Higher Passenger Satisfaction



Celebrating two Red Dot awards for Brussels MIVB/STIB, design agency Yellow Window illustrates the case for more integrated design solutions in the public transport sector.

Integrated System Building for Customer Appreciation

Passenger satisfaction is vital in building successful public transport (PT) systems, few would disagree. However, it's not just one factor to manage here, but a string of experiences throughout the journey. Each

step of the way counts. Optimising, for example, the on-board vehicle experience or the overall network changeovers are important, but a passenger would always value their journey in its entirety – as an experience, a system and a service. Beyond being painless, today's journeys should be rewarding and seamless.

This 'integrated experience', however, does not seem to come naturally to the public transport sector. In PT ecosystems, manufacturers typically still focus on the products, operators manage the service and transport authorities are to oversee the whole system. Perhaps this is the root cause for the lack of integration and coherence (not ignoring large complexities in e.g.

legacy, stakeholders or franchising). The fact remains that people have other mobility alternatives, some of which are easier, more service-oriented as well as more enjoyable, integrated and coherent to use.

Product-Service Systems in Public Shared Services

The socio-economic shift from ownership to usage – where consumers (in)voluntarily own less (of the) products and increasingly consume services – drives the increased attention towards the design of integrated product-service systems (PSS).

Product-service systems (PPS) are an integrated approach to designing products and services supported by network actors, to better meet the needs of customers, sustainability and efficiency.

PSS design centres on the complete user experience. With entire industries shifting focus to service aspects and experience, it's interesting to see how the public transport sector reacts – as PT inherently shares many of the PSS key principles: functionality over ownership, pay-per-ride (actual usage), sharing, collaboration and networking, fostering of long-term relationships and environmental and social sustainability.

We have been advocating for years that the PT sector should incorporate PSS design more seriously. When it comes to designing rail – and public transport solutions in general, Yellow Window has long applied integrated design approaches. It led the studio to expand beyond

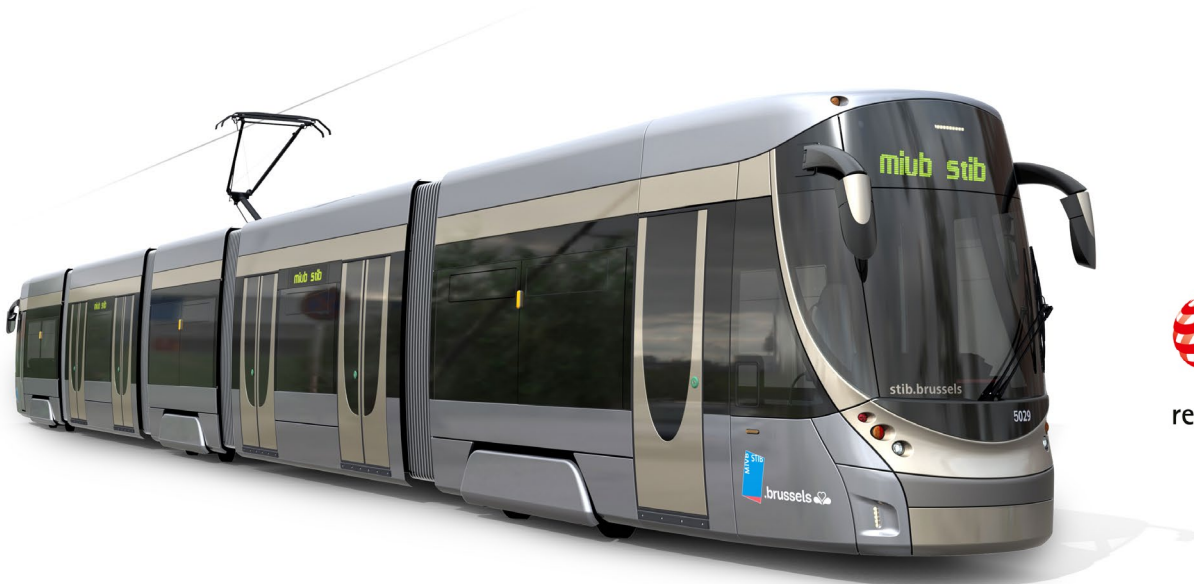
product design and widen its scope into service and policy design early this century.

PSS design approaches are relevant – as a holistic, user-centred discipline, design has always been an integrating factor. PSS design strives to get a 360° outlook for the service / product combination that PT is. It strives to embed the design of rolling stock and infrastructure in a seamless and convenient experience for passengers, while optimising resources and reducing the environmental impact. And now we have a double bespoke international design award to prove its case.

The Case for Integrated Design

Yellow Window has worked for over 20 years with Brussels' public transport operator MIVB/STIB in a holistic product-service approach to deliver significantly higher satisfaction rates. To illustrate the impact of integrated solutions, we list below some key elements that were considered when designing public shared services for MIVB/STIB, as can be found in the latest Alstom TNG tram added to the fleet.

- **A unique system identity** is important for STIB/ MIVB. Equally being a symbol for the citizens of Brussels as well as for the operator, or the city as European capital. The organic influences and material inspiration are based on Art Nouveau – but beyond being a reference to Brussels and its past, its modern materialisation adds a warm and humane character to the system. The identity is also being extended over infrastructures, such as e-bus charging or the Clear Channel metro signs in the pipeline.



reddot winner 2023



- **Multi-modal vehicle integration:** Yellow Window led the horizontal integration of various modes of transportation (buses, trams, metros and infrastructures) into one recognisable fleet, with a unique design language and experience. Vertically, the new vehicles better integrate last mile solutions (bicycles, scooters) while improving accessibility for prams and wheelchairs.
- **User-centred touchpoints and infrastructures:** all vehicles share a strong focus on passenger comfort and convenience. Natural materials are used where possible. Inclusivity and diversity are built-in – through alternative accessibility options as well as a diverse array of options to stand or sit on board.
- **User centred optimisation:** through analysing passenger behaviour and modelling of flows, we've identified bottlenecks and devised ways to optimise interiors. The newest vehicles feature adaptive layouts to mediate demand and adjust service levels between comfort, efficiency, and capacity. Involving users and wider stakeholders in the process improves alignment of the design with the diverse needs and preferences and embracing the service.
- **State-of-the-art vehicles:** to encourage and shift mindsets towards sustainable and shared transportation, respecting the passengers is a must. Convenient, seductive and qualitative vehicles are yielding great ROIs, from increased ridership to reduced vandalism. Confirming the design quality are the operators latest CAF metro and Alstom trams receiving Red Dot design awards this year.
- **Proactive procurement:** to acquire these qualitative and customised vehicles from the market, we translated the service requirements towards the industry and engaging them in a productive dialogue. Multi-stakeholder and user needs were translated into realistic concept designs as a prerequisite in the tender specifications.
- **Safety:** to share the road responsibly, the TNG tram features unique safety features to mitigate potential impact with 'soft modes'. Ranging from a nearly 180-degree drivers view, to soft (foamed) materials covering all front parts below the glazing, and a cylindrical front shape design to deflect any persons / objects coming in contact.
- **Security:** to improve the security perception within its metro stations, Yellow Window introduced multidisciplinary service design techniques in security evaluations of metro stations, setting the stage for recommendations and guideline development. To relieve anxiety on board, open yet warm, respectful vehicles interiors have become the norm.

Summary

This selection of elements integrated by our PSS design approach helped to enhance Brussels' public transport system to become more attractive, accessible and efficient – aiming to encourage more citizens into choosing the system as their preferred mode of travel. While these examples cover a decade-long journey and still do not cover the entire system, an increase is seen in ridership and satisfaction, and ultimately on the city's liveability and sustainability.

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ATS-500 Functional Test System



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Door Operation



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The efficient and reliable maintenance of electronic circuits over their long working life is critical to the safe operation of mass transit systems. Test all of your critical electronics systems with our comprehensive solutions, consolidating the work of many testers into one.

Our consolidated solutions cover virtually every critical system on board the train, as well as wayside. From communications and control, to HVAC, to door operation, to high voltage applications, the ATS-500 family is your state-of-the-art choice to ensure optimal performance of your complex electronics.

**Maximum uptime. Functioning systems.
Happy passengers.
How's that for peace of mind?**

Astronics

The Benefits of a Consolidated Testing System

Astronics Test Systems is a leader in subsystem testing in the rail sector.

We interviewed Jim Curtis, Engineering Fellow – Transit, about the company’s consolidated test system, its benefits to transit operators and the future of equipment testing in the sector.

Keri Allan, Railway-News: What’s unique about your consolidated test system?

Jim Curtis: It’s literally a single test station that can verify and troubleshoot almost every subsystem on a train. It’s unique in that this one platform can address systems from multiple vendors across multiple disciplines from communications subassemblies through to propulsion and electromechanical door systems.

We have a consolidated test station that will test any boards or subassemblies powered by car body voltage. Then there’s our high-voltage test system for anything that uses third rail input voltage. Some customers require both and in these cases we’re able to turn them into one single platform.

KA: How has this been developed to support the mass transit industry?

JC: The latest system is the result of around 15 years of development. Our first exposure to the transit sector was developing a test system for New York City Transit Authority (NYCTA). Since then, we’ve delivered test equipment for just about everything in the industry. As a result, we understand what’s needed to support the

entire range of products a test technician has to deal with on a daily basis.

We take feedback from customers and then tweak our design accordingly. Take interface test adaptors (ITAs). Any test system requires a connection to the unit you’re testing and technicians had difficulty maintaining large numbers of these ITAs.

In response we developed a ‘universal’ ITA utilising our custom switching matrix to greatly increase the number of units under test (UUTs) that can be tested on a single ITA.

KA: Can you tell me a little about rail customers you’ve worked with?

JC: Clients include the Bay Area Rapid Transit (BART), Massachusetts Bay Transportation Authority (MBTA) and Metropolitan Atlanta Rapid Transit Authority (MARTA). NYCTA is one of our biggest customers and we’re currently providing consolidated electronics testing for its R211 railcar upgrade project.

Space is a premium for our customers, so freeing this up through a single consolidated test platform is one of the most obvious benefits. NYCTA had lots of old automatic test equipment (ATE) in its building; pretty difficult to maintain. We’ve helped them consolidate greatly – down to just two or three test systems for large rail contracts, which is a big deal.

Another benefit is that users only need to learn to use one interface for all their testing. That consistency means less time spent on training.



ATS-500 Functional Test System



ATS-500 High Power Test System

KA: What's your engineer-to-engineer ethos?

JC: We use the same process with all our clients, which is to go through the design with the customer in an engineering environment, verifying that what we are designing and delivering will meet their needs.

We'll have many working sessions throughout the lifecycle of the design effort – design reviews, preliminary designs, critical design, etc. – and that's all done on an engineer-to-engineer basis. Our consolidated solutions also mean the involvement of OEM engineers, to ensure we fully understand how their products work.

KA: Astronics Test Systems has a long heritage in the testing world – how have you seen things change?

JC: I think the biggest change I've seen, and one that's here to stay, is testing becoming very software intensive. Circuit board designs for rail are utilising programmable devices and microprocessors with operating systems on board everywhere.

To support testing these designs our testers must provide the tools necessary to update and replace the software and firmware to effectively repair the unit under test.

KA: How are you preparing for the future?

JC: A lot of what we're working on is related to the intensity of software. We're looking at more open architecture for example, not only on the test system itself, but also the operating systems of the units we're testing.

We're developing a Linux-based test system to create an open environment that can be supported for many years. These trains need to be supported for a long time, so obsolescence becomes an issue and we're trying to address this.

Another thing is developing better tools, not just internally at Astronics Test Systems, but ones that customers can use to develop the test programmes themselves. Software development is very labour intensive, so we're putting effort into developing tools to streamline this.

On the high-power side, we're seeing higher voltages, more power, fibreoptics and complex gate drive technologies. Insulated-gate bipolar transistors (IGBTs) are still in mainstream use for propulsion switching, inverters and compressor drives, but I think we'll have to keep up with changes in this area to support interfacing to these enhanced designs to effectively diagnose faults.

Visit our [website](#) to learn more about Astronics Test Systems

ASTRONICS
TEST SYSTEMS



Polarteknik

Door System Products and Expert Services for More Safety, Reliability, Availability and Fire Integrity for Your Fleets

The Polarteknik 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 our 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 and high-speed and very high-speed classes of railway of 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 also 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





Polarteknik
TDS
TRAIN DOOR SOLUTIONS

DID YOU KNOW?
POLARTEKNIK is in
58%
of the railcars in UK
with interior doors

POLARTEKNIK is in
46%
of the fleets (classes)
with some system or
mod in UK

Feel the Flow

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and customers can benefit from the consolidated sourcing made regarding key components and obsolescence management that draws from the legacy design data.

Sustainability

Polarteknik has throughout its history had a very environmentally friendly and recyclable product range of up to 99.5%. The Polarteknik design process takes into consideration the raw materials used, impacts of the production processes and the packaging the products are delivered in.

Now Polarteknik is an ISO14001-certified and EcoVadis gold-rated company ranked in the top 5% among 90,000 rated companies globally. EcoVadis has assessed companies in over 160 countries based on four categories of performance: environment, labour and human rights, ethics, and sustainable procurement.

About Polarteknik Oy

Our strengths include wide-ranging knowledge, in-depth expertise and long-term commitment.

We deliver reliable, sustainable and efficiently produced interior door systems for the world's leading train

manufacturers. We are known as a trusted and forward-looking partner that promotes sustainability and combines experience, vision and an understanding of the industry.

Our mission is to work together with our customers towards a green future for transport by ensuring that rail travel is the world's most comfortable way to get from one place to another.

About Train Door Solutions Ltd

Train Door Solutions is a UK company specialising in servicing pneumatic and electrical door systems. The company, from its registered office in Milton Keynes, UK provides its services for leading train service companies, fleet owners and OEM manufacturers. TDS has been a part of Polarteknik since January 2020.

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

Connect with Train Door Solutions at www.traindoor.com.





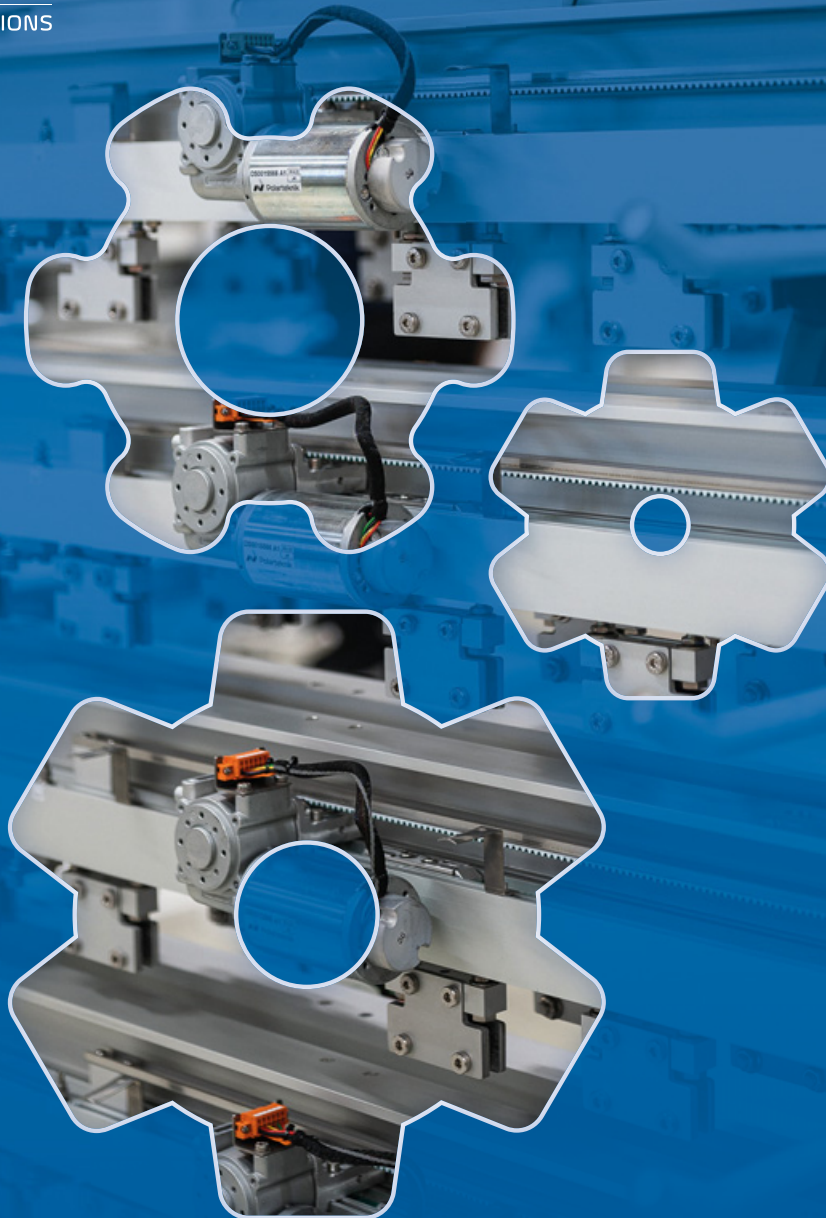
Polartechnik

TDS

TRAIN DOOR SOLUTIONS

AFTER SALES

*Our services include design, installation and commissioning support, training, maintenance, modernization, spare parts and technical support during the lifetime of the fleet.
Sustainable - reliable - safe.*



Feel the Flow



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Zoppas Industries

Zoppas Industries Heating Element Technologies: Pioneering Sustainability and Efficiency for Railways

The railway sector plays a significant role in global transportation, providing an efficient and reliable mode of travel for both passengers and freight.

However, one crucial aspect that often goes unnoticed is the heating requirements within the railway industry. Heating solutions are essential to ensure passenger comfort, prevent equipment damage and maintain operational efficiency in harsh weather conditions.

As sustainability becomes an increasingly important consideration, it is crucial for the railway sector to adopt heating solutions that are energy-efficient, environmentally friendly and aligned with long-term sustainability goals.

Traditional heating systems often lacked efficiency, resulting in energy wastage and increased costs. The need for a more sustainable and efficient heating solution led to the development of innovative technologies tailored to the railway sector.

Zoppas Industries' Contribution to Sustainable Rail Travel

Incorporating Zoppas Industries Heating Element Technologies' electric heating solutions into the railway sector enhances the overall sustainability and efficiency of train operations. Underfloor heating, HVAC systems and auxiliary heating systems provided by Zoppas Industries offer energy-efficient alternatives to traditional heating methods, reducing carbon emissions and minimising environmental impact. By

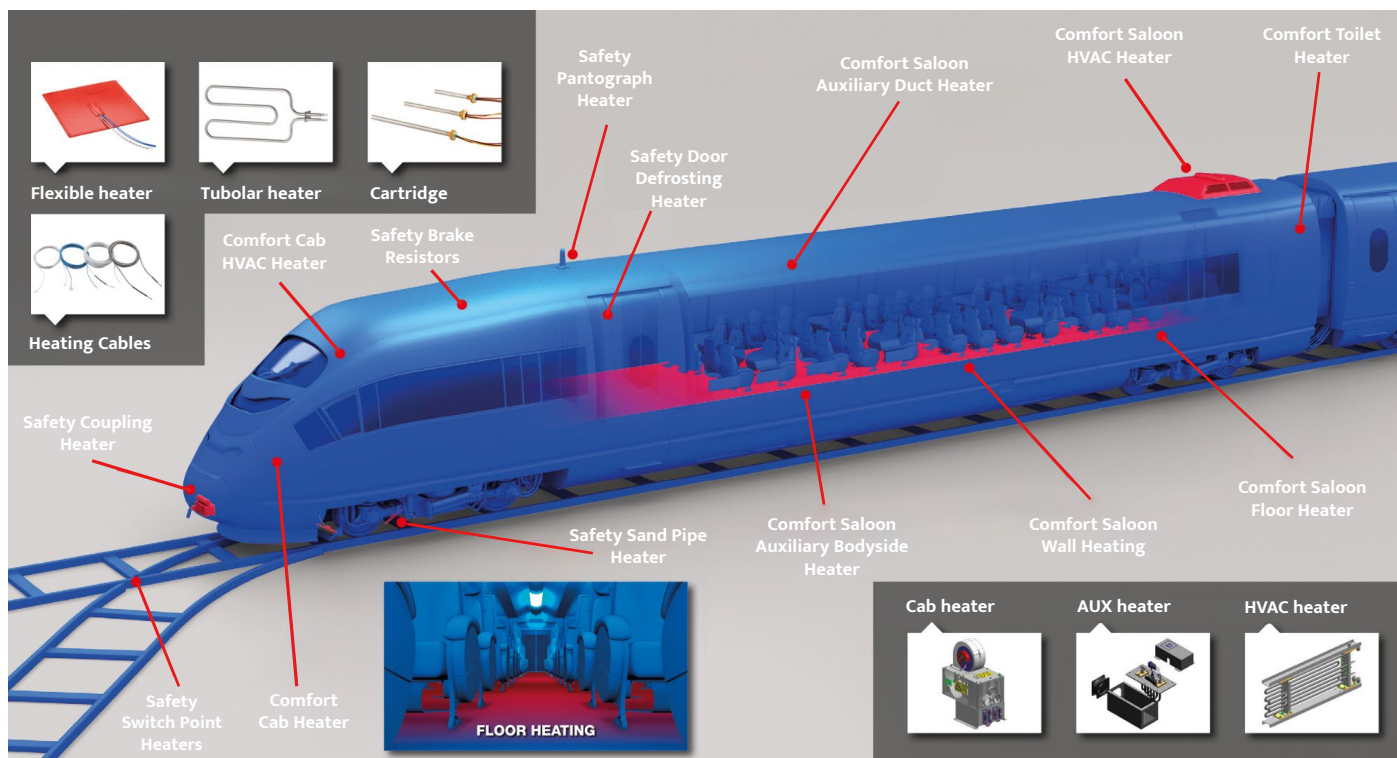
leveraging these innovative solutions, the railway sector can provide a comfortable and sustainable travel experience, contributing to a greener future for the transportation industry as a whole. ZIHET's commitment to innovation and sustainability serves as a testament to the ongoing efforts to develop heating solutions that are aligned with long-term sustainability goals.

Zoppas Industries' underfloor heating systems provide a comfortable and uniform heat distribution within train compartments. By using electric heating elements embedded within the floor, these systems ensure efficient heat transfer to the surrounding environment, minimising energy waste. Underfloor heating offers passengers a pleasant and warm travel experience while reducing energy consumption and carbon emissions compared to traditional heating methods.

Heating, ventilation and air-conditioning (HVAC) systems are crucial for maintaining a comfortable

Zoppas Industries headquarters





Zoppas solutions for railways

indoor climate within trains. Zoppas Industries' electric HVAC systems incorporate technologies that optimise energy consumption while delivering reliable heating and cooling capabilities.

The auxiliary heating systems provide supplementary heat to critical components and areas within trains, such as control panels, batteries, and crew cabins.

These heating solutions can adapt to meet the specific requirements of different railway applications. Whether it is retrofitting existing train fleets or integrating heating systems into new rolling stock, Zoppas Industries offers flexible solutions that seamlessly integrate with the existing infrastructure, ensuring a smooth transition to sustainable heating.

Benefits of Sustainable Heating Adoption in Railways

By adopting these sustainable heating solutions, the railway sector can realise several long-term benefits. Firstly, reduced greenhouse gas emissions contribute to global efforts to mitigate climate change. The transition to electrified heating systems and the use of renewable energy sources minimises the sector's carbon footprint and aligns with sustainability targets

set by governments and international agreements. Secondly, energy-efficient heating technologies result in cost savings and operational efficiency. Reduced energy consumption leads to lower operating expenses, allowing railway operators to allocate resources to other important areas, such as infrastructure maintenance and service improvements.

Finally, sustainable heating solutions enhance passenger comfort and satisfaction. Providing a warm and comfortable environment during train journeys improves the overall passenger experience and promotes the well-being of travellers. It ensures that passengers can enjoy their journeys regardless of the outside weather conditions, making rail travel a more attractive and appealing option.

Research and development in this field can lead to the creation of more efficient and environmentally friendly heating systems, not only benefiting the railway sector, but also influencing other industries to prioritise sustainability in their operations. By transitioning from traditional heating methods to Zoppas Industries' electric heating systems, clients can significantly reduce their reliance on fossil fuels and embrace cleaner energy sources.

In addition to providing energy-efficient heating

solutions, Zoppas Industries also assists clients in optimising their overall energy management. By incorporating intelligent energy management systems and advanced control mechanisms, Zoppas Industries enables clients to monitor and regulate energy consumption, identify areas of improvement, and implement strategies for further decarbonisation.

Zoppas Industries' goal is to be a partner to its clients, working closely with them to understand their specific needs and challenges. By collaborating on customised heating solutions, Zoppas Industries helps its clients navigate the complex process of reducing their environmental impact and achieving their sustainability targets.

Conclusion: Heating the Path to Railway Sector Sustainability

In conclusion, heating solutions in the railway sector have a crucial role to play in achieving sustainability goals. By transitioning from traditional heating systems to electrification, heat recovery, and energy-efficient technologies, the railway sector can significantly reduce its environmental impact, enhance operational efficiency, and improve passenger comfort. Embracing sustainable heating solutions is not only a responsible choice but also an opportunity for the railway sector to lead the way in creating a greener and more sustainable transportation industry. As the demand for environmentally friendly travel options continues to grow, investing in sustainable heating solutions will not only benefit the railway sector but also contribute to a more sustainable future for all.

Company Portrait

As a company of the Zoppas Industries group, Zoppas Industries Switzerland AG is specialised on the railway industry supporting, developing and producing tailor-made solutions with many years of experience and references for international clients.

Zoppas Industries Heating Element Technologies (ZIHET) is a world leader in the design and manufacture of resistors and heating systems for all sorts of applications: from domestic and professional equipment, to food service equipment, home appliances and satellites to the transportation and mobility sector.



Heating floor system for railways

ZIHET operates production facilities in Italy, as well as in Switzerland, Eastern Europe and China. The company also has sales offices in various countries around the world, including the United States, Germany and Mexico. The entire design, production and testing processes are carried out in their own facilities, located throughout the world.

The global presence allows ZIHET to serve customers in diverse markets and industries. The company invests heavily in research and development to stay at the forefront of heating and temperature control technology. Collaborations with universities, research institutes and industry partners allow the company to develop new products and solutions that meet evolving customer needs.

Watch our video [here!](#)

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Zoppas Industries
Heating Element Technologies

Camira

Camira Innovates Environmental Flame-Retardant Treatment for Transport Interiors

Camira has engineered an environmentally conscious, non-halogenated, flame-retardant treatment for wool fabrics in the public transport sector.

NitroPhlam365 reduces combustibility and smoke generation on trains, to safeguard passengers in the event of a fire. In comparison to conventional flammability treatments, NitroPhlam365 has a 15% reduction in carbon, energy and water footprint. This is the equivalent of running a UK home for two years or taking 40 cars off the road in a year.

Research has shown that traditional flame-retardant fabric treatments, which contain halogens, including chlorine and bromine, can have potentially carcinogenic and toxicological effects on humans and the environment. Many flammability treatments that are currently in use on public transport are now under review, and even prohibited, in some geographies.

NitroPhlam365 enhances the natural flame retardancy of wool; with its high moisture and nitrogen content, wool does not readily ignite and combust and, when exposed to a flame, will form a char layer on its surface. A future-proof FR treatment, informed by the latest



innovations in scientific research and development, NitroPhlam365 shields the wool fibres and upholstery foams from the flames, controlling and slowing combustion while at the same time minimising toxic smoke production.

Commenting on Camira's innovation, Technical Development Manager Colin Sutcliffe said: *"Engineered for environmental efficiency and to enhance the natural flame retardancy of Camira's wool-rich transport fabrics, NitroPhlam365 is designed for heavy contact use in public transport applications over extended periods of time."*

"Delivering the highest of performance and safety levels, whilst providing significant benefits to human health and the wider environment, this new flammability treatment is halogen-free, eco-friendly, and enables wool fabrics to meet key flammability standards with ease."

"In comparison to traditional treatments, NitroPhlam365 reduces CO2 emissions during production and uses less water and energy; it also increases fabric strength, making it a compelling choice for today's eco and health-conscious consumers."

NitroPhlam365 is based on a combination of non-toxic and non-carcinogenic phosphorus and nitrogen compounds, which do not bio-accumulate in humans or the environment. The treatment meets Europe's most stringent flammability test criteria including EN 45545 (R21), EN 45545-2:2020 and BS 6853. Alongside this, NitroPhlam365 treated fabrics demonstrate superior tensile and tear strength and optimised abrasion performance, compared to fabrics treated with traditional flammability solutions.

Rolling stock (railway) flammability standards govern material requirements within public environments to ensure user safety. They specify test methods, test conditions and performance limits surrounding combustibility, fire growth and smoke generation of components to ultimately aid users in safe vehicle evacuation.

The more stringent the classification within a flammability standard, the larger the evacuation window. EN 45545 is the European standard for fire

protection which harmonises rolling stock standards across multiple geographies.

EN 45545-2 (R21) assesses the ignitability, heat release, smoke opacity and toxicity of materials used within a railway carriage and establishes three specific hazard levels, ranging from the lowest HL1 to the most stringent HL3. Camira tests to the latest release of the standard (2020).

- ISO 5660-1 Cone Calorimeter
- EN ISO 5659-2 Smoke Generation
- EN 17084 Method 1 Smoke Toxicity

The British standard code of practice for passenger trains, BS 6853 assesses materials for rate of flame spread, smoke opacity and toxic fume. Superseded by EN45545 in 2013, this standard is still requested by some customers and as such Camira still supports third party-verified certification. As with the EN 45545 standard, BS 6853 has a range of category levels from category 1a (the most stringent) to category 2.

- BS 476: Part 7: 1997 Surface Spread of Flame
- BS 6853 D.8.5 Smoke Density a BS 6853 B.2 Smoke Toxicity Chamber

Camira's NitroPhlam365 has been proven to meet EN 45545 (R21) to HL3, the most stringent test criterion, to the latest EN 45545-2:2020 standard as well as BS 6853. This means it provides optimal passenger safety in the event of a fire, reducing combustibility, fire growth and smoke generation to safe levels. The best flame retardants are tailor-engineered to work in synergy with a fabric's composition and construction. NitroPhlam365 has been engineered by Camira to specifically complement and enhance the natural flame retardancy and outstanding physical characteristics of our wool rich transport fabric collection.

To find out more or to obtain a copy of our certification visit www.camirafabrics.com or email info@camirafabrics.com.

camira



Limitless textile possibilities

From plush moquette textiles to sleek flat woven fabrics and pure leather ranges, Camira's construction capabilities are without limit – and, with an in-house design studio and a world-leading reputation in flammability performance, we are experts in making design dreams a woven reality.

Explore at www.camirafabrics.com

camira

TOUCHLESS PUSH BUTTONS



MAFELEC TEAM

CREATING SMART AND
SUSTAINABLE INTERFACES

The push buttons can be activated contactlessly via a sensor. However, the passenger still has the option to carry out the activation using the tactile surface.

TSL-ESCHA

CK Touchless – Touchless and Tactile Operation



The new CK Touchless push button enables touchless operation through the integrated sensor above the tactile touch surface (Photo: TSL-ESCHA)

The CK push button series by TSL-ESCHA has been extended by a product variation. The CK Touchless is the first hybrid push button from TSL-ESCHA that features touchless and tactile activation.

Touchless Technologies on Trend

Touchless technologies represent a current technological trend that has changed the way we interact with a product. In particular, the COVID-19 pandemic and the accompanying hygiene measures have further increased the demand for touchless technologies. Companies began to develop solutions that would minimise the need for physical contact.

Non-contact interaction with a product is playing an increasingly important role in high-traffic public transportation. From contactless payments to digital information systems, interfaces are being created that avoid direct contact between the passenger and the technology.

TSL-ESCHA's First Hybrid Push Button

TSL-ESCHA looks back on 35 years of experience in the development and production of push buttons. The focus is on the continuous development of products in order to realise holistic solutions to meet individual customer requirements. With the integration of touchless technology, TSL-ESCHA is expanding its successful Combikey (CK) push button series and

offers a product variation which additionally enables touchless activation of the push button.

The CK Touchless was designed for applications in rail vehicles and buses and can also be easily integrated into existing vehicles thanks to its simple installation. It offers a wide range of customised applications and is particularly suitable for use in wet cells and other areas where hygiene and cleanliness cannot be guaranteed on a permanent basis. The use of touchless technology also improves passenger comfort and increases personal well-being when using public transportation.

The CK Touchless is the first hybrid push button from TSL-ESCHA to feature a two-in-one solution. It is particularly user-friendly because, depending on the situation, preference and need, on the one hand it can be activated touchlessly via the sensor and, on the other hand, the passenger still has the option of activating it via the tactile touch surface.

The configuration of the touchless function ensures optimum coverage of the interaction area. Due to the pointed cone shape of the activation area, no adjacent push buttons are triggered. This ensures precise and reliable detection. In addition, the sensor detects wiping movements during cleaning processes, so the push button is only activated when the movement is intended. Due to this intuitive hand movement toward the tactile touch surface, the CK Touchless is easy to handle and can be actuated effortlessly.

Proven Product Features of the CK Series

The CK Touchless continues to combine the proven product features of the CK push button family. The robust building technology with a powder-coated stainless steel front bezel meets the requirements for quality and durability to meet the challenges of daily use in public transport. The transparent touch surface cover on the pictogram provides additional protection against abrasion and vandalism. Furthermore, the push button is also easy to clean thanks to its low-profile design and the stainless-steel cover.

With the CK push button series and its modular design, TSL-ESCHA offers a wide range of possible combinations of colours, pictograms, touch surfaces and tactile symbols that can be customised. The tactile



CK Touchless with WC pictogram

symbols are raised and comply in shape and size with the normative and legal requirements according to EN 14752.

The barrier-free and user-oriented operation makes the push button an efficient and reliable all-rounder in public transport that meets hygiene and customer requirements. The passengers' sense of safety and well-being is enhanced, while the passenger experience is improved.

Continuing to Grow as a Team

TSL-ESCHA, based in Halver (Germany) and MAFELEC in Chimilin (France) are part of the MAFELEC TEAM, an owner-managed French group of companies. As a know-how provider, the MAFELEC TEAM offers innovative solutions for HMI (human-machine interfaces), lighting, door opening push buttons, signal devices as well as sensors. Markets include bus and railway, industrial vehicles, industry, energy, defence, aerospace and elevators. The CK Touchless, as the first joint project, is the starting point for a successful future collaboration to continue to provide customers with customised and durable product solutions and ensure contemporary passenger comfort.



Trispel GmbH

Target Group-Oriented Individualisation of Rail Vehicles through the Use of Innovative Film Solutions

The discussions on the heterogeneity of society as well as the associated consequences have been increasing in recent years.

Not infrequently, these discussions are a matter of political controversy. However, one undeniable fact is that the associated diversity does not stop at the everyday requirements of passengers of public railway transportation. Manufacturers and operators of public transport, who see this social development as a big opportunity, aim to retain and even expand their customer base by individualising their vehicles by means of target-oriented film solutions.

One thing is certain, the needs of passengers and operators are far more complex in today's society than simply transporting passengers from A to B. In addition to the basic requirements for punctuality, safety and comprehensible passenger information, the desires for identification and an attractive atmospheric design of the vehicles play a more important role than ever. Operators of the vehicles aim for a wide range of demands on their own vehicle fleet, as their vehicles are considered to be the most important figureheads of each company. With an individual design, passengers should be able to tell at first glance which service provider they are being transported by, and regular redesign is used to adapt the design of the vehicles to the current zeitgeist. Within this scope, operators face several challenges such as the effective marketing of indoor and outdoor areas or the protection of surfaces against vandalism. Especially the latter point has been shown to play an increasing role in recent years. By

being a flexible and cost-effective option, modern high-performance film solutions are increasingly used to target those challenges in the railway industry. This is reason enough to familiarise yourself with the possibilities of this technology.

For over 40 years, the major goal of Trispel GmbH has been to support railway vehicle manufacturers and operators in equipping their vehicle fleets with high-tech film solutions. The medium-sized and family-run company with currently around 100 employees is located in Celle, Germany. For many years, Trispel has been considered an expert in providing innovative film solutions to the rail vehicle industry and it is the market leader in Germany.

"Nowadays, we don't just sell products, we offer our customers comprehensive and individual service packages. Starting with the analysis of the substrates in our adhesive technology laboratory, through to the selection of suitable products to the application service for entire vehicle fleets, everything comes from a single source. Over the last 40 years, we have acquired extensive knowledge on the whole industry to provide our customers highly individual, attractive and enduring film solutions," says one of the Managing Directors of Trispel GmbH, Alexander Wenzel. In order to equip operators' as well as manufacturers' adhesive technology personnel with the required knowledge of properly applying film solutions, Trispel offers individual as well as group training. A key success factor of those training sessions is adapting the content of the courses to the individual needs of the audience, ranging from inexperienced maintenance staff to highly qualified adhesive personnel.

The area of application for films has steadily developed over the past few decades and now ranges from pictograms, coloured and structured films, technical inscriptions and large-format prints for interior and exterior design to accessible signage systems and special films to protect vehicle fleets against vandalism. With each new area of application, new requirements are put forward. Low-energy substrates, abrasion resistance, chemical resistance, optimisation for the visually impaired, visibility in the dark, freedom from reflections and the obligatory protection against graffiti removers are just a few of the demands that customers place on the films currently used.

As a qualified supplier of Deutsche Bahn AG, Trispel products are approved according to DBS 918020 for outdoor use and DBS 918021 for indoor use. In 2008, Trispel GmbH established the 'Rail-de-Sign' brand on the market in order to being able to meet the customer-specific requirements of the public transport sector. A look at some of the best-practice projects realised by Trispel GmbH gives an idea of the potential of current film technology when creativity meets technical know-how for successful implementation.

For example, Schweizer Bundesbahnen SBB has recognised the different needs of the heterogeneous society and has taken this as an opportunity to offer passengers in their InterCity vehicles not only the classic 1st and 2nd class passenger compartments,



Imaginative castle motifs are attached to the vehicle walls with the help of film solutions © BB CFF FFS

but also other zoning for individual needs. This idea is certainly not new, but the consistent implementation in the planning and design of the family car is remarkable. On behalf of Alstom (former Bombardier Transportation), Trispel GmbH is applying film solutions to SBB InterCity double-decker trains with motifs suitable for children since 2014. This way, young passengers can recognise the location of family compartments on the train at first sight from the huge, colourful films on the outside of the vehicles. Digitally printed films were chosen for outdoor, long-term usage. The surface of the prints is refined in such a way that they are resistant to both UV radiation and cleaning agents used to remove graffiti. In addition, film solutions also play a central role in interior design of the vehicles. The playground on the upper deck, the 'Ticki Park', is equipped with imaginative castle motifs and the tables are equipped with exciting board games.



Tactile information system – to make it easier for blind and visually impaired people to find their way around the German ICE © Deutsche Bahn AG - Volker Emersleben

In addition to play areas for children or quiet zones for commuters, the needs of passengers can also be much more essential, especially when passengers are physically restricted. In collaboration with several associations for the blind and Deutsche Bahn AG, Trispel GmbH has developed a suitable product for this customer group. Pictograms and information signs can be equipped with three-dimensional tactile images and braille to make it easier for blind and visually impaired people to find their way in vehicles. This product makes information tangible and allows visually impaired passengers to use the vehicles autonomously.

Another problem that every operating company faces is malicious vandalism. Surfaces are smeared,



After installation, the decals look like they have been painted and cannot be removed from the surface without special tools, making them particularly resistant to vandalism © Deutsche Bahn AG - Oliver Lang

window glasses are scratched and at times fixtures are even stolen from the vehicles. Panes and surfaces can be protected through sacrificial films. If damaged, these are simply replaced with new films, significantly reducing the maintenance costs for operators. In addition, Trispel GmbH offers another sophisticated technical solution against the unauthorised removal of pictograms and information signs. Even if the financial loss of a pictogram is negligible, the missing

information can have dramatic consequences, for example in an emergency. This especially applies to safety-relevant pictograms such as the marking of escape routes or the position of fire extinguishers. Specially designed decals consist of superimposed layers of paint and are transferred from a carrier material to the respective surface. After the installation, the pictures look like they have been painted and cannot be removed from the surface without special tools. As a result, the relevant information is retained in any case, leaving operators better prepared in any case of emergency.

Through the targeted use of modern film technology, vehicle fleets can be individually adapted to the relevant needs in numerous ways. In this way, film solutions can be considered to be the bond between manufacturers, operators and passengers. The possible uses are only limited by your own creativity.

Visit our website trispel.de or email info@trispel.de for more information!

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We are your contact for individual lettering and film design solutions, specialized in rail and local public transport - working for you worldwide!

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J. Lanfranco & Cie

Quality Control at the Heart of the Company's Manufacturing

The desire for support and service has always been part of the DNA of J. LANFRANCO & Cie.

The company has recently acquired new inspection machines that further enhance its ability to ensure the highest standards of quality in its products.

J. LANFRANCO is the only French nut manufacturer to be able to offer the validation of its parts in its manufacturing process. We now have even more efficient means of investigation. With this latest equipment, our company reaches the same level of expertise as private laboratories.

Our safety fasteners are designed to meet the highest standards in the railway sector.

These investments make our company one of the French flagship manufacturers of self-locking safety systems in compliance with standards NF EN ISO 898-2, NF EN ISO 3506-2, NF EN ISO 2320, NF E25-035-2.

The AUTOMATICA, our new measuring bench can perform torque/tension tests from M5 to M39 according to quality classes. We have a new four-way sensor to measure the under-head and in-thread coefficient for dimensions ranging from M16 to M39. We also carry out tests on imperial dimensions. With the level of precision of this bench, we can accurately measure the performance of the surface treatments and/or Filmogène (top coat) offered by our company. This acquisition ensures that our customers comply with the friction coefficients specified in the order.

We recall the importance of controlling the coefficient of friction, because it is directly related to the torque and tension in the assembly.

The ZEISS binocular machine by its magnification capacity (x1000) and the integration of measuring software, allow us to directly control the protection thicknesses on our products.

This enables us to ensure that our products comply with the strictest constraints.

The measurement of the minimum thickness on the workpiece ensures a good salt spray test result (red rust resistance) of the expert products. This test is a destructive test.

These acquisitions have enabled us to strengthen our expertise as a manufacturer of safety fasteners.

Through these investments and the company's involvement in the development of new international standards, J. LANFRANCO demonstrates its commitment to remain at the forefront of innovation and to be a major player in the global safety fasteners industry.

These acquisitions represent significant advancements for J. LANFRANCO, allowing them to strengthen their expertise as a manufacturer of safety fasteners. By incorporating these new inspection machines into their quality control processes, J. LANFRANCO guarantees the reliability, durability and performance of their safety fasteners.

J. LANFRANCO's dedication to remaining at the forefront of manufacturing excellence solidifies its position as a major player in the global safety fasteners industry.

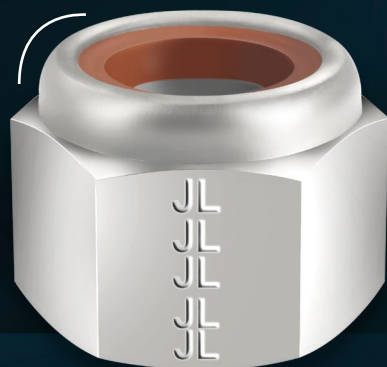
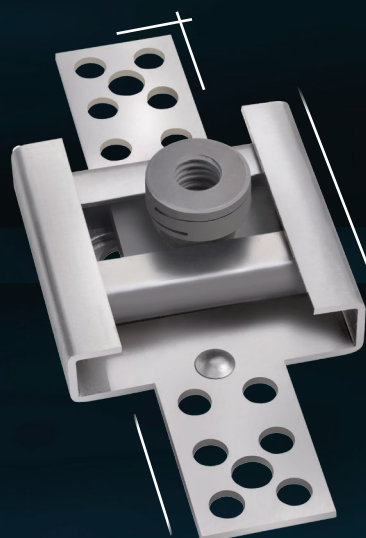
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J. LANFRANCO NUTS

HOW DO THEY WORK?

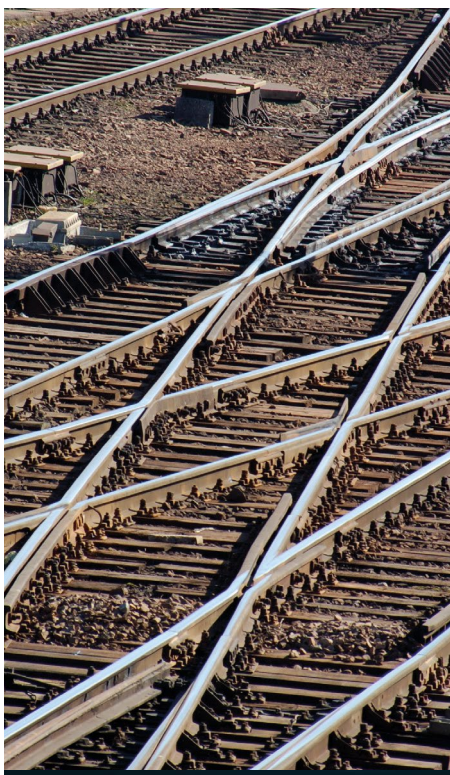
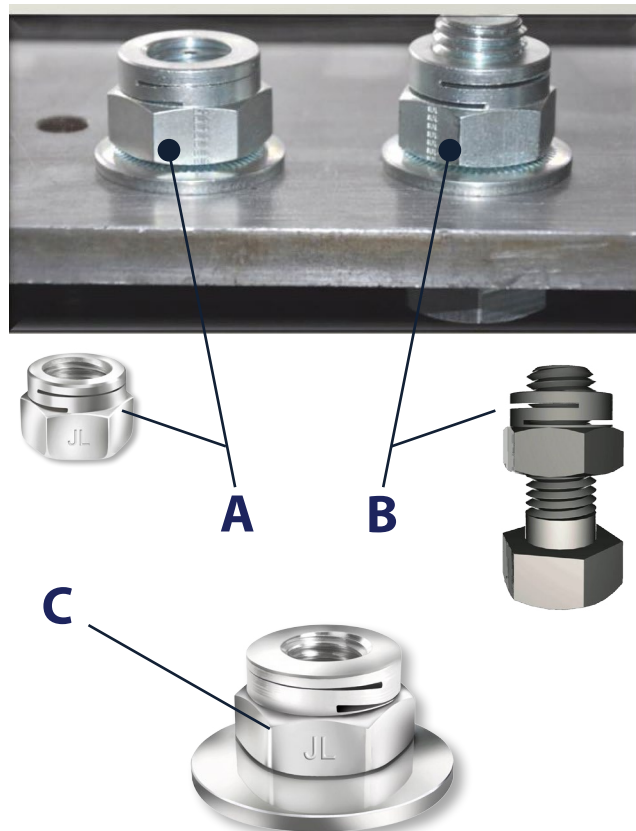
The locking device is ensured by the two slots located on the turret part of the nut. Each slot is de-picked by a precise manufacturing process **(A)**.

Once the nut is fitted on the screw, the slots are pushed back open to their original shape and grip against the flank of the thread of the screw which creates the torque **(B)**.

This form of self-locking does not damage the screw and allows a minimum of 5 installations.

A unique all-metal piece ensuring optimal performance in temperature conditions ranging from -70°C to $+500^{\circ}\text{C}$.

In the case of the ERM nut **(C)**, the integrated spring washer becomes a single piece to ensure better tension in the screw, better distribution and continuous contact, ideal for electrical bolting connections.



TRACK



CATENARIES



ROLLING STOCK

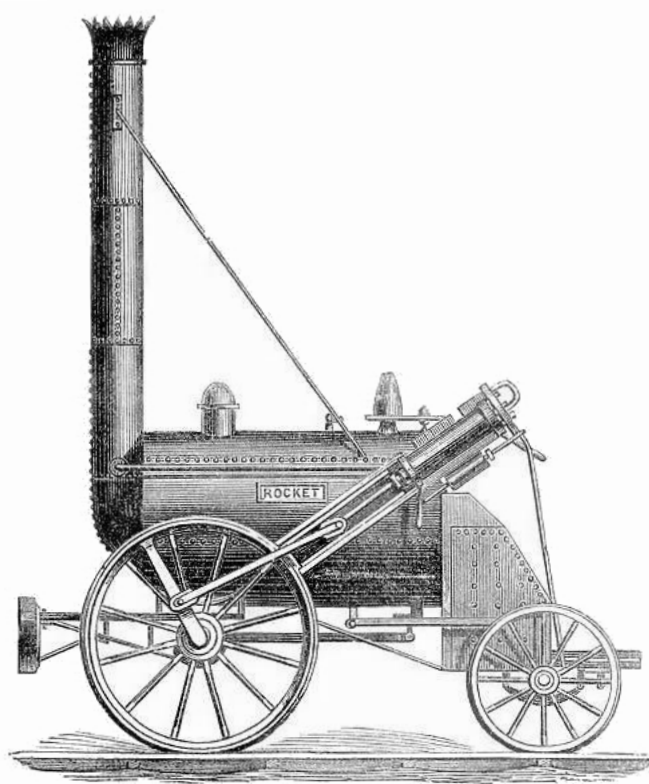
Argus Fluidhandling

Argus Fluidhandling – Railway Trivia

Few people know that low-pressure hydraulic hose and fittings products (of a type) have been around since ancient Greek times; however, the 1800s brought about hydraulic machines requiring the hose and fittings we are more familiar with today, although they did not utilise the crimped couplings we now have until later.

These hydraulic hose assemblies (with crimped, swaged or press-on-style hose couplings) did not appear until the invention of the hydraulic brake in the early 20th century (for automotive applications). The need for hydraulically operated equipment grew, especially in the expanding railway industry, for such equipment as cranes and hydraulic cylinders which subsequently generated a substantial market for higher pressure hydraulics and sparked a new demand for hydraulic hose assemblies to fulfil the host of new railway innovations and to be deployed in the manufacture of diesel engines and associated rail infrastructure.

The longest single journey on one train in the UK is from Aberdeen to Penzance, lasting 13.5 hours and covering 785 miles



After the Second World War manufacturing companies began fabrication of a one-piece brass hose coupling for use on the SAE 100R1-type hose which became the accepted industry norm.

Historically hose companies manufactured just hose products, and fittings companies produced just hose fittings, then separate hose assembly companies would fabricate the swaged-style hydraulic hose assemblies.

Although current expectations are that all hydraulic suppliers manufacture a matched hose and fittings range, in the mid-20th century it was common practice

to mix and match hose and fittings from multiple suppliers resulting in poor life expectancy of equipment and quality of the assemblies.

This practice continued until innovations in materials, manufacturing processes and a worldwide distribution of hose assemblies made hydraulics production in the late 20th and now 21st centuries far more technically advanced and considerably more reliable than in prior years.

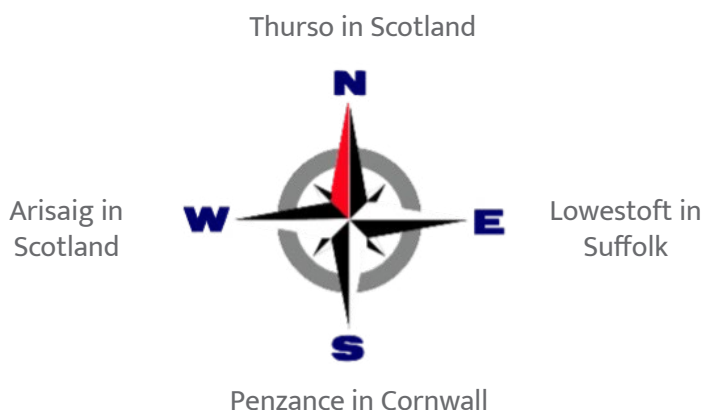
Argus Fluidhandling Ltd specialises in the manufacture of hose assemblies, rigid tube assemblies and structures for OEM markets throughout the world. Our history goes back over 80 years to 1941. We have grown considerably in size, product knowledge and experience since those days with some memorable moments shaping our direction along the way.

Specifically designed for the rail sector, we provide an excellent hose called RailSAFE that meets the requirements of NF F 16-101 – BS6853 and EN45545-2 and has been specifically developed for the rail sector utilising the knowledge gained through our relationship with this sector over many years.

- Part code: RailSAFE AF45 Hose range – EN45545:2013-approved
- Manufacturer: Argus Fluid Handling – Alfagomma

Additionally, we are so confident in our RailSAFE hose we are subjecting the RailSAFE AF45 hose range to an extended one million cycle input test. The AF45 hose range is designed specifically for the rail industry and is often used to replace the standard EN854 R3 hose for railway air brake applications.

Furthest reaches of the National Railway Network



Group capabilities include:

- Hose development and validation
- Hose assembly manufacture, small & large
- Fitting design & manufacture
- Tube bending
- Laser profiling
- Robotic welding
- CNC machining

Certified to ISO9001: TS16949: ISO14001

Argus Fluidhandling – has designed and manufactured extremely reliable and cost-effective hydraulic hose, fittings and hydraulic accessories for the rail industry for over 60 years.

For more information contact Joe Mack, Business Development Manager, ARGUS

+44 (0)7595 821434

joe.mack@hiflex-europe.com

www.argusfluidhandling.com



 Directory

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MANKIEWICZ
Coating Concepts of the Future



Green All along the Line



Spray-painting offers many sustainability advantages

The energy transition is a key issue in all economic sectors. Current measures will only become more pressing in the future.

There is hardly any aspect of life that is devoid of innovation for sustainable solutions and the topic of mobility is high on the agenda.

In transport and logistics, a lot is being done to develop greener concepts, products and technologies. This applies to the rail industry too, even though its high energy efficiency and low emissions when compared to other modes make it inherently environmentally friendly.

Sustainability has social and economic dimensions too. This means strengthening social commitments and growing in an economically healthy way while sustainability is a core principle. These are the

aspirations that paint manufacturer Mankiewicz has been committed to for many years. By definition paint is a sustainable product: paint protects products and helps ensure considerably longer service lives, thereby conserving resources.

The Sustainable Connection: Trains and Paint

Sustainability is not only about making rail transport greener, but also the train itself.

There are two main things to consider. Firstly, paint is an essential component of the many surfaces of rail vehicles. It is used practically everywhere – on interior fittings and seat shells as well as on carriage exteriors and structural components, such as the chassis and undercarriage.

Secondly, trains are designed for an average service life of around 15 years between major refurbishments. During this time, they must withstand extreme stress factors, both inside and out, for as long as possible. These include stone chipping, temperature extremes, moisture, UV radiation, luggage impacts, vandalism and cleaning agents. Paint must provide a resistant surface to protect stressed components against the most diverse of influences for an extended period.

By achieving this it expands maintenance cycles and makes a significant contribution towards extending the overall service life of trains.

However, there are many other aspects in the production and lifecycle of a train that can contribute to its sustainability. Mankiewicz concentrates on the following:

Procurement, Raw Materials & Production

Mankiewicz takes care to only approach ethically justifiable and certified suppliers that are truly sustainably and to source only renewable raw materials wherever possible – with regard to the paint formulation. The energy we use is 100% generated from renewables, such as hydropower. For the production of high-performance rail vehicle paints, Mankiewicz has installed a heat recovery system and uses the recovered energy. Furthermore, the washing solvents that are contaminated by the cleaning processes during production are reprocessed in the company's own distillation plant so they can be reused.

Transport & Logistics

There is great potential to optimise delivery for sustainability. Location, for example: Mankiewicz has 16 production sites that keep distances to customers as short as possible. The paint products are packaged in lightweight materials to reduce fuel consumption. Further, Mankiewicz optionally supplies mixing benches. These enable customers to produce precise quantities of their own specific colour shades, avoiding the need to reorder small quantities – this reduces waste.

Application & Functionality

Switching from solvent-based to water-based paints is another sustainability move. It reduces the emission of

volatile organic compounds (VOCs), which are released into the atmosphere during drying. This reduces the environmental impact of the paint.

Mankiewicz is pursuing another innovative approach for reducing VOCs, namely the development of 'high-solid paints'. These require significantly less solvent because the proportion of solids in them is higher. Their manifold advantages over water-based paints, which require precise painting conditions, are particularly relevant for the railway industry: easier processing, shorter drying times and even more robust durability.

Mankiewicz is able to offer advice on the right choice and provide the system that perfectly suits customers' needs.

Maintenance & Recycling

Even a component coated with paint will eventually reach the end of its life. When it comes to recyclability, paint offers no real disadvantage compared to unpainted substrates when they are disposed by burning. Nevertheless, coating manufacturers are now also considering the future challenge of separating the paint from the substrate.

With new paint systems such as SpotRepair, Mankiewicz ensures that components with a damaged coating do not have to be disposed of but can be repaired and thus remain in use for longer. Our anti-graffiti paint system also contributes to extended service life, as it makes it easy to remove stubborn graffiti and this means components do not have to be completely repainted or replaced.

Keeping Sustainability on Track Together

The management at Mankiewicz has a deeply rooted aim of supporting sustainability. This is shown in its support of codices such as the UN Global Compact and the Responsible Care Initiative as well as certifications such as DIN EN ISO 14001 and DIN EN ISO 50001. Such leadership is required so that manufacturers and suppliers can work together to master the energy transition and delivery sustainability via all available avenues.

www.mankiewicz.com/en

Background image: Repairing painted surfaces prolongs service life



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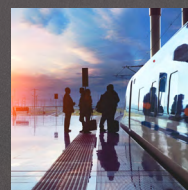
Rail- volutionary

Supporting you through tomorrow's rail challenges

Set off toward the future of the railway industry with SKF! Experience insights and knowledge delivered straight to you through our **railvolutionary updates and expert-led webinars**. From emerging trends in performance and digitalization to advances in sustainability and remanufacturing, we've got the pulse of the industry at your fingertips. Don't miss out on our Ask an Expert video series, where SKF experts answer important questions, providing personalized insights like never before.

Join us on a transformative journey where superior performance and efficiency meet innovation. At SKF, we're not just part of the railway industry; we want to help you shape its future. Get on board with us. The destination: a greener, efficient, and digitalized rail industry.

Scan the QR code to gain access to the latest railvolutionary activities from SKF and the wider rail industry!



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On the Right Track: Your Whistle-Stop Rail Knowledge Tour

Offering valuable insights from experts, SKF invites you to engage in conversations around performance, digitalisation and sustainability. And all this in one place!

As a locomotive of human progress, the rail industry has always been at the crossing of innovation and advancement. It is an industry that encapsulates our collective aspirations for connectivity and sustainable development. Today, we find ourselves at an exciting crossroads where technology and innovation are redefining the contours of the railway industry.

A Response to Transformation

Riding the rails of this transformative wave, several key areas have emerged as crucial pivot points: performance enhancement, digitalisation and sustainability. Each area comes with its unique set of opportunities and challenges.

Performance in the rail industry is a many-splendored thing, covering a wide range from service reliability to infrastructure resilience. As the industry leaps forward, the magnitude of the challenge to maintain and even improve these factors is ever-increasing. In this context, SKF, a leader in bearings and rotating equipment such as wheelsets, axleboxes and drivetrains, can become your crucial ally. With an intimate understanding of the industry's beating heart, SKF is ideally positioned to help rail operators maintain optimal performance of their fleets.

Digitalisation, the transformative force of the 21st century, is also rewriting the playbook in the rail industry. It promises a future where rail services are more efficient, reliable and responsive. However, integrating digital technologies into the intricate fabric of this industry is a herculean task, calling for an evolution of practices and processes along with the adoption of new technologies. SKF, with its pioneering work in condition monitoring services, is at the forefront of this digital transition, enabling operators to ensure safer and more reliable operations.

Sustainability, a principle that has become a pressing necessity in all walks of life, takes on a broader meaning in the rail industry. It's not merely about reducing emissions and increasing efficiency but about embedding a range of practices aimed at minimising the industry's environmental footprint. This holistic challenge involves developing solutions that are effective, efficient and sustainable. SKF, with its innovative approach to remanufacturing, addresses this challenge head-on, giving railway components a new lease of life, thus saving resources and reducing waste. Recognising the imperative need for knowledge sharing and collaboration in these evolving areas, SKF has curated a series of Railvolutionary webinars. In these enlightening sessions, experts from diverse fields share their knowledge, elucidating various issues and possible solutions.

What's On?

In the inaugural webinar, SKF Railway Sustainability Manager Katarina Wising explored how SKF is embedding sustainability best practices in its

operations and customer applications, showing SKF's commitment to helping operators reduce their environmental footprint.

This was followed a session given by SKF's Railway Head of Digital Solutions, Victor Martinez, where he shared his wealth of knowledge on IoT. He unveiled SKF's latest digital tools and systems, painting a picture of a future driven by smart, connected solutions that enhance efficiency and reliability for rail operators.

In a subsequent webinar, the complex world of wheelset bearings was opened up by Jan Babka, Railway Application Competence Center Manager at SKF. Babka's deep dive into this topic helped demystify various solutions and guided operators in navigating the "jungle" of wheelset bearings, an area where our experts' applicational knowledge is unmatched.

A compelling session with SKF's Jochen Baum focused on the limitations of traditional bearing life calculation methods, a model initially developed by SKF and widely used in the industry for over 70 years. Baum acknowledged the evolving landscape and the growing demands on bearings due to real loads, kickstarting a crucial dialogue on these challenges.

Missed our first webinars? Don't fret. We recorded all sessions and made them available for you to watch whenever you like!

No Terminal Station in Sight

That said, our Railvolutionary series is set to continue, illuminating various other aspects of the industry. Jens Goldenbohm, SKF Railway Industry Manager, along with Bernd Bauer, SKF Industrial Sales' Training Manager will unravel the often-overlooked challenge of railway noise in an upcoming webinar. In addition, Maurizio Giovannelli will delve into the fine balance between product and product lifecycle, underlining the need for operators to take a long-term view when making procurement decisions.

As a companion to these webinars, the **'Ask an Expert'** series features seasoned professionals answering specific questions, sharing their expertise and empowering operators with personalised insights. On top of that, our team provides regular railvolutionary updates in the form of news articles, from which you can learn more about upcoming trend topics and

challenges, such as overcoming the workforce shortage, performance-based service contracts and strategic partnerships for improved condition monitoring.

Next Stop: Smart, Sustainable Success

In an industry that is continually evolving, resources like these mentioned offer valuable insights, helping operators get set for the future. The success of the rail industry lies not only in advanced components but also in the knowledge and preparedness of those who operate them. SKF's unrivalled expertise in rotating equipment, condition monitoring services and remanufacturing, coupled with these resources, ensures operators are equipped to navigate the changing landscape. Together, we can drive towards a future that is smarter, more sustainable and more efficient.

Missed our first webinars? Don't fret. We recorded all sessions and made them available for you to watch whenever you like!

Go to Railvolutionary Webinars and see them all. Also, read some related articles in the Railvolutionary Updates.

For more information contact railways@skf.com.

Interested to see more Railvolutionary content go to railrevolutionary.com and sign-up for the regular updates.

Roediger Vacuum GmbH

A Clean Matter – Roediger Wastewater Treatment for Train Wash Plants

For more than 30 years Roediger has been supplying reliable and individual systems for the wash water and rinse water treatment of train exterior washing systems.

As one of the world's leading railway operators, Deutsche Bahn (DB) understands the importance of maintaining clean and efficient trains to ensure safe and comfortable journeys for millions of passengers. With a vast network spanning across Germany and beyond, DB's fleet of trains requires regular cleaning. More than 7,200 kilometres of DB trains and suburban trains are cleaned every year – an area of 2.3 million square metres!

Roediger provides eco-friendly practices, including the implementation of innovative water treatment and reuse methods to allow environmentally conscious operations of the train-washing plants. These water treatment systems for train washing plants focus on sustainability, ensuring that water consumption is optimised without compromising on cleanliness.

Water Recycling System

Roediger provides advanced water recycling systems that are of central importance for eco-friendly train washing plants.

These systems capture, filter and treat the water used during the cleaning process, enabling its safe and efficient reuse. Instead of allowing thousands of litres of water to go to waste after a single wash, the treatment process ensures that the same water can be used for multiple cleaning cycles. The majority of the washing and rinsing water (up to 90%) can be reused.

A high water-recovery rate enables the economical

operation of the train washing plant and is made possible by a cascade-like interconnection of the individual water circuits.

Roediger water technology automatically controls freshwater demand, water recycling and wastewater treatment.

The sophisticated Roediger water treatment and purification technologies guarantee that the recycled water meets the highest standards of cleanliness and safety.

The various process stages adapted to the washing process include the following processes as required:

Filtration and Purification

The recycled water undergoes a series of filtration and purification steps to remove any remaining contaminants and impurities. Advanced filtration systems, precipitation, flocculation, neutralisation and sedimentation effectively cleanse the water, making it suitable for reuse without compromising on quality.

Disinfection

Roediger takes disinfection seriously to ensure that the treated water is free from any harmful microorganisms. Advanced disinfection methods are employed to eliminate any potential pathogens, making the water safe for reuse.

Storage and Distribution

Once the water has undergone the rigorous treatment process, it is stored in dedicated tanks for later use in the train-washing plants. These tanks are carefully monitored to maintain water quality and ensure

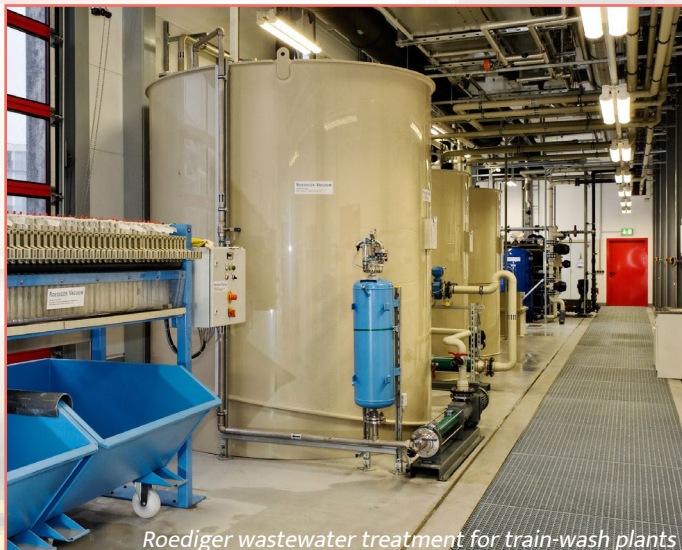
a continuous supply of clean water for washing operations.

Sludge Treatment

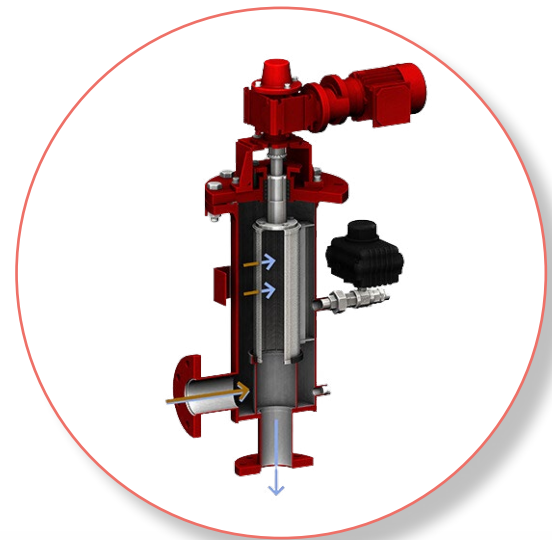
The train-wash process generates significant amounts of sludge, which is a mixture of water, cleaning agents and the removed dirt and pollutants. After separation and filtration, the excess water of the remaining sludge is removed by using automated dewatering technologies, such as chamber filter presses, in an environmentally friendly manner. This results in a reduction in the volume of sludge, making it easier and more cost-effective to handle and transport for final disposal.

Advantages of Roediger plants for wash water and rinse water treatment:

- Roediger wastewater treatment plants use only standard chemicals that can be purchased cheaply on the market
- As a residue a well pressed filter cake is produced, which can be easily disposed of
- Roediger offers a flexible process technology that can be adapted to the respective washing process and can be used for both intensive cleaning chemicals and neutral cleaners, allowing for high variability in optimising the procurement of cleaning chemicals
- Roediger supports the change or conversion of cleaning chemicals
- Compliance with strict discharge limits, e.g. phosphate and heavy metals (copper, nickel, zinc)
- Compact design, e.g. through the use of drum filters



Roediger wastewater treatment for train-wash plants



The use of automatic backwash drum filters enables a compact design of the treatment plant. The drum filters enable fine filtration ($\geq 5\mu\text{m}$) at high cleaning speed (4–10m/s) and low rinsing-water losses

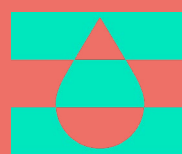
De-icing

In addition to the treatment of wash and rinse water from train washing, Roediger also offers solutions for the implementation of technical equipment for train de-icing during winter operation.

The undercarriages of the trains must be free of snow and ice for maintenance and ultrasonic testing. The Roediger de-icing system can be installed in the hall of the train-wash plant. De-icing is carried out by means of temperature (39 °C) and pressure (1–2 bar) without the addition of environmentally harmful chemicals.

Roediger's innovative water treatment and reuse methods exemplify a commitment to environmental stewardship and sustainability. By optimising water consumption and employing advanced water treatment technologies, Roediger provides technology for many railway operators worldwide. As passenger demands for eco-conscious travel options grow, Roediger systems can be essential in reducing the railway sector's ecological impact.

For more information contact:



Roediger

Andreas Bayerlein
Roediger Vacuum GmbH
andreas.bayerlein@roediger-vacuum.com

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Roediger Vacuum GmbH

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Motherson Rolling Stock

Motherson: Building Relationships at RSN



Motherson Rolling Stock, a subsidiary of Motherson Sumi Systems Limited – MSSL (GB) – kicked off the summer with a successful trip to the **Rolling Stock Networking** (RSN) exhibition.

Held in Derby, which is also home to the company's UK base and was **recently announced as the HQ of Great British Railways** (GBR), RSN was a chance to meet with the great and good of the rail industry.

Focusing on passenger and freight rolling stock, technical enhancements, depot equipment and the rail supply chain, RSN 2023 saw more than 150 exhibitors come together under one roof, and had the highest number of attendees in its five-year history – up 20% on figures from last year.

"It was a great event, and the busiest I've ever seen it," said Neil Adam, General Manager of MSSL (GB). "It provided the perfect opportunity to improve our brand awareness, develop new relationships and strengthen existing ones."

"Speaking with the train operating companies (TOCs) enabled us to get a better understanding of their plans for 2024 and beyond, which will help us to better align with them and be ready to help when they need us," he added.

Showcasing Motherson's Range of Products

MSSL (GB) had a stand at the exhibition where it showcased one of the driver desks currently being

manufactured for the Alstom Avenra platform.

"It was also a good opportunity to get the Motherson name out there, as many in the industry are more familiar with our past 'guises'," Adam said.

This is because MSSL (GB)'s site has been an integral part of Britain's rail industry for 140 years, and past owners have included British Railways, ABB and Bombardier – which sold the rolling stock electrical component part of its business to Motherson in 2019. In 2021 Alstom acquired Bombardier.

"It was great just to participate in the show, teach more people about MSSL (GB) and what it can offer the rail industry; just making those connections and letting businesses know we're here to help," Adam continued.

"Some of those we spoke to didn't realise all the things that we do; that we're so much more than harness builders. On our stand we played videos that showcase our versatility and range of products and many people went away with a better understanding of the scope of solutions we offer."

An Invite to the Supplier Engagement Event

One particular highlight from the event was MSSL (GB)'s involvement the supplier engagement event at RSN.

This provided a great opportunity for Adam and his colleagues to speak directly with a number of different suppliers.

"It was wonderful to be invited to participate in this year's supplier engagement event," he said.

"Participating in this enabled us to have some one-on-one time with existing and potential new suppliers. We had some very productive conversations."

Motherson – Here to Help

If your rail company needs a leading manufacturer of electrical systems, look no further. **MSSL (GB)** is here to help with any needs you have and can deliver reliable products that meet your bespoke requirements.

If you'd like to find out more about MSSL (GB) and how it could support your business, **please contact** Neil Adam, MSSL (GB) General Manager or Pawel Eberhardt, Rolling Stock Global Sales Director, to discuss your needs further.

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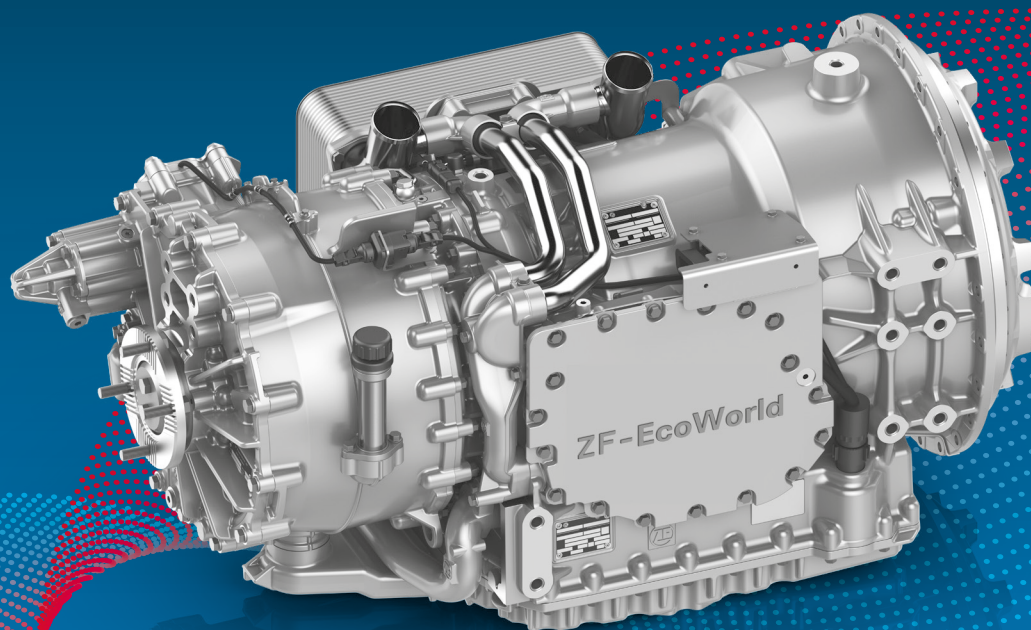
motherson 



Repowering with ZF EcoWorld for More Sustainability

The 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 provides a towing function, as well as a coasting function which can save additional 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.



For more information please visit
www.zf.com/rail



ZF Friedrichshafen AG

Save Up to 20% of Fuels with Repowering Solutions from ZF

If rail operators in local and regional transport want to remain on the road to success, their vehicles have to run economically over as long a period as possible.

Considering the fact that fuel is two-thirds of the overall vehicle operating cost, oil and fuel prices challenge cost effectiveness for many operators. Modern drive systems that contribute to saving fuel and increasing vehicle lifecycles are becoming more and more important. The ZF Repowering package is an economic solution to meet these requirements. But what is a repower?

Repowering for More Sustainability and Profitability

Repowering means to remove outdated transmissions from existing rail vehicles replacing them with

modern, more cost-effective and economic driveline components. The engine and the existing bogie with its axle drives are not affected. Optimised mechanical ratios ensure that the engine remains in the most economical speed range, especially when accelerating and driving at lower train speeds.

ZF's repowering solutions aim at reducing fuel consumption, thus lifecycle costs as well as at extending the service life of the rail vehicles. Furthermore, ZF drivelines also reduces waste heat significantly, improving the train cooling system capacity and at the same time generating substantially less CO2 emissions.

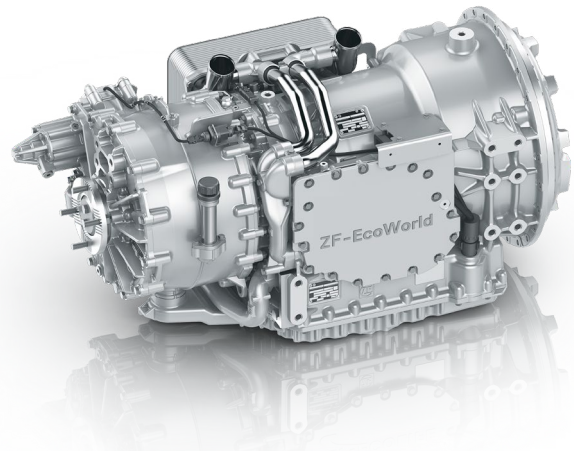
ZF's Solution: The EcoWorld Powershift Transmission

ZF's most recent development, the six-speed powershift transmission EcoWorld, features an integrated reversing function and is suitable for DMU (diesel multiple units) and MPV (multiple purpose vehicles)



applications. It can either be applied in new vehicles or also as a repower (retrofit) option. The six-speed powershift transmission is particularly economical and achieves up to 20 percent fuel savings in comparison to hydrodynamic transmissions. It provides a towing function as well as a coasting function which can save additional fuel depending on the route, engine type and load condition. Thus, the transmission achieves maximum efficiency and is equipped with a powerful torque converter.

ZF's EcoWorld powershift transmission achieves up to 20 percent fuel savings compared to hydrodynamic transmissions



Successful Repower Project in Ireland

With mounting pressure on the transport industry to move towards a greener future, which has been further heightened with the launch of the Transport Decarbonisation Plan in July 2021 in the UK, ZF is actively investing in its repowering technology to support rail operators.

In a recent collaboration with Rolls-Royce and Irish Rail (Iarnród Éireann), the Republic of Ireland's state railroad, ZF has repowered several Class 22000 Hyundai Rotem DMUs with new EcoWorld transmissions to enable more efficient operation, improved acceleration and reduced noise. The intercity DMUs circulate on the entire network of Irish Rail, including the Dublin to Cork line. Following the replacement of the transmission, savings of up to 18 percent in fuel and CO2 were achieved. In total, the ZF EcoWorld will provide an 18 percent improvement on commuter routes and a 15 percent improvement on intercity routes, according to the trial data.

Calculations project that this would result in annual

savings across the entire Iarnród Éireann InterCity Fleet of approximately EUR 4 million, as well as fuel savings of 4,500,000 litres and not to mention CO2 emissions savings of 1,255 tons.

ZF Friedrichshafen AG

Industrial Technology
Marine & Special Driveline Technology

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rail@zf.com

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For a project with Irish Rail (Iarnród Éireann), ZF repowered Class 22000 Hyundai Rotem diesel multiple units (DMUs) with its EcoWorld transmission

Premium PSU

Revolutionising Railways with Cutting-Edge AC/AC Railway Variable Frequency Drive (VFD)

Introducing AC Master Series

In the railway sector, electric motors are widely used in various applications, such as compressors, fans and pumps. These devices require electrical energy to operate and deliver the necessary speed to the equipment they drive. By using VFDs (variable frequency drives), we can ensure that the AC motors run at the right speed according to the specific demands. This not only saves energy but also reduces maintenance costs and noise emissions.

Premium PSU's engineering team has been working on a standardised solution to meet the increasing demand for AC/AC VFDs in trains. In a significant stride towards modernising railway systems, Premium PSU, a leading innovator in power electronics, proudly unveils its latest breakthrough product – the AC/AC Railway Variable Frequency Drive.

The new AC Master Series, comprising the TDX-3300, TDS-3300 and VDX-10K, represents a remarkable advancement in power electronics technology, offering unparalleled control and efficiency in powering railway systems. While these devices share similarities, their

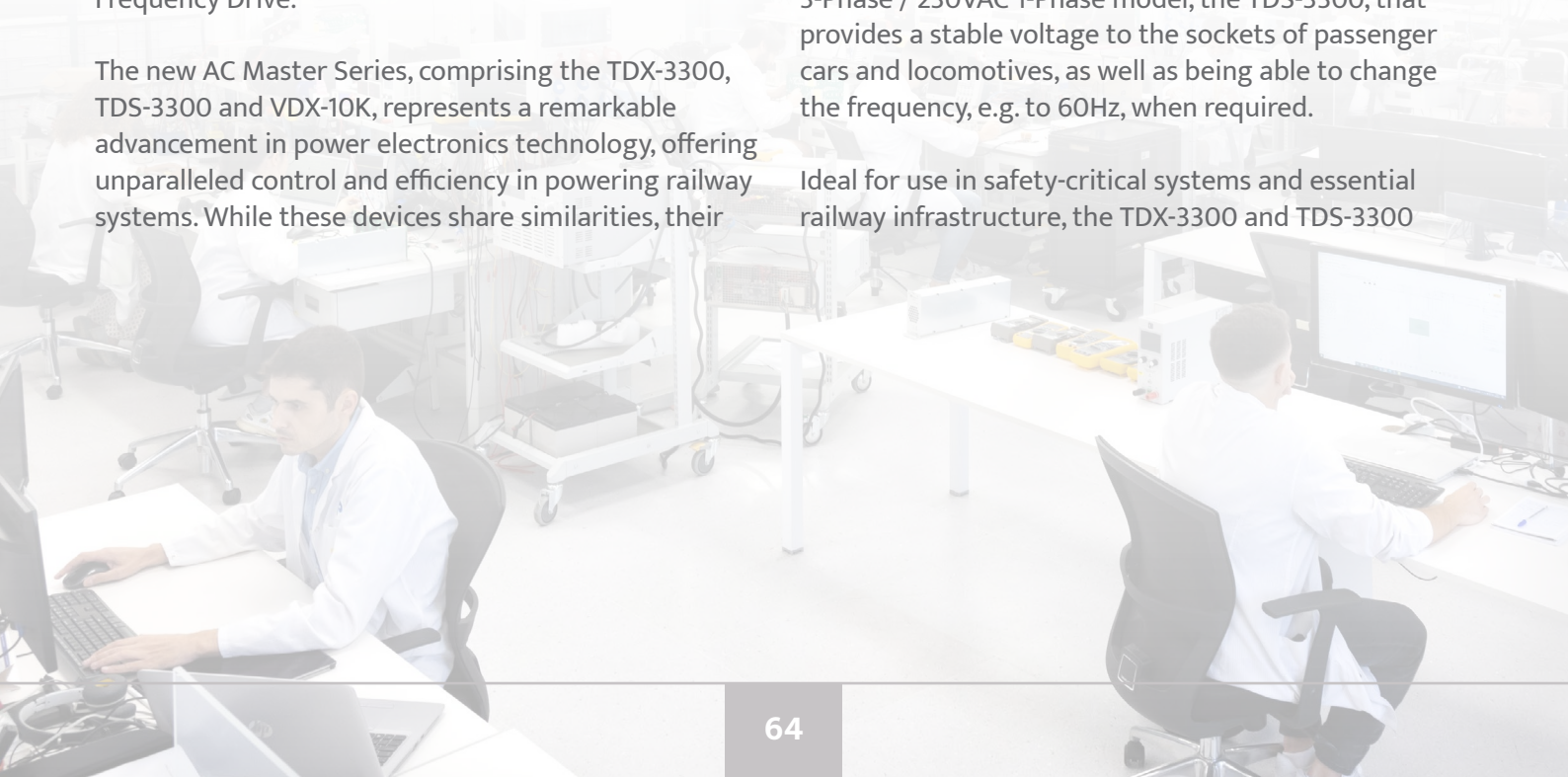
distinctive capabilities set them apart, delivering cutting-edge solutions for diverse railway applications and ensuring reliable and efficient power delivery in the most demanding environments.

TDX-3300 / TDS-3300 – The Ultimate Power Supply

The TDX-3300 stands as a true marvel of engineering, boasting an additional converter stage – the step-up converter. This ground-breaking feature ensures exceptional stability in power output, even amidst fluctuations in the input voltage. By elevating the input voltage, the step-up converter guarantees a consistent and independent output voltage, safeguarding critical railway equipment from power loss.

In addition, the team also developed a 400–480VAC 3-Phase / 230VAC 1-Phase model, the TDS-3300, that provides a stable voltage to the sockets of passenger cars and locomotives, as well as being able to change the frequency, e.g. to 60Hz, when required.

Ideal for use in safety-critical systems and essential railway infrastructure, the TDX-3300 and TDS-3300



offer an array of advantages, making it an indispensable solution for powering various applications.

Key Features TDX & TDS-3300

- Unmatched output stability: the step-up converter enables a constant output voltage, regardless of input voltage fluctuations, ensuring the reliability of onboard electronics and systems
- Enhanced safety: with steadfast power supply regulation, critical railway equipment remains operational, even during power disturbances or fluctuations
- Versatile application: the TDX-3300 finds its place in a variety of railway applications, from powering electric motors to essential water pumps and fans while the TDS-3300 is suitable for powering sockets in trains

VDX-10K – Empowering Engine Power Supply

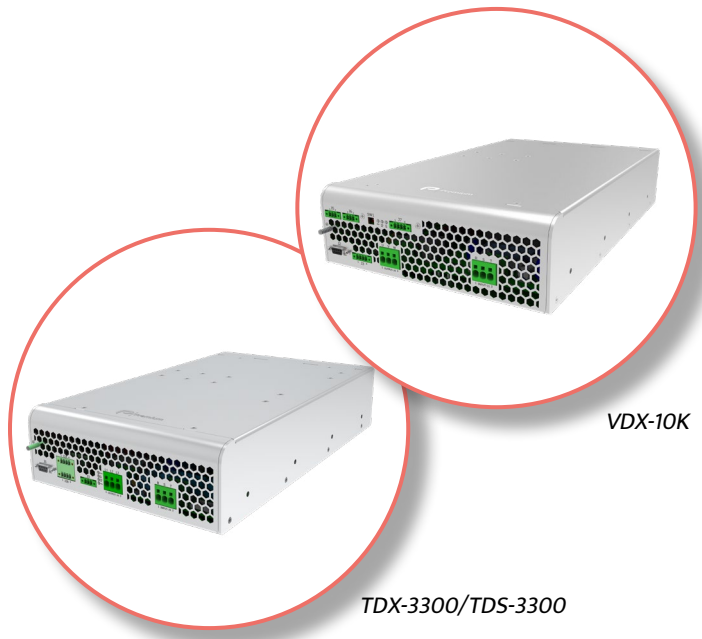
The VDX-10K is a powerful and cost-effective solution designed for diesel-electric trains. It efficiently powers essential components, like cooling fans for diesel engines, without requiring a step-up converter, resulting in lower costs.

The advantages of the VDX-10K are extensive. Its state-of-the-art technology enhances operational efficiency, reduces wear and tear on motors and extends the lifespan of critical railway components. With unmatched control and protection, it ensures safe and reliable railway operations.

Its robust design optimises power delivery to various pieces of equipment within the railway environment, making it reliable and efficient for engine-driven systems.

Key Features of VDX-10K

- Advanced three-phase sine-wave AC/AC variable frequency drive
- Customisable soft start mechanism for smooth motor start-up
- Gradual output voltage increases with linear frequency transition
- Precise control over motor acceleration through configurable start-up ramp slope
- RS-232 and CAN Bus interfaces for seamless configuration



Transforming Railway Power Management

The introduction of the TDX-3300, TDS-3300 and VDX-10K marks a significant milestone in the railway sector's pursuit of efficient and reliable power solutions. These new series empower railway operators with cutting-edge devices, always fulfilling the highest railway standards and requirements that promise enhanced safety, efficiency and performance across their systems.

As the railway industry continues to evolve, the AC Master Series stands as a beacon of progress, offering tailored power solutions to meet the ever-expanding demands of modern rail transportation. The devices exemplify a commitment to innovation and engineering excellence, making them indispensable tools in shaping the future of railway power management.

Premium PSU's relentless commitment to innovation and dedication to engineering excellence has culminated in the creation of this transformative product, compliant with rigorous railway standards.

For further information, please visit the official website: www.premiumpsu.com.



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- CAN Bus Communication
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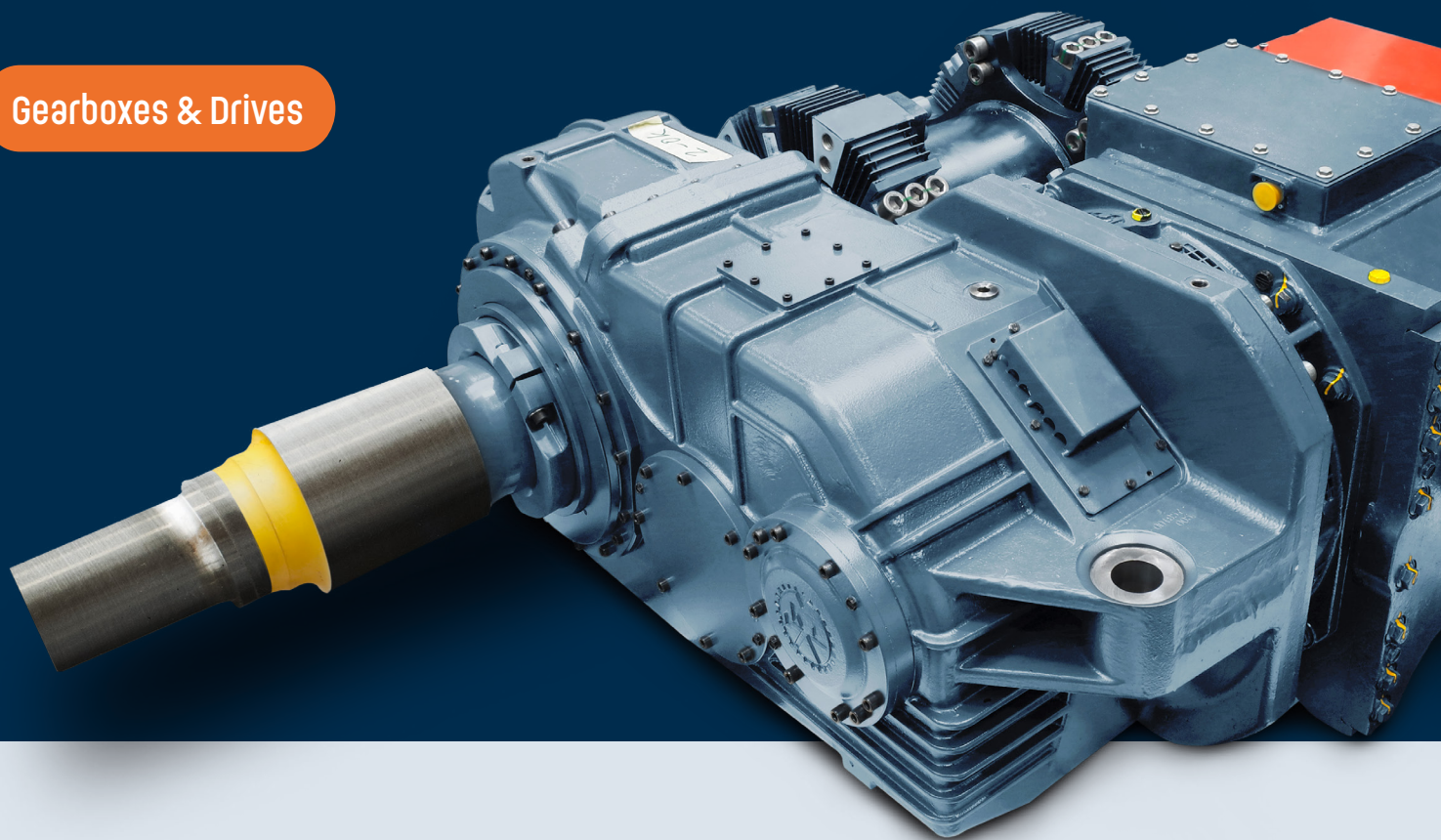
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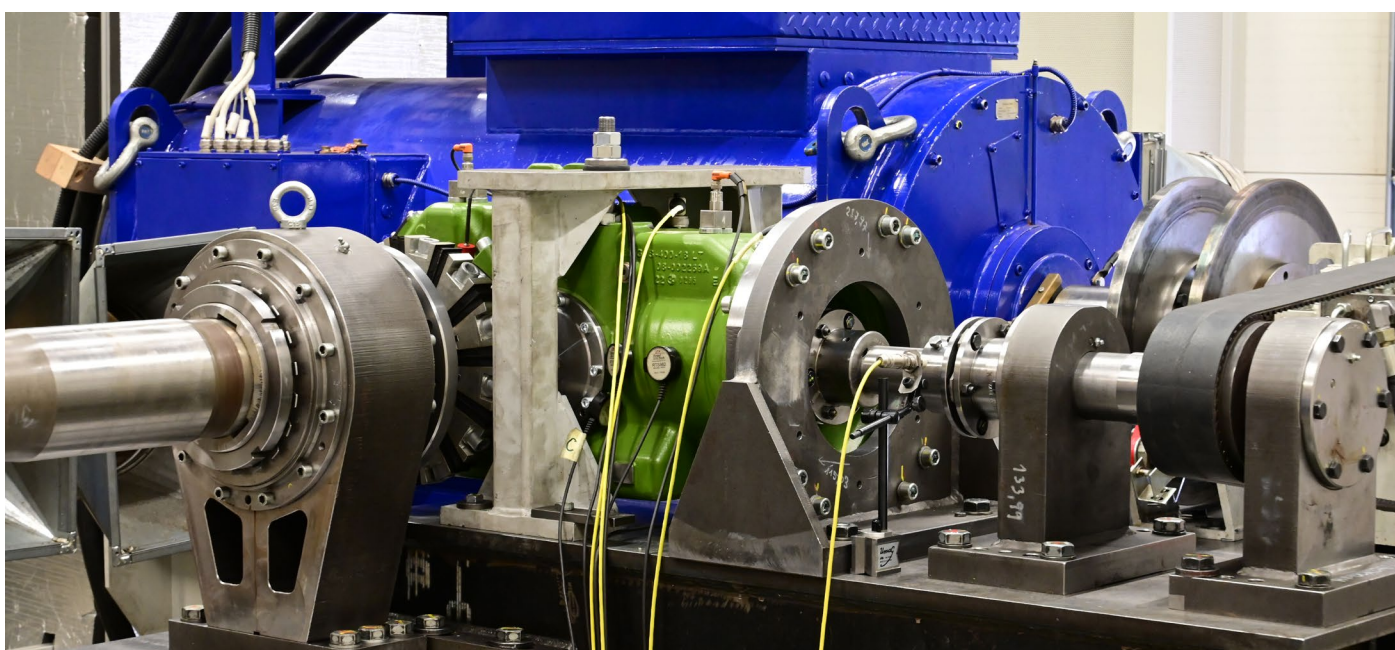
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Wikov & Gmeinder

Wikov MGI and Gmeinder Getriebe – Shared Tram Gearbox Know-How



Strong Partnership

For four years, Gmeinder Getriebe has been under the wing of Wikov Industry, which has included another manufacturer of gearboxes for rail vehicles – Wikov MGI – for more than 20 years. This strategic partnership offers many synergistic effects, but in one way it really stands out. Close co-operation under a common owner makes Wikov MGI and Gmeinder Getriebe a top-quality supplier with the widest portfolio of tram gearboxes and drives in the world.

Low-Floor Tram Market – Different Concepts and Different Solutions

The low-floor tram market is specific in that it is still relatively new, although the first low-floor tram entered

service in the early 1990s. It may seem that 30 years is a long time, but fully low-floor trams did not see a more massive deployment until after 2000. The fact that it is still a new market is also evident in the fact that there are still a large number of tram manufacturers in the world compared to, for example, metro unit manufacturers. However, consolidation is gradually taking place, introducing temporary uncertainty into the component supply chain. From a gearbox and drive supplier's point of view, this is clearly visible. Being well prepared and having a place to go for its proven solution is half the battle for a supplier. The Wikov MGI + Gmeinder Getriebe duo is one such supplier nowadays.

Today, Wikov MGI and Gmeinder Getriebe have a market-proven comprehensive line of gearboxes and drives for low-floor trams, both for bogies with an axle

and with independent-running wheels, with gearbox power from 50 to 180kW.

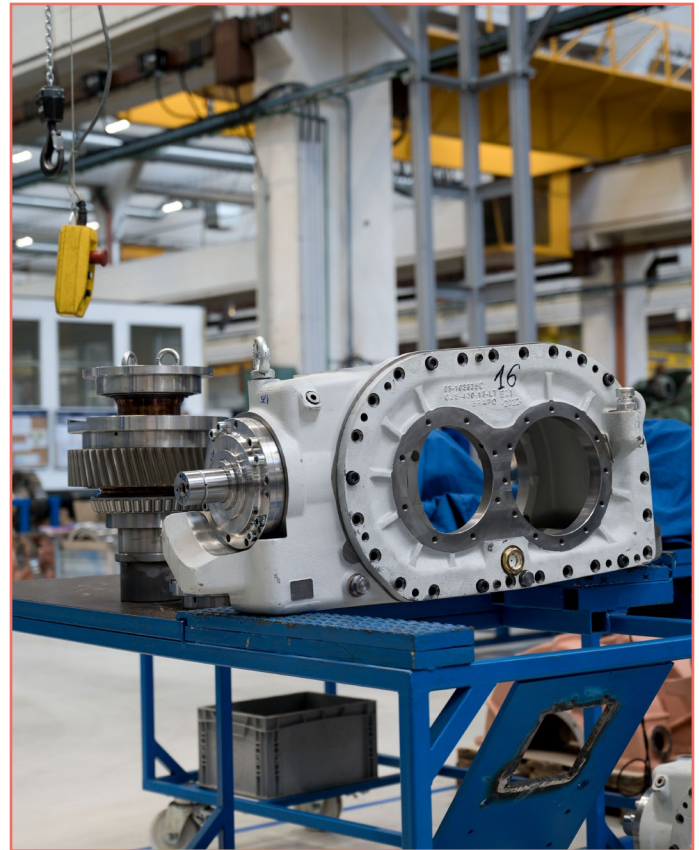
There are currently, let's say, four groups of bogie types used in the world in terms of drive designs. The first is the use of a conventional axle, which ensures a transverse mechanical connection between the wheels. The second group is a bogie without an axle, but still with a transverse mechanical connection of the wheels, thanks to a special connecting shaft. The third group is a bogie with independent-running wheels without an axle, where wheel connection is ensured by electronic control – solutions with gearboxes or direct drive are offered here. The fourth group is a single-axle bogie with a portal frame.

The first group – i.e. with a conventional axle – is the most commonly used concept today, and a number of tram manufacturers are returning to it due to the relative simplicity of the drive. We can offer designs both for the longitudinal assembly of the drive outside the bogie frame, and for variants where the drive is located inside the bogie with the engine mounted laterally.

The second group that does not use a conventional axle, where the mechanical connection is provided by a special connecting shaft, is used today, for example, by the Croatian manufacturer Končar and the world's first low-floor trams GT6 (AEG/Adtranz). We have market-tested solutions for this group as well.

For bogies with independent-running wheels, if the customer chooses a variant with a gearbox, and not a direct drive, we provide supplies of complete drives. It does not matter whether the customer uses one motor for two gearboxes or each gearbox has its own motor. For single-axle bogies with a portal frame, we offer special bevel gearboxes.

If partially low-floor trams are added, where two-stage



helical gearboxes with a solid or hollow shaft are mostly used, it can be said that the Wikov MGI + Gmeinder Getriebe duo covers, with exceptions, all bogie concepts used in modern trams.

We cannot do without thorough testing of gearboxes and drives.

We have extensive testing capacities for various uses. We use a development workplace with experimental test stands, including those with dynamic loads. We also use a cooling chamber for cold climate tests, and for efficient serial no-load tests we recently opened a new test room dedicated only to gearboxes for rail vehicles and that uses the most modern elements of today's testing including the involvement of artificial intelligence.



Scan the QR code to contact Wikov

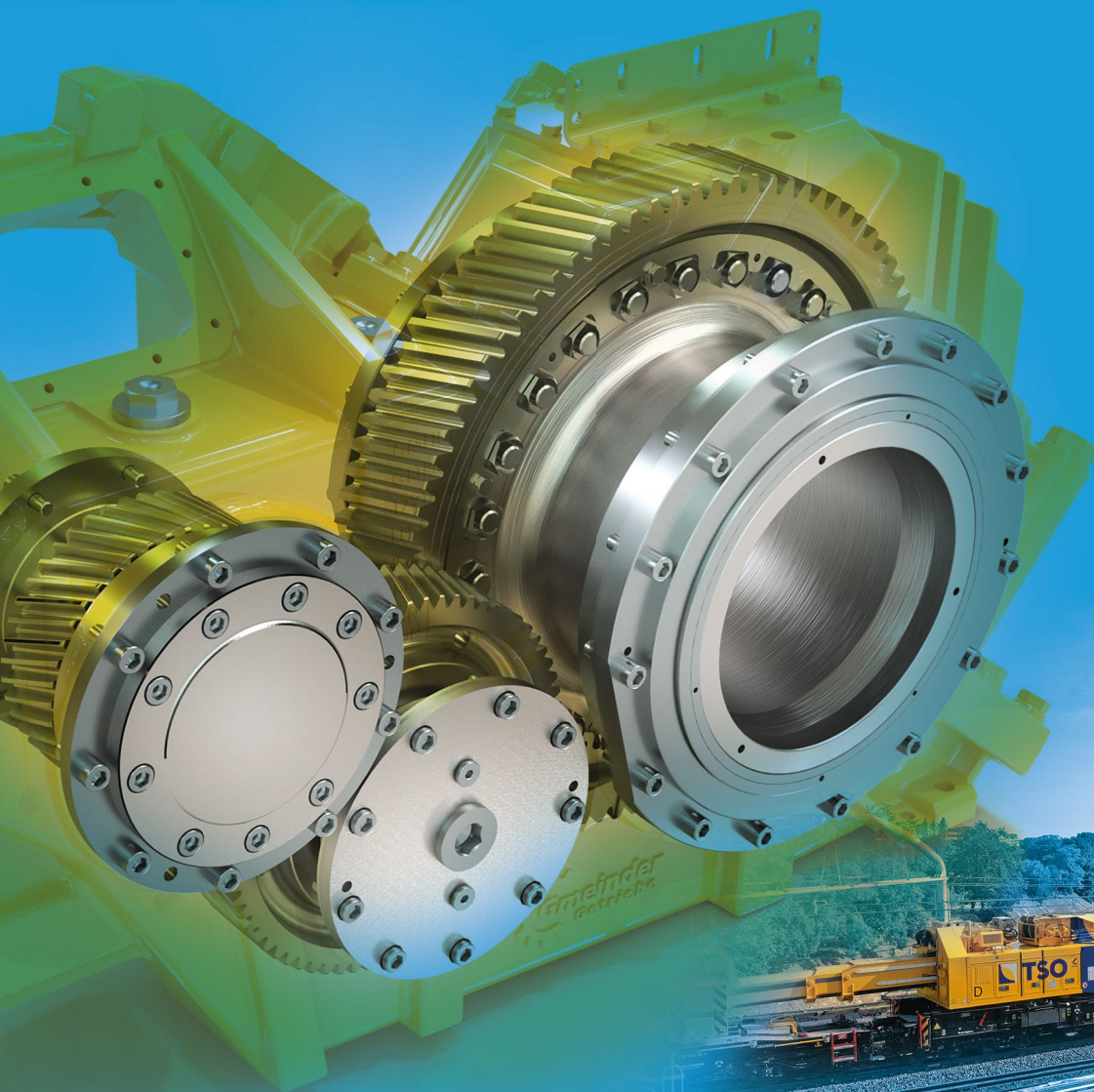


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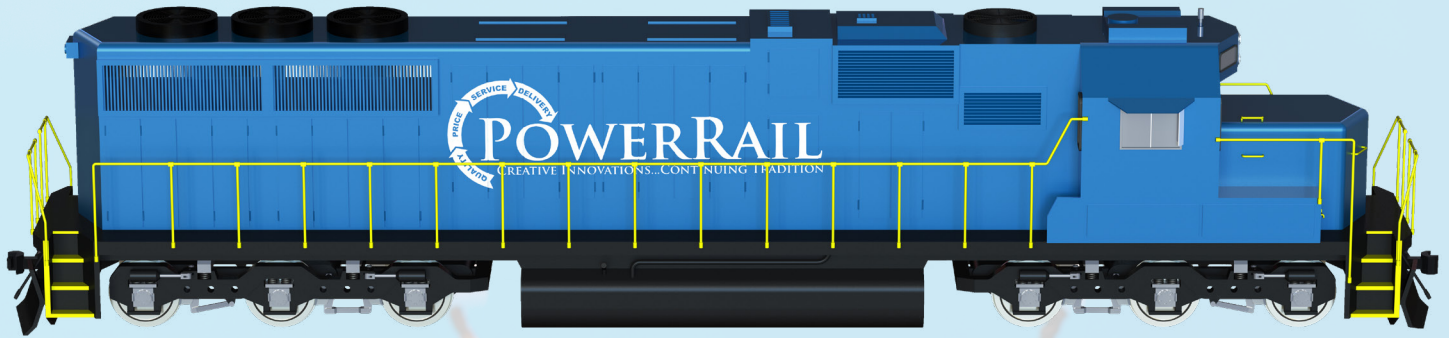
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PowerRail offers a complete line of new products that provide quality and true reliability for all demanding applications. All components are manufactured to meet or exceed OEM specifications, and must also meet our rigorous internal M-1003 AAR Quality inspections. **QUALITY IS #1!**



REMANUFACTURING

PowerRail proudly supplies remanufactured parts and components for locomotives, young and old. We offer Unit Exchange and Repair & Return options. In addition, our New-UX[®] Program provides a new part in exchange for a rebuildable core, which will be recycled and remanufactured for others.



GLOBAL DISTRIBUTION

PowerRail is a United States-based company with locations throughout the world. Formed in 2003, PowerRail's Global Headquarters is now located in Exeter, Pennsylvania. Our state-of-the-art Distribution Center features over 200,000 sq. ft. of warehouse space with multiple shipping and receiving docks.



PowerRail

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PowerRail

The History of PowerRail

A Look at the Past 20 Years

With a love of trains and 25 years' experience in railroad and locomotive parts distribution, Paul P. Foster, PowerRail's founder and CEO, recognised a need for servicing the short line railroad industry.

In March 2003, PowerRail Distribution was born in Wilkes-Barre, Pennsylvania. At the time, PowerRail was simply a distribution centre, offering quality after-market locomotive parts to railroads across the United States.

In May 2005, Foster saw an opportunity to begin manufacturing parts and components in-house, and therefore service a broader scope of customers. A new building was leased in Connersville, Indiana and PowerRail Manufacturing began producing locomotive engine-related parts and components, including compressors, pumps, motors and more.

In October of 2006, PowerRail Distribution felt their first wave of growing pains, which led to the relocation of their main distribution centre to a larger facility in the neighbouring town of Duryea, complete with an 80,000 sq. ft. warehouse to support the company's rapidly growing business. As time progressed, Foster was able to bring railroad-experienced staff to PowerRail, along with an industry-accredited technical support staff.

The following year, in September 2007, PowerRail purchased Cooper Bearings in Georgetown, Delaware. Cooper Bearings is a leading remanufacturer of Bearings and Journal Boxes for both freight and passenger locomotives and cars. With over 20 years



PowerRail's original logo, circa 2003

of experience and a name so well-known throughout the industry, the decision was made not to change the name to a PowerRail facility.

The next few years brought unprecedented growth and expansion. In March of 2010 PowerRail Electronics and Technology was formed. 2011 saw the addition of Rail & Traction North America, and Avoca Rail Products joined the family in 2013. Avoca Rail Products is PowerRail's full-service fabrication and welding facility, supplying the rail industry with quality locomotive truck/bogie parts. Avoca Rail also specialises in products such as guide assemblies, traction motor covers, exhaust chambers, spring packs, and more.

PowerRail further expanded their capabilities to support the railroad industry in 2014 by purchasing a locomotive repair facility in Monroe, Georgia – PowerRail Locomotive Services – and added a Mobile Maintenance department, which is also housed at that location.

In 2016 PowerRail spread their wings internationally with the opening of PowerRail Australia in New South Wales. In 2017, PowerRail launched a Marine Supply



PowerRail's new building in Exeter, USA

division – PowerRail Marine. With the additional companies, joint venture locations, and strong vendor relationships, the PowerRail family of companies offers a true 'one-stop-shop' experience.

2017 through 2019 were productive years for PowerRail as they continued to add new parts to their manufacturing product lines and new customers to their roster. International sales soared and additional support staff were added to distribution and customer service to handle the surge.

In early 2020, as our world coped with the COVID-19 outbreak and many businesses were forced to shut down, the PowerRail Family of Companies continued to service the rail industry. PowerRail was deemed an 'essential business', providing parts and components to railroads that are tasked with moving freight and critical supplies every day.

In Spring 2022, just one year before their 20th anniversary, PowerRail purchased a 200,000 sq. ft. facility in Exeter, Pennsylvania, and spent the next several months relocating their operations. The new state-of-the-art facility is more than double the size of their former corporate offices and distribution centre. The additional warehouse space and numerous shipping and receiving docks assist PowerRail in their goal of providing on-time delivery to their many customers around the world.

The relocation to the new facility has also allowed PowerRail the opportunity to consolidate some of their

existing locations. Currently housed at PowerRail's new main campus in Exeter are the corporate offices and distribution centre, as well as two of PowerRail's manufacturing facilities, Avoca Rail Products and Cooper Bearings. Having all these facilities under one roof has allowed for more efficient synergies between the locations.

PowerRail's state-of-the-art distribution centre now features multiple receiving and shipping docks, and services hundreds of trucks per week.

PowerRail is now not only a stocking distributor of freight and transit locomotive parts, but also a true manufacturer and remanufacturer of aftermarket parts and components, which demonstrates the broad range of products offered. Over the years, PowerRail has extended their customer base to include short lines, regional, class I's, commuter rail and international.

As a recognised leader among the ranks of its competition, PowerRail is AAR M-1003-certified, a highly sought after quality certification in the railroad industry. Having the mindset of quality has given them an internal culture of 'Uniting Innovation, Engineering, Manufacturing and Distribution'. Congratulations to PowerRail, and to continued growth in the next 20 years!



Between the future of transportation and
the secure infrastructure that connects it,



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Cisco has a rich history of delivering exceptional transportation results worldwide. We've worked with over 32,000 transportation customers in 169 countries to help them transform operations and power inclusive, safe, efficient transportation for all.

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handheld

The Power of Ultra-Rugged Android Tablets in the Transportation and Railway Industry

The Essential Need for Reliable Tech Solutions in a Digital Era

In our modern world, where the logistics and transportation industry is more critical than ever, there is an ever-increasing need for smart digital solutions, but also an increasing need for reliable technology solutions that last in the long run. This is where the Handheld Algiz ultra-rugged tablets come into play.

Handheld, headquartered in Sweden, has firmly established its position at the forefront of technological innovation, with a focus on producing rugged mobile solutions that is both durable and efficient; The Algiz tablets as well as the Nautiz rugged handhelds and Handheld's offering of customised rugged solutions are designed to withstand the harshest of work conditions, whether it's working outdoors building train tracks, roads and tunnels, or checking public transport tickets in a stressful indoor environment.

Meeting the Demands of the Transportation and Railway Industry

The transportation and railway industry obviously presents unique challenges due to its 24/7 operating environment, harsh working conditions and the criticality of maintaining operational efficiency. This requires tools that are resilient, reliable and capable of delivering seamless performance, even in the toughest of circumstances. Handheld's Algiz tablets meet these requirements, providing an all-in-one solution to the industry's operational needs.

Unmatched Android Tablets Engineered for Extreme Conditions

Handheld **ultra-rugged Android tablets** are constructed to resist shocks, drops and extreme temperatures. With their IP67 rating, they are fully protected against dust and water, making them ideal for use in any environment. What sets the Algiz Android tablets apart is their capacity to handle everyday outdoor conditions. They are built to survive the hardest knocks and the most gruelling environments, delivering consistent performance irrespective of the circumstances.

Optimised User Experience: Bright Touchscreen and Seamless Navigation

Tablet computers built for professional work should always come equipped with bright and crisp touchscreens that provide excellent visibility, so that drivers and operators can access necessary information without struggle – even in direct sunlight – and Algiz tablets are no exception. Additionally, the multi-touch screen offers seamless navigation, further improving the user experience.

High-Performance Specs for High-Efficiency Operations

Moreover, Algiz tablets have powerful processors and large RAM capacities, providing swift and smooth operation, ensuring applications run efficiently. This

kind of power, combined with their rugged build, makes them ideal for tasks ranging from railroad construction and maintenance – to routing and scheduling or real-time tracking and ticketing.

Superior Data Protection: Safeguarding Sensitive Information

Handheld's Algiz tablets also offer top-tier security features. The Android Enterprise Recommended (AER) verification makes it simple for businesses to confidently select, deploy and manage Android devices and services that meet elevated enterprise requirements validated by Google. And with the latest Android OS security features, including biometric fingerprint readers these devices provide businesses with peace of mind, knowing that sensitive information is safe and secure, regardless of where the job takes them.

Easy Integration with Existing Systems – And Remote Device Management

Handheld has made a significant effort in ensuring the Algiz tablets are easy to integrate with existing systems. And the proprietary MaxGo mobile device management (MDM) software enables custom settings across all devices in your field network. Whether your deployment has one unit or thousands of devices, you can easily co-ordinate system settings across your units and manage them remotely.



5 Top Features – And Don't Get Fooled by the Slim Design

The Algiz RT8 Android tablet has a slim and ergonomic design, yet it is IP67-rated and meets MIL-STD-810G military performance standards for truly rugged operations. It comes with a 'beast' battery and a dedicated GNSS receiver among some other great features that makes the job on the field more efficient than ever before. Let Handheld's Jesper Bengtsson give you his top 5 favourites features here:



Algiz Tablets: A Gamechanger in Transportation and the Railway Industry

In conclusion, the Handheld Algiz ultra-rugged Android tablets are a gamechanger in the transportation and railway industry. Their slim and ergonomic design, ability to withstand extreme conditions, paired with their high-performance specifications and easy integrability, make them an essential tool in these industries. By delivering consistent performance in any environment, they help ensure that the world of transport infrastructure and railway operations stays efficient, reliable and secure, with the help of state-of-the-art tech solutions for industries that demand the best.

For more information, contact Dave Cawsey, Country Manager Handheld UK and Ireland

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d.cawsey@handhelduk.com
www.handheldgroup.com

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THE TOUGHEST ANDROID DEVICES FOR ANY FIELD TASK

Handheld's Android tablets are second to none, offering a remarkable blend of outstanding performance, sleek design, and unmatched durability for even the most demanding field applications.

Laughing off the roughest weather and harshest handling, our rugged Android tablets and handhelds are perfect for working outdoors when building train tracks, roads and tunnels, or checking public transport tickets in a stressful environment.

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SENSIT s.r.o.

New CO2 Sensor Product for Railway Vehicles – CO2 Sensors for Air Ducts

In addition to temperature, relative humidity and CO2 sensors for railway vehicle applications, the Czech sensor manufacturer SENSIT s.r.o. now also offers two sensors for measuring carbon dioxide concentration in air ducts.

CO2 sensors in air conditioning ducts help to ensure a comfortable climate for passengers in the vehicle throughout the journey. The air conditioning unit also controls the air based on the CO2 evaluation, thus saving energy and costs. This makes the entire control more efficient.

The new CO2 sensors consist of a plastic head and stem and are available with either a 4 to 20 mA output (KSC 520 sensor) or RS 485 / MODBUS (KSC 122 sensor). A modified version with CAN protocol output is also available. You can thus choose the variant that will be compatible with your control system. Their installation is easy thanks to the unique 'S head' design developed by SENSIT s.r.o. The CO2 measurement range is 400 to 5000 ppm and the measurement accuracy is ± 50 ppm (+3 % of the measured value).

Like the other temperature, relative humidity, CO2, atmospheric pressure and VOC sensors for railway vehicles that SENSIT s.r.o. develops and manufactures, this new product meets the requirements defined in the railway standards:

- Insulation test according to ČSN EN 50155
- Shock and vibration test according to ČSN EN 61373
- Electromagnetic compatibility according to ČSN EN 50121-3-2
- Fire resistance according to EN 45545



For CO2 measurement in railway vehicles, it is also possible to use combined interior sensors KSTHC 102 (with RS 485 output) and KSTHC 104 (with CAN protocol output), which, in addition to CO2 concentration, also sense temperature and relative humidity, making them effective, among other things, in de-fogging windows and walls of train sets. The KSTHCPV 102 is designed for the control of temperature, relative humidity, atmospheric pressure and air quality (by sensing CO2 and VOC concentrations) in the passenger compartments of train sets and carriages.



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Czech producer of Sensors
for Railway Vehicles



ASC GmbH

Continuous Infrastructure Monitoring at 300km/h

Railway infrastructure monitoring is cumbersome, disruptive and expensive. Or is it?

Enabled by ASC sensor technology, Turkish State Railways (TCDD), Siemens Mobility and DB Systemtechnik GmbH decided to take an innovative approach: continuous infrastructure monitoring (CIM).

Rail infrastructure monitoring needs to occur regularly, typically using special machinery that disrupts regular train services. The aim is to ensure that any signs of fatigue or other parameters running out of spec are detected early, so that critical maintenance can take place in time and avoid costly breakdowns and service disruptions.

Increased Capacity and Ride Comfort

TCDD wishes to minimise these service disruptions yet increase capacity and ride comfort on two newly built high-speed rail links from Ankara to the cities of Konya and Eskisehir, and another from the capital to Istanbul. Therefore, the national Turkish operator has been collaborating with Siemens Mobility Türkiye and German rail infrastructure specialist DB Systemtechnik to implement constant monitoring of rail tracks and

other infrastructure from high-speed passenger trains while in active service.

To that end, a Siemens Velaro train has been equipped with the latest innovative technologies to conduct all necessary measuring activities in real time. Future risks will be proactively identified, too, by integrating historic data and calculating the appropriate time for preventive maintenance, repair or replacement to take place. The approach is based on years of CIM experience gathered on the German railway network.

Stable Monitoring ‘Where Wheel Meets Track’

A critical success factor for CIM to deliver valid results is the use of the most robust and stable sensor equipment. *“For this reason, we have been relying on ASC sensors,”* recollects Dr Klaus Ulrich Wolter, Senior Engineer Onboard Infrastructure Monitoring at DB Systemtechnik. *“At Deutsche Bahn, we’ve been conducting continuous monitoring from high-speed in-service trains since 2013.”*

ASC sensors have been in use since 2018. *“In five years with almost three million kilometres covered by some of our CIM trains, ASC’s sensors are still running*

Siemens Velaro TR





Installed DB Systemtechnik sensorbox mounted on the wheelset

smoothly. It's that reliability and the cutting-edge expertise of our partners that we are also offering to our customers, in Türkiye as well as around the world."

The CIM-equipped Velaro for Türkiye will be able to conduct comprehensive monitoring at speeds of up to 300 kilometres per hour and beyond. What counts, therefore, is the long-term stability of all sensors in use. *"We need to position the sensitive equipment as closely as possible to where the wheel-track interaction happens,"* explains Wolter. Therefore, ASC accelerometers and gyroscopes have been integrated in tailor-made measurement systems embedded directly at the axle box.

Predicting the Future

Longitudinal height is the most critical track geometry parameter. *"It changes more rapidly than other variables of the inner track geometry and is of great influence on operational quality,"* states Wolter.

"Other key parameters that our CIM system keeps monitoring include track twist, calculated from gyroscope signals, as well as dynamic alignment resulting from lateral accelerations," says Wolter. The latter are also used to assess railroad switches and insulated joints, while ride comfort is another important parameter established from these acceleration forces.

In all this, the DB Systemtechnik team needs highly accurate results. *"Since once you start determining future maintenance needs, every little inaccuracy widens the window of uncertainty,"* says Wolter. This is another reason why DB Systemtechnik has been partnering with ASC, as even the smallest inaccuracies

could trigger major uncertainties and, therefore, costs for the customer.

CIM Reduces Costs

"The beauty of continuous infrastructure monitoring is that we're now able to automatically monitor and proactively evaluate all components along the track, without having to delay or stop other traffic," highlights Yilmaz Tosun, Senior Manager – Business Development & Sales at DB Systemtechnik.

The advantages of moving from corrective to data-driven 'predict and prevent' maintenance are compelling. *"To date, we've seen cost savings of up to 30 percent compared to the use of dedicated standalone measurement trains – in addition to significantly lower repair and maintenance costs and enhanced operational quality."*

For this approach to have the intended impact, DB Systemtechnik is able to fit all necessary measuring equipment on to any train. In addition to ASC's inertial sensors, this also includes technologies for the monitoring of trackbed density, overhead line condition, overall train operation and various perception systems. *"Today, the Velaro is not only the fastest, but also the most comprehensive measurement train ready for active service,"* Klaus Ulrich Wolter is convinced.

Applications are almost endless. *"Based on the latest technologies and experience gathered with our flexible and reliable partners, we are able to turn nearly any in-service train into a fully equipped, automatic CIM train,"* he says. *"To ensure safe, sustainable and productive railway mobility, we believe all infrastructure will be monitored this way in the future."*

Read more [here](#).

ASC GmbH
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FRAUSCHER

Distribution of Input-Output Data for Railway Solutions

By Florian Einböck

In modern railway operations, the exchange of data plays an essential role.

Modern axle counters make it possible to exchange both vital and non-vital data between different stations and higher-ranking systems. In this way, they constitute an optimal solution that ensures both flexibility and efficiency of rail operations.

Axle Counting Solution with Data Transmission Capabilities

Axle counters are vital components in modern railway systems, responsible for accurate train detection and the provision of essential data for various railway operations. Modern axle counter solutions provide highly available and flexible data transmission capabilities at the same time. This enables the efficient exchange of digital input-output data for a wide range of railway applications.

By enabling the exchange of both vital and non-vital information, axle counting solutions with data transmission capabilities are suitable for SIL 1 to 4 in railway operations. Vital information comprises the status of signals, point positions, level crossing barrier positions, occupancy information, and relay status. Non-vital information includes status of power supply, temperature alarms and door alarms.

Utilisation of Established Technology

Due to their advanced technology and robust design, axle counters can serve as a highly reliable solution for data transmission requirements. This ensures a constant exchange of data and reduces the risk of interruptions or downtime in railway operations. In addition, axle counters designed with modular components enable customisation according to individual needs for different railway applications. Built with flexibility and durability in mind, axle counters integrate seamlessly into existing infrastructure

Vital information	Non-vital information
Status of Signals	Status of power supply
Point position	Temperature alarms
Level crossing barrier positions	Door alarms
Occupancy information	
Relay status	

Table 1: Overview vital and non-vital information

and minimise the need for frequent replacements or repairs. Incorporating axle counters for data transmission requirements brings long-term benefits with reductions in lifecycle costs.

FAdC® for Data Transmission

With the FAdC®, Frauscher Sensor Technology offers a flexible solution that is suitable for use in both axle counting and data transmission. The data transmission capabilities thereby either support the axle counting functionalities or function as a stand-alone solution. The latter implies that the FAdC® can be used to exchange vital and non-vital data either between two stations or between a station and a higher-ranking system such as an interlocking. In this way, information can be read in and out in a bidirectional manner. This functionality is made possible by an integrated IO-EXB card that enables data to be received and transmitted without the need for any additional equipment or cables.

Example Use Case: Retrofitting

FAdC® for Data Transmission is applicable to both new and existing infrastructure. An example of this is the use case retrofitting. With existing trackside

equipment, communication to networks is often not possible. The FAdC® with data transmission offers an approach to bridge the missing network connectivity. This capability makes it possible for operators to maintain the existing system with only few additional components and at the same time benefit from the advantages of digitalisation. For retrofitting, the FAdC® for Data Transmission thus represents an efficient and environmentally friendly solution.

Conclusion

The data transmission capabilities of modern axle counters play a crucial role in terms of the digitalisation of railway systems. Due to the scalable and modular design of FAdC®, there are numerous possibilities when it comes to their implementation in railway systems. By exchanging vital and non-vital information in a reliable way, the solution enables the retrofitting of existing trackside infrastructure by an efficient integration into digital interlockings. With these digital capabilities that conform to industry-leading standards, Frauscher's innovative solutions are well-poised to address the emerging challenges in the railway industry.

www.frauscher.com/en

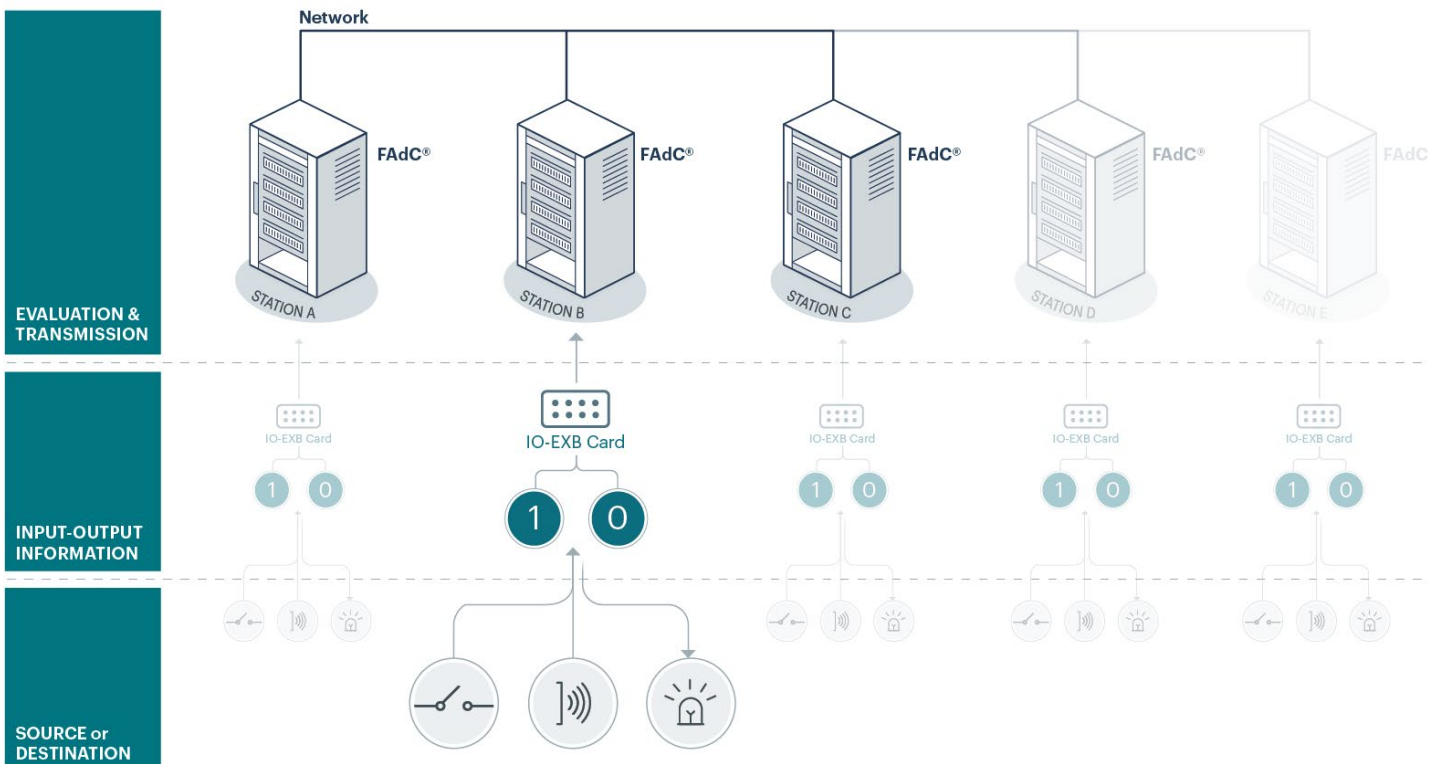


Figure 1: Data transmission architecture

FAdC[®] for Data Transmission

Distribution of Input-Output data
for railway solutions

Benefits

- highly available and robust solution
- suitability for SIL1 - SIL4 applications
- simple and flexible configuration without programming
- low life cycle costs and reduced maintenance





Smart Railway Computer Solutions

Telematics for Transportation Security and Efficiency, Plus Passenger Satisfaction

This evolution drives the need for embedded computers to have high performance, longevity, and reliability, fitting perfectly with railway environments. NEXCOM is dedicated and offers train PC

featuring AI-powered, 5G NR, Wi-Fi 6E wireless connectivity, anti-shock design, metal dust proof ability, stable & wide range power supply, industrial-grade reliability, and extended product life cycle.

nROK Series

- Railway Computers – EN50155
- 8/9/12/13th Gen Intel Core™/Xeon®, Intel Atom® CPU
- Fanless and rugged design
- 5G/LTE, Wi-Fi, BT, CAN, GPS + DR, PoE, and multi-SIM integration
- Optional isolated 24~110VDC power input
- AI applications with add-on GPU cards
- EN50155 & EN45545-2 certifications



vROK Series

- 10.4-inch all in one railway open frame panel computer – EN50155



vROK 3030

aROK Series

- Advanced AI Computers with GPU – EN50155
- 8th/9th Gen Intel® Core™/Xeon® CPU
- Designed for AI applications: driver assistance, track obstacle/intrusion detection, track maintenance, video analytics
- Selected NVIDIA GPU, Google TPU, and Hailo AI modules add-ons
- 5G/LTE, Wi-Fi, BT, CAN, GPS + DR, PoE, and multi-SIM integration
- EN50155 & EN45545-2 certifications



TAIWAN
EXCELLENCE
2022



aROK 5510

aROK 8110



Transforming Smart Railways with NEXCOM's nROK 7270 and nROK 7271 Intelligent Solutions



A vintage steam train bursts out of a fan-shaped depot, chugging towards a future where a 5G/Wi-Fi network-enabled smart railway takes centre stage, encapsulating an aura of momentum and futurism.

Rail travel, with the aid of mobile surveillance, has never been more secure and suitable for long journeys. We're entering a new era of smart railways, powered by edge AI. One of the driving forces behind this shift is NEXCOM, a leader in the application of smart railway

technologies. Infused with a passion for progress and a mission to create a better, more connected future, NEXCOM has been instrumental in driving key technologies forward.

Modular Board Designs Enable Rapid Customisation

The standout features of smart railways are their modular board designs. These designs can fulfil all types of applications with existing module boards and can even develop new ones within just three months. The concept of modularisation, a cornerstone of

NEXCOM's nROK 7270 and 7271 systems equipped with the cutting-edge 12/13th generation Intel® Core™ i9 desktop processors, enables rapid response to unique client needs. A series of prepared module boards can be assembled to client specifications, offering swift delivery of customised solutions – crucial for smart railways.

Abundant I/O Designs Fulfil Infotainment, Safety and Edge AI Computing Applications

Consider a bustling city station. As a train glides on to a platform, passengers aboard are deep into their digital devices – streaming videos, reading news or catching up on work, from the uninterrupted onboard 5G/Wi-Fi network, powered by the nROK systems; the nROK systems can host expandable to four 5G/LTE modules, and expandable to three wireless modules. This increased bandwidth and capacity for concurrent users is crucial for managing large passenger loads, enhancing service quality and passenger satisfaction.

For infotainment applications, nROK 7270 and 7271 expansions can be requested to support two 10GbE M12 X-coded ports for backbones network. This is particularly useful for applications requiring large bandwidths, such as video-on-demand services where many passengers may be streaming simultaneously. Picture a group of friends aboard a cross-country train, watching their favourite TV series concurrently, due to the high-speed and low latency network facilitated by these systems. This rich infotainment experience is transforming the way passengers perceive rail travel.

Safety is a paramount concern in railway operations. Consequently, the nROK 7270 and 7271 systems, by default, come equipped with four 2.5GbE X-coded PoE+ ports while offering expanded capabilities. For instance, they can be expanded to include up to eight additional 1GbE M12 X/D-coded PoE+ ports for IP cameras, accommodating video surveillance, rear-view monitoring and coupling monitors.

Both nROK 7270 and nROK 7271 are equipped with expansion slots supporting Google Coral or HAILO AI accelerators, delivering AI functionalities from 4 to 26 TOPS. These accelerators facilitate real-time edge AI computing for various applications, including pantograph inspection, track obstacle intrusion inspection, rail track condition monitoring, and sign detection and classification.

nROK 7271 Features Power Isolation and Front/Rear Board Replacement Options, Doubling Its Durability and Adaptability

The nROK 7271 further distinguishes itself with a unique ability to provide power isolation for 24–110VDC and optional up to 3s protection against temporary voltage dips, a feature critical for scenarios where input voltage variability may threaten equipment. The system's power isolation design fortifies it against potential damage from fluctuations, thus enhancing its robustness. Users are granted the flexibility to utilise this power isolation feature at the rear and to install modules at the front, accentuating the unique modular flexibility of the nROK 7271. This feature contributes significantly to the durability and lifespan of the equipment amidst voltage instability.

For users with more application requirements, such as 5G/Wi-Fi, PoE, 10GbE, daughter board expansion is also available. While module boards on the nROK 7270 can be replaced at the rear, the slightly taller nROK 7271 provides the additional advantage of front and rear board replacement options, thereby effectively doubling its adaptability.



Embody the Perfect Fusion of a 5G/Wi-Fi Network, Mobile Surveillance and Edge AI Technologies – Realise Future of Rail Travel with the nROK 7270 and 7271

With their modular designs, powerful computing capabilities and extensive edge AI functionalities, the nROK 7270 and nROK 7271 encapsulate NEXCOM's innovative approach. These robust systems withstand harsh environments and offer strong after-sales service, confirming NEXCOM's leading position in the industry. These systems remain premier choices for smart railways, embodying the perfect fusion of a 5G/Wi-Fi network, mobile surveillance and edge AI technologies. With NEXCOM's nROK 7270 and 7271, we are not just envisioning the future of rail travel; we are riding on it.

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televic GSP

Keep Passengers Informed during Disruptions with Remote Announcements



In case of a disruption, it's often on-board staff who are responsible for informing passengers and following up on the situation. However, as more and more train operators make the shift towards automatic train operation, they also need to rethink the way they inform travellers during a disruption. Televic GSP offers the solution with Remote Announcements.

How Are Passengers Currently Informed during Disruptions?

In the event of a disruption, it's crucial to inform passengers as quickly and accurately as possible. These days, train conductors and drivers are often informed by means of paper notes, which are handed over manually at the next station.

They then relay the information to passengers through the on-board PA (public address) system to broadcast the message.

However, this approach has several drawbacks:

- The approach is delay-sensitive, as the messages are handed out only when the train reaches one of the stations on its journey or when staff receive the

- information through another channel
- Since each staff member translates the information into an audio announcement, the message conveyed will be less consistent and prone to occasional errors or misinterpretations
- Since the message is announced last minute, there is no visual support on board. This means that the message is unlikely to come across for people with headphones or hearing impairment
- Finally, there is no feedback that the message has been conveyed to passengers

Towards Automatic Train Operation

One of the major challenges for disruption management is the transition to automatic train operation. In this scenario, on-board guards or even drivers are no longer required, which means that train operators will have to rethink the way they inform travellers in case of disruption.

Remote Announcements: Managed from Your OCC

Our Remote Announcements module bundles multiple on-board functionalities and makes them available through wayside interfaces (through UI and APIs), so that they can be managed from your operational control centre (OCC) rather than by on-board staff.

Remote Announcements offer multiple benefits for train operators:

Instant, Centralised Messaging

By handling information delivery in a centralised, automated way, you can ensure that the information delivered is consistent for all vehicles, making the process less error prone. What's more, there is limited delay, as the messages are sent ASAP to the vehicles for automated playback.

Targeted Messaging

The **LiveCoM Suite** Remote Announcements functionality allows you to select which vehicles to address based on real-time information.

For example, it's possible to address specific sets of vehicles (e.g. operating on a particular route) or to

schedule messages to play during a specific validity period (e.g. during a particular time of day).

Both Audio and Visual Messages

The combination of **audio** and **visual** messages in multiple languages via a single system ensures that the information is accessible to the broadest possible audience.

Remotely Send Instant or Scheduled Announcements

With Remote Announcements, you can either compose and send out messages ad-hoc or display them according to a set date or time range for a subset of vehicles based on parameters such as their route, journey, station, direction, etc.

The latter allows you to define and manage longer-term announcements that may, for example, inform passengers of upcoming events and disruptions.

Get Feedback via the Historical Overview

From the OCC, you can consult an overview of the execution status of requested announcements at any time. This makes it possible to track which messages have been sent and scheduled for display, thus avoiding the risk of inadvertently not informing passengers.

Curious to know more? **Book your personal demo with LiveCoM Suite now.**

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Televic GSP is dedicated to provide innovative and reliable:

- › Passenger Information Systems
- › Condition Based Maintenance technology
- › Services & Lifecycle Support



With over 35 years of experience in the rail industry, we design, manufacture and maintain globally our products and solutions.

Find our technology on-board over 60 000 vehicles worldwide.

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- › Or contact us at televicgsp@televic.com



HEXAGON

Unmatched Measurement Expertise across Rail Applications



Across the rail industry, metrology is an increasingly used tool for ensuring production productivity and quality is improved and wastage is minimised without compromising passenger comfort and safety.

In manufacturing and maintenance, the integration of advanced inspection technology is a necessity. Each area of the railway production process has high potential for productivity gains by introducing improved inspection methods.

Hexagon has the ground-breaking metrology and automation expertise needed to understand and deliver solutions to various challenges.

Focus on Solutions for Railway Wheelset and Track Profile Measurement

Train wheelsets and rail infrastructure are typical wear parts and have significant effects on passenger comfort and safety as well as noise and ride. Profiles of wheels, brake discs, rails and switches are therefore regulated by recurring measurement operations in demanding operating conditions. The challenge lies in

the efficient generation of valid measurement data for the entire wheel-rail system. Efficient wheelset profile measurement can drive timely maintenance actions and help minimise train downtime, as well as ensuring a smooth and safe journey for rail passengers.

Hexagon's 2D laser profilers, automated on-track systems or portable measuring arms combined meet the specific demands of the railway industry by delivering accurate and reproducible results, independent of operator influence. These specialised rail profile measurement devices are widely used for wheel profile inspection, brake disc measurement, wheel distance measurement, wheel wear inspection and rail wear inspection.

Technologies and Products

2D Laser Profiler

Designed to measure all common train wheel, brake and track profiles, handheld rail measurement devices provide quick and correct evaluations with high repeatability.

The unique CALIPRI principle from Hexagon is a development of laser light section technology for non-contact dimension and profile measurements. It involves an innovative technology automatically correcting tilts and rotations of the measurement device. The result: highly accurate, reproducible, and user-independent measurement results – by hand and within seconds. Never again struggle with imprecisely positioned gauges: CALIPRI replaces error-prone and imprecise inspection devices.

The CALIPRI train and rail solutions range meets the demand of the railway industry for easy-to-use profile measuring devices with highly reproducible results. The

series stands for multifunctionality across the board for the complete wheel-rail system. Different software measurement modules for wheels, break discs, rails and switches allow customised use across the rolling stock domain. With CALIPRI rail measurement solutions, users can perform different measurement tasks with just one lightweight and easy-to-operate system. Measured dimensions are displayed on a tablet PC or directly via the sensor display, and can be compared to predefined limit values.

The CALIPRI C42 handheld measurement devices are widely used within the rail industry to support train wheel manufacturing and quality assurance. The CALIPRI technology is also applied to train and rail maintenance and service application including wheel profile wear and diameter measurement, brake disc wear analysis, rail and switch wear measurement and wheelset back-to-back distance measurements.

CALIPRI X is an automated, permanently installed on-track wheelset measurement system for the rail industry. It eliminates time-consuming and costly manual measurement, delivering precise results in seconds, immediately identifying out-of-tolerance areas.

An accurate understanding of wheel wear condition allows you to move from interval-based to condition-based maintenance – and ultimately true predictive maintenance – enabling better resource planning and significant cost savings. The non-contact optical laser system measures all wheelset parameters according to the European standard EN 15313 – including wheel profile, diameter, back-to-back distance, equivalent conicity, camber and wheel toe.

In combination with the cloud storage and analysis tool CALIPRI Predictor, measurements are automatically and





instantly stored in the cloud, saving the time and effort of your maintenance team. Together, CALIPRI X and the analytics of CALIPRI Predictor will enable you to safely operate your rolling stock with longer, more predictable maintenance intervals, less downtime and reduced lifecycle costs.

The solution ensures full traceability and allows secure 24/7 access to results and analytics for fleet technicians, workshop owners, maintenance workers and other company personnel, wherever they are located worldwide.

Measurement with CALIPRI X couldn't be easier: a train only needs to drive slowly over a sensor unit where laser and camera modules automatically measure and record the profile of the wheels. The system is easily installed on existing tracks where trains frequently run – in front of depots, workshops, washing facilities or in sidings. This allows frequent measurements to be made without extra effort or costs. The result is that you always know the current condition of your fleet.

Together, CALIPRI X and CALIPRI Predictor offer an integrated solution that delivers unrivalled productivity gains and operational cost savings when maintaining your rolling stock over its lifecycle.

The benefit for customers is that these measurement solutions close the loop between measurement, data handling and demand planning. With CALIPRI, the

entire process – from performing measurements and monitoring values to planning and executing maintenance – has been digitised as much as possible and predictive maintenance has been brought to life.

The Absolute Arm

The Absolute Arm delivers tactile probing and non-contact scanning in a uniquely ergonomic package to ensure accurate measurement that can be taken to the heart of production for inspection for expert analysis. It's the clear choice for high-end portable measurement applications. With usability central to its design, this is a measuring device that can't be beaten when it comes to ease of movement and ease of measurement. All this adds up to a far more productive and versatile arm that delivers high-accuracy measurement results more quickly and more easily than ever before.

A specialised touch measurement tool that also boasts the option for entry-level 3D scanning – the Absolute Arm 6-Axis is one of a kind. Based on patented technology with Absolute Encoders located at every articulation point and designed with ease-of-movement and usage as a focus, this is a portable measuring arm like no other.

The most recent developments in the current generation of Absolute Arm models make it the perfect answer to the challenging questions now being asked of metrology equipment. With IP54-rated protection



against liquids and particles during transport and measurement – a first on the market offering among portable measuring arms – the Absolute Arm can handle humid factory conditions, splashing oil and milling dust without breaking a sweat.

High temperatures are another area in which the Absolute Arm excels, with guaranteed operation at specified accuracies in environmental temperatures of up to 45°C. Whether it's down to production sites in the tropics or non-existent air conditioning systems, the Absolute Arm can stand the heat like no other portable arm on the market.

Integration within the Metrology Asset Manager solution offers another way in which the Absolute Arm is better protected than ever before. Thanks to real-time monitoring anywhere in the world, you can be protected against poor measurement results by making sure you know the moment arm performance drops below expected levels. Instant notifications can even be defined for incidents like shock events that may impact measurement accuracy and require a recalibration.

About Hexagon

Hexagon is a global leader in digital reality solutions, combining sensor, software and autonomous technologies. We are putting data to work to boost efficiency, productivity, quality and safety across industrial, manufacturing, infrastructure, public sector, and mobility applications. Our technologies are shaping production and people-related ecosystems to become increasingly connected and autonomous – ensuring a scalable, sustainable future.

Hexagon's Manufacturing Intelligence division provides solutions that use data from design and engineering, production and metrology to make manufacturing smarter.

Learn more about Hexagon
(Nasdaq Stockholm: HEXA B) at hexagon.com
and follow us [@HexagonAB](https://twitter.com/HexagonAB)

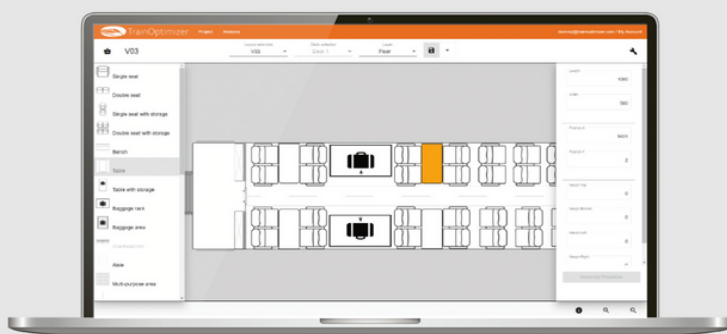


HEXAGON



TrainOptimizer
by netwiss

Individual expert consulting



TrainOptimizer® Software



**More customer-friendliness
Improved economic efficiency
More punctuality & operating quality**

Visit us at the trade fairs:

World Passenger Festival, Vienna > Stand 36

The Rail Interiors Show, Prague > Stand 329



TrainOptimizer

netwiss

Get the Best Out of Your Vehicles!

It often seems to be a contradiction that vehicles that focus on passenger requirements can also be efficient at the same time.

It is usually assumed, especially in long-distance transport, that as many seats as possible on the train will increase utilisation and thus profit through ticket revenue. However, the opposite is the case; these vehicles lead to increased energy consumption, unpunctuality, lower customer comfort and safety, and ultimately have a lower seat-occupancy rate!

Scientific studies clearly show that well-designed vehicles which, on the other hand, focus on the needs and expected behaviour of passengers, when boldly and consistently planned, lead to significant energy

and cost savings in operation, improve punctuality and operational quality, are safer and at the same time popular with passengers.

Key sticking points for all operational problems are passenger behaviour when boarding and alighting and the luggage carried. Seat maximisation always leads to cramped spaces in the vehicle, narrow aisles and a lack of customer-friendly luggage racks. In practice, all this leads to significant problems in passenger flow with long dwell times in the stations, delays and higher energy costs in operation due to the necessary higher travel speeds and, on top of that, due to luggage that cannot be stowed away, to a reduced seat occupancy rate and strongly declining customer satisfaction!

Customer-friendliness and significantly improved economy of vehicle interiors at the same time – is



TrainOptimizer
by netwiss



that possible? Yes, this is not a contradiction! Based on twenty years of research and development, we help you get the best out of your vehicles at the highest level!

TrainOptimizer® is a special service from the Austrian company netwiss that helps you optimise layouts and interiors of rail vehicles. We help you to increase customer comfort and satisfaction while improving efficiency through improved luggage accommodation, significantly shorter dwell times and increased seat availability at the same time. Vehicles optimised in this way are safer, more popular with passengers, more punctual, significantly more energy efficient and at the same time achieve a higher degree of utilisation, which in total leads to significant reductions in operating costs and increased profitability.

We know exactly where passengers like and don't like to sit, what activities they do during the journey, how much luggage they have with them and where it is stowed or which compartments are not used, how long passengers take to get on and off, what difficulties they have and much more. We know all this from over twenty years of research and analysis of over 400,000 passengers.

We carry out vehicle optimisations for you in a short time for all types of passenger carriages, from trams and metros to high-speed trains. In addition to our targeted, customised consulting services tailored to your individual needs, we also offer a special software with the same name TrainOptimizer®, with which you can independently optimise your vehicles in a short

time. All measures are based on over twenty years of intensive research and scientific examination of passenger behaviour in rail vehicles in co-operation with the Vienna University of Technology.

Our satisfied customers include: DB-Fernverkehr, DB-Regio, ÖBB, SBB, Siemens, Alstom, Stadler, Ace4Rail, NÖVOG and many more, for whom we have evaluated and optimised vehicles in over 30 projects.

Visit us in October at one of the two trade fairs listed and let us advise you. We will get the best out of your vehicles for you!

World Passenger Festival, Vienna, Stand 36
(4–5 October 2023)



Rail Interiors Show, Prague, Stand 329
(25–26 October 2023)



www.trainoptimizer.com

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Cisco

The Importance of Cyber Security in the Rail Industry



The railway industry is increasingly embracing new systems and technologies to enhance operational efficiency, safety and connectivity.

As operators move on from their legacy systems, there is an ever-increasing number of connections and complexity to deal with from a security standpoint.

Expanded connectivity means increased chances for cyber criminals to disrupt critical infrastructure and global economies. Threats have gone from simple hacks

to sophisticated attacks for financial gain, disruption and espionage. The world's critical infrastructure – power grids, healthcare systems, food industries and transportation – can and have been disrupted by cyberattacks.

At Cisco, we're listening and working alongside rail operators, governments and our networks to map out a digital future with trust at its foundation.

Enterprise Architecture Approach

An enterprise architecture approach and zero trust

framework is recommended to think more holistically about how components in a network can work together to drive security and operational resilience. This enterprise approach, versus one that is more siloed, can deliver enterprise segmentation, security and compliance across the ecosystem.

Collecting and analysing telemetry at the lowest granular level provides the comprehensive visibility needed to enable rail operators to see what's going on on their network – in real time. This level of visibility enhances the capacity to troubleshoot whether the network is undergoing network performance issues or facing an adversarial attack. Visibility and analytics also result in the ability to orchestrate a dynamic response to either – anywhere across the enterprise.

Cisco Connected Rail

The Cisco Validated Design for Connected Rail provides an end-to-end architectural framework and a resilient network foundation designed to improve the safety, efficiency, performance and service levels of rail operations. This architecture includes network segmentation to securely deliver multiple services (vital and nonvital) over a common infrastructure – lowering risk and reducing cost.

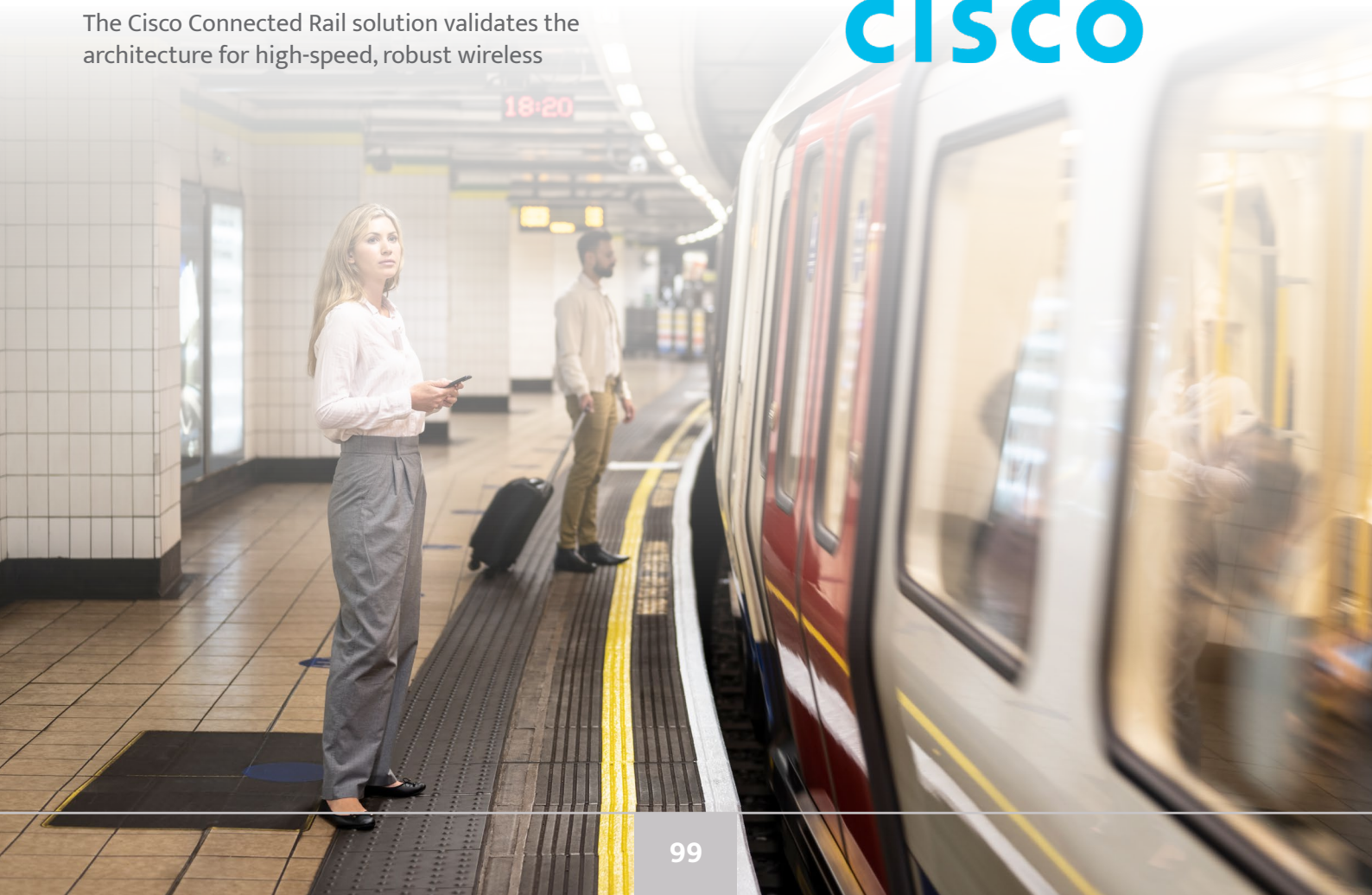
The Cisco Connected Rail solution validates the architecture for high-speed, robust wireless

connectivity between train and trackside as well as resilient, scalable access and backhaul transport infrastructure to interconnect wayside, stations and operations centres across an operator's regions.

Simplified Approach to Security

The new digital reality that rail operators face brings with it an unprecedented level of risk. The volume and sophistication of threats have left these organisations with a mixture of security tools that don't always work together, are unnecessarily complex and aren't well-suited to address increasingly advanced and costly attacks.

Cisco works with rail operators around the world to achieve a holistic, simplified approach to security, privacy and trust. At the heart of our approach is integration – reducing the complexity of managing dozens of products. With this platform approach, customers work seamlessly with the tools they have to create a more safe and secure transportation ecosystem.



Frequentis

Digitalising French Railways

As part of a strategic development plan to transform the French rail network by 2030, Frequentis has been asked to develop and supply a customised communication system for the entire network. Thomas Karl, Frequentis Vice President Public Transport, explains what the project entails.



*Thomas Karl,
Vice President Public Transport, Frequentis*

Railway-News: What is the FERCOM project and how will it benefit French railways?

Thomas Karl: FERCOM is a railway communication project that aims to support SNCF Réseau, France's national state-owned railway company, in digitalising its railway telephony dispatching system and preparing its transition from Global System for Mobile Communications-Railway (GSM-R) to the Future Railway Mobile Communication System (FRMCS). FERCOM involves the development and supply of a customised communication system for the entire French rail network.

The main objective here is really to drive performance through digital innovation.

RN: How does the FERCOM project contribute to SNCF Réseau's strategic development plan?

TK: The FERCOM project will provide a modernised dispatching system for the entire SNCF network coupled with a bearer independent communication (BIC) mobile application for enhanced railway communications dedicated to train drivers and maintenance teams.

It will constitute the first phase in the transition from legacy systems to modernised communication solutions, taking advantage of various communication networks. By adopting the BIC concept, SNCF Réseau aims to enhance railway operations, improve efficiency and support its transformation plan to modernise the rail network, especially for tracks not equipped with GSM-R.

Thus, FERCOM will help SNCF Réseau prepare for its future communication and incident management needs.

Notably, Frequentis is the world's leading provider of GSM-R dispatcher systems, having delivered systems with a total of over 10,000 terminals. This track record of success aligns with our commitment to driving the evolution of rail communication systems towards FRMCS.

RN: What is Frequentis FTS 3020 and how does it support major railways globally?

TK: The FTS 3020 is a fixed terminal system used in

control rooms of major railways worldwide as part of their operational communication systems. The FTS 3020 enables communication between train traffic controllers within control centres, train drivers, service staff on trains, and maintenance staff on the track. The system is designed for high reliability and availability, featuring an IP-based virtualised core node, active redundancy and an extremely rich function set. Its architecture enables flexible interfacing between a wide range of legacy communication infrastructures and other network elements. With this built-in flexibility, organisations can deploy modern IP-based technologies and build next-generation rail services without the need to decommission their existing legacy platforms first.

RN: Can you mention any of the customers using the system?

TK: The Frequentis FTS 3020 is also used by many of the world's major railways in 25 countries as a component of the operational communication system including UK Network Rail, Deutsche Bahn (German Rail), Swiss Rail, Iarnród Éireann (Irish Rail) and many more.

We are proud to be contributing to improved

operational communication and enhancing rail operations.

RN: What other capabilities does FTS 3020 have? What makes it suitable for mission-critical use?

TK: The FTS 3020 enables seamless integration with different communication networks, including GSM-R, TETRA, LTE and future FRMCS/MCX networks, making it ideal for mission-critical use. Its straightforward user interface is designed to be convenient for controllers, allowing for efficient communication and information exchange. The role-management capabilities embedded in FTS 3020 allows organisations to maximise resources by using automated role sharing to evenly distribute workloads during peak and off-peak hours. The system is flexible and can be easily configured to support specific operational needs and dispatcher workflow patterns, therefore reducing training requirements and accelerating time-to-value. It is also scalable, capable of supporting the management of a single railway line or countrywide rail networks.

Your question also allows me to mention our MissionX solution, which is the bridging platform for the interworking of legacy communication networks like



GSM-R and TETRA with 5G MCX, making it suitable for both pre-FRMCS and fully compliant FRMCS solutions.

Our MissionX offering spans voice, data and video communication, as well as new communication features and multi-organisation networks. It provides benefits to users and consumers of mission-critical information, owners and providers of critical infrastructure, as well as control room operators. Our solutions work with all standard networks and any device that can host our services.

RN: What are some of your proudest achievements within the public transport sector?

TK: Frequentis has extensive experience within the public transport sector and has always been aiming to make the most modern technology usable. An example of this has been our work with VR, the Finnish state railway company, to implement the Unified Railway Communication and Application (URCA) system to fulfil the Finnish Transport Agency's need for a cost-saving transitional solution to the future GSM-R replacement.

This was the first railway-specific bearer independent communication solution, which allows seamless communication across different radio networks. A BIC solution therefore enables railways to run newer communication technologies alongside GSM-R during a controlled transition period.

RN: Are there any other innovative projects you are working on in the rail sector?

TK: We are also exploring the use of drones for rail track maintenance checks and are currently working closely with Austrian Federal Railways (ÖBB) on this development. This project explores the potential for drones to provide faster, more efficient, and more frequent inspections of rail tracks. By leveraging advanced sensors and imaging capabilities, these automated drones can capture high-resolution images and collect data to identify maintenance needs promptly. The collaboration between Frequentis and ÖBB aims to test the operational feasibility of hangar-based automated drone flights, paving the way for future-oriented railway operations in Austria.

Frequentis is also working on project Harmony researching the potential for sensor-based rail checks. This works by managing and analysing data from

"The Frequentis FTS 3020 is also used by many of the world's major railways in 25 countries as a component of the operational communication system including UK Network Rail, Deutsche Bahn (German Rail), Swiss Rail, Iarnród Éireann (Irish Rail) and many more."

Thomas Karl, Frequentis Vice President Public Transport

deployed sensors along the rail infrastructure to provide real-time insights into track conditions, signals, and critical assets. Automated monitoring, analysis, and visualisation will then enable proactive identification of maintenance issues, enhancing safety and optimising resource allocation for a reliable rail network.

It's an exciting time for innovation and collaboration with rail networks worldwide, supporting the digital transformation and we are looking forward to opening our new office in Lille to support the digitalisation of French Railways.

Tom Karl

With over 20-years of industry experience, and a Master's degree in communication engineering from Vienna University, Tom Karl is Frequentis Vice President Public Transport. As well as global responsibility for Frequentis railway and urban public transport business he is Board Member of the Austrian Association of Railway Supply Industry.

About Frequentis

Frequentis is an international supplier of communication and information systems for control centres with safety-critical tasks, leveraging 75 years of cross-domain experience in aviation, defence and transport.

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- ✓ Precise positioning
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Tallysman

Integrated (Smart) GNSS Antennas and Their Railway Applications

In a previous Railway-News article, ‘**Precise Positioning for Railway Vehicles**’, some of the fundamentals of Global Navigation Satellite System (GNSS) operation were described, including pseudo-random noise (PRN) code-based and carrier phase-based measurement methods for position calculations.

Also discussed was the use of real-time kinematic (RTK) corrections via base/rover GNSS receiver pairing to achieve sub-6cm accuracy. RTK accuracy is required to improve rail safety and productivity, especially in autonomous systems.

Briefly recapping, GNSS antennas require a stable phase centre, predictable phase centre variation, a design that mitigates multi-path and supports deep out-of-band filtering of interfering RF signals (e.g. 5G cellular signals). At the same time, the antenna must be capable of receiving GNSS and augmentation (correction) signals broadcast from medium earth orbits and geostationary satellites, respectively.

Benefits of a Smart GNSS Antenna

Traditional GNSS installations placed the GNSS antenna on the roof or a mast and ran a coaxial RF cable to the receiver. This design is suitable for installation where the antenna and antenna cable are not subject to RF noise. Today’s installations are increasingly complicated, and often, sensors are collocated; therefore, both the antenna and RF cables are subject to interference from these sensors or vehicle communications (RF signals).

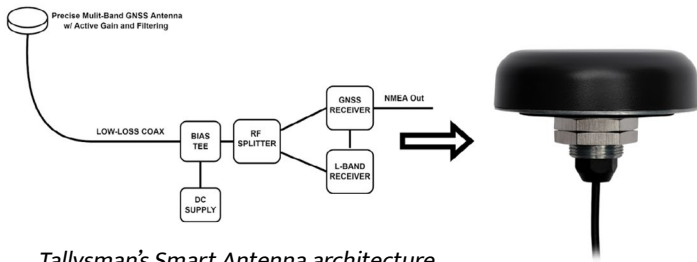


In a Smart Antenna, the GNSS antenna and receiver are in the same enclosure, often on the same PCB, and are shielded from these other sensors and RF noise. A smart antenna design provides the cleanest and purest signal to the receiver. With a clean and pure signal, the receiver can estimate the most accurate and precise measurements.

Tallysman’s TW5390 Smart Antenna Features

Tallysman’s TW5390 smart GNSS antenna integrates the TW3972, American Association of Railways (AAR) certified GNSS antenna and the u-blox F9x family of GNSS receivers. The antenna has many key features such as multi-constellation, multi-band correction support (including L-band options), a low axial ratio that provides excellent multi-path mitigation, a precisely calibrated phase centre, Tallysman’s eXtended Filtering (XF), a low-noise amplifier that ensures a low noise figure and strong signal to noise ratio (C/No).

The TW5390 smart antenna is based on the u-blox F9x chipset family. The key GNSS features of the smart antenna are that it supports the following: u-blox



Tallysman's Smart Antenna architecture

dual band professional grade F9x chip, optional u-blox D9S module (L-band corrections), RTK and PPP-RTK, integrated inertial measurement unit (IMU) (F9R), and offers several interface options (RS232, RS485, USB).

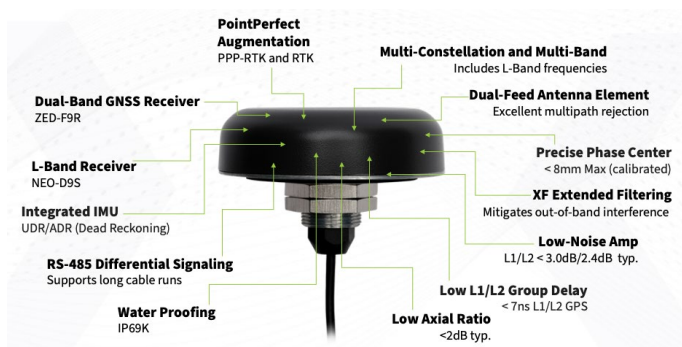
Multi-constellation and multi-band GNSS provide several benefits, but primarily, more observation on different frequency bands typically yields a more accurate and robust position estimate. An IMU can bridge short GNSS signal outages, such as when a train passes through a short tunnel or under a bridge. Choosing a receiver family that offers a variety of configuration choices can optimise performance, cost and flexibility.

Tallysman offers a TW5390 development kit that gives users a tested, robust, out-of-the-box smart antenna.

GNSS Corrections: RTK and u-blox PPP-RTK

For this technical note, we will focus on the concepts of GNSS corrections without delving into the details. All raw GNSS measurements contain errors. These errors originate from satellite orbit and clock variations, atmospheric (ionospheric and tropospheric) effects, receiver errors and signal multi-path. In this discussion, we will describe two GNSS correction techniques: real-time kinematic (RTK) and Precise Point Positioning (PPP)-RTK.

RTK is a relative positioning technique that relies on



Tallysman's TW5390 Smart Antenna features

cancelling or minimising errors by keeping the distance from the known base station to the rover short and then taking the difference of these measurements to cancel other errors. RTK requires a base station every 30 to 40km. The base station makes its observations and its co-ordinates available to the rover. The rover then computes its co-ordinates. RTK position estimates have a relative accuracy of around 10mm (short baseline), and the absolute accuracy is based on the accuracy of the base station. RTK solutions converge very quickly when the baseline is short; as the baseline gets long, it takes longer to converge, and the accuracy decreases.

PPP-RTK, on the other hand, is an absolute positioning technique that does not rely on a local base station. PPP-RTK has base stations that are used to track the GNSS satellites. The base station observations are sent to a central processing station, and the GNSS errors are estimated and then sent to the rover. The u-blox PPP-RTK service (PointPerfect) supports a typical accuracy of 20 to 60mm and a convergence time of approximately 30 to 40 seconds within the service area.

Both RTK and PPP-RTK need a communication system to transmit the correction data to the rover. For example, RTK can use a radio link from the base station to the rover or an Internet protocol (IP, NTRIP) message over cellular. PPP-RTK corrections can be delivered using two different technologies: broadcast from a geostationary satellite directly to the TW5390 or delivered over an IP link using the MQTT protocol.

TW5390 Railway Applications

Tallysman's TW5390 multi-constellation and multi-band smart GNSS antenna supports RTK and PPP-RTK correction/augmentation technologies. GNSS augmentation technologies enable real-time sub-6cm positioning accuracy. These features and the features listed in the TW5390 features section make the smart antenna an ideal positioning product for railway applications such as locating rolling stock, tracking support vehicles and tracking rail side workers.

Contact Tallysman for the latest Smart GNSS antenna news.



TrackTexTM

Anti-Pumping Geocomposite



The mud pumping solution that keeps journeys on track

- Proven performance
- Improved track quality
- Durable in extreme conditions
- No specialist equipment required
- From GEOfabrics: The experts in rail geosynthetics



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Track & Infrastructure

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GEOfabrics

TrackTex – Solving Mud Pumping for the Rail Industry Worldwide

Since the costly issue of mud pumping was identified by the rail industry, decades of research have gone into developing solutions, which have evolved over time.

Problem areas of ballast contamination in trackbeds cause a real headache for rail operators and contractors alike. But solving the issue often has a considerable impact on day-to-day operations and budgets, due to demanding track possession times and frequent maintenance intervals.

Re-ballasting has often been adopted as a solution. However, this is a short-term answer and over time, the problem returns – again and again. The cost implication of regular, repeated maintenance is significant but can be avoided by employing a specialist solution. There are three targeted methods that have been used over the years to tackle mud pumping:

Sand Blankets

Traditionally, mud-pumping was treated with the installation of a 300mm thick sand blanket. While this

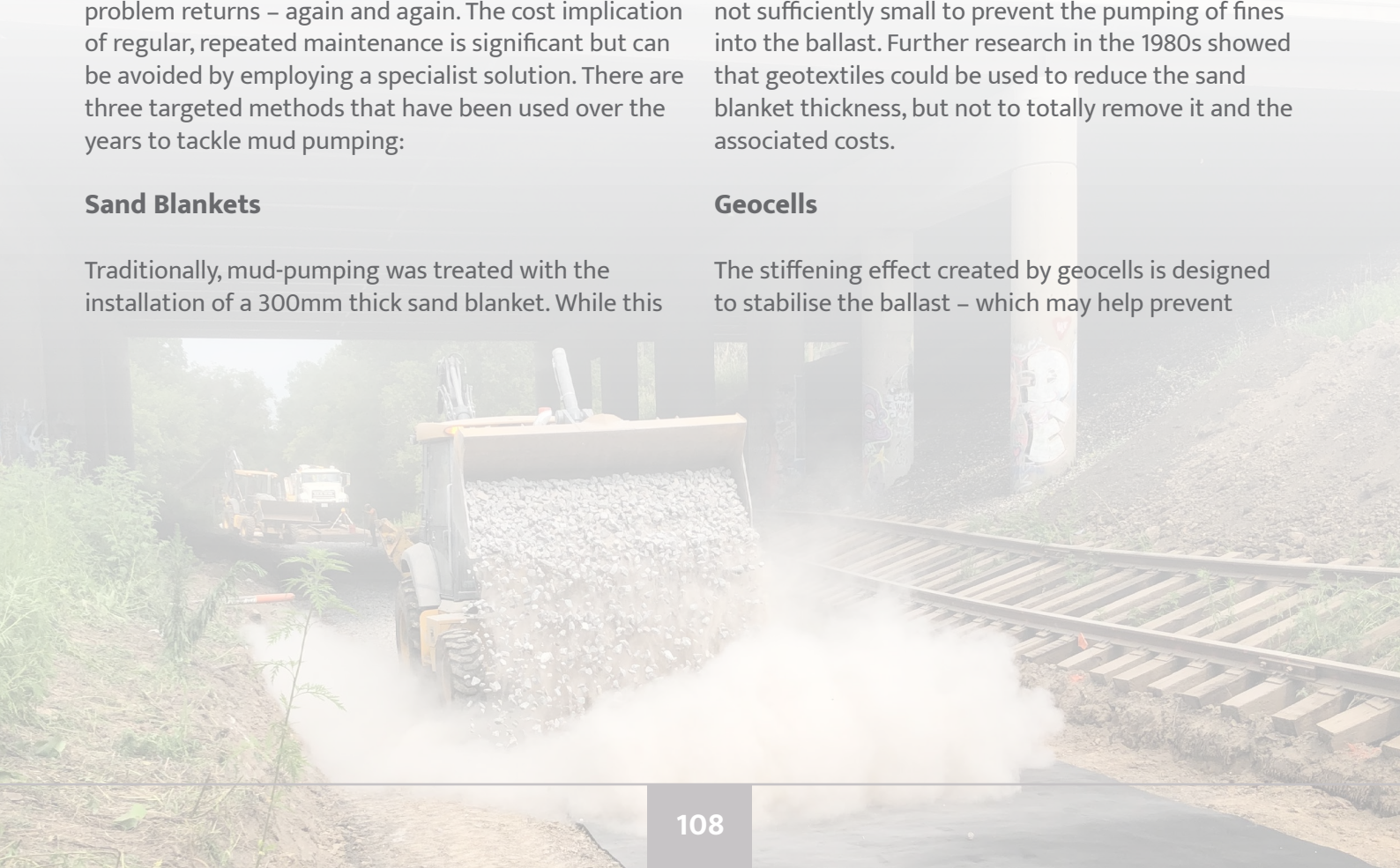
proved very effective at preventing the migration of fines, the installation of a sand blanket requires significant excavation – and consequently a large volume of material needing to be imported and exported. This makes for a slow and expensive installation – a challenging exercise to complete within a given possession window.

Geotextiles

As geotextiles were developed during the 1970s, the performance they offered led to the suggestion that they would become the replacement for sand blankets. However, following extensive testing it was established that the pore opening size of these geotextiles was not sufficiently small to prevent the pumping of fines into the ballast. Further research in the 1980s showed that geotextiles could be used to reduce the sand blanket thickness, but not to totally remove it and the associated costs.

Geocells

The stiffening effect created by geocells is designed to stabilise the ballast – which may help prevent

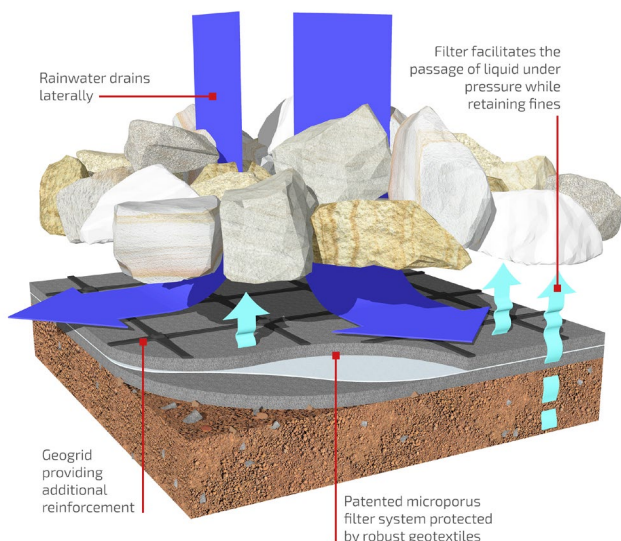


pumping. However, without a physical barrier, fines are still likely to migrate into the ballast over time. As with sand blankets, the installation of geocells requires excavation so it's a slow and labour-intensive process. Future ballast cleaning and tamping works may also be hindered as the geocell sits within the ballast build up.

TrackTex – A Specific Rail Industry Solution

While all these solutions are effective in part, they don't meet the complex needs of the rail industry in full. And that's where TrackTex comes in. A solution designed specifically to tackle mud pumping, TrackTex has been developed by GEOfabrics in conjunction with material scientists and network operators.

This patented, anti-pumping geocomposite is the result of more than a decade of research by trackbed engineers – and its unique filter system actually improves trackbed quality over time. TrackTex has also been proven to significantly increase maintenance intervals – by more than 25 times – and offers much faster installation times than traditional methods. So not only does it solve the complex problem of mud pumping but it offers a range of time and cost benefits, too.



A Trusted Global Solution

The rail industry has been actively using TrackTex since 2010 – and enjoying the significant cost savings that come with it. In fact, both private and state-owned rail operators across the world have already installed TrackTex as a spot treatment.

There's now more than eight million square feet of TrackTex installed across Europe, Australia and the United States to date – a statistic which speaks volumes about its efficacy. Site monitoring across a number of key sites has also resulted in clear evidence of the success of TrackTex. It's now accepted as the most cost-effective way of preventing and correcting mud pumping failure by many rail operators.

Jim Herbert, Commercial Director at GEOfabrics explains: "Anecdotal evidence suggests as much as 60% of a rail maintenance budget is spent on just 5% of the network, as problem areas need repeated remedial work. TrackTex represents the culmination of years of research into effective remedies for mud-pumping. The unique microporous filter at the centre of TrackTex provides a barrier to rainfall and migration of fines, yet allows pore water pressures to dissipate under loading. This means that the subgrade actually improves over time. Customers report that this can extend maintenance intervals by more than 25 times, giving them significant financial benefits."

Learn more [here](#).

TrackTexTM
Anti-Pumping Geocomposite

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GEOfabrics[®]

Complete Composite Systems (CCS)



Composite ballast boards from CCS being installed on site

CCS is proud to introduce its lightweight, impact-absorbent ‘composite ballast boards’ – ideal for protecting railway lines and trackside facilities on embankments from the likes of rockfall or snowslide.

Traditional concrete ballast boards are often very heavy and laborious to install, particularly over long lines of track. After more than a year of development and testing, our glass-fibre reinforced polyester (GRP) version is lighter with an interlocking design – making the boards quicker and cheaper to fit.

These **composite ballast boards** are also more sustainable. Manufactured by pultrusion from

specially selected unsaturated polyester resins and strengthened with resolute glass-fibre reinforcement packs, the sturdy design ensures the boards will remain damage-free during transit and won’t crack when installed or while under load.

The GRP-pultruded profile is coated with a polyester veil to provide protection from corrosion, UV rays and water, proven over decades of use in marine



and corrosive environments. This gives the product a lifespan of at least 50 years, with no maintenance required.

Composites are extremely impact-absorbent, while the open-cell tongue-and-groove design of the boards allows interlocking panels to be stacked on top of each another. Our 300mm-deep panels, for instance, can be stacked up to three high to build a robust 900mm-high retaining wall capable of withstanding a range of heavy forces.

Easy Handling

The lightweight construction of our composite ballast boards allows for easier handling, reducing potential injuries for on-site engineers and cutting installation times. To illustrate this point:

1 CCS ballast board = 12.5kg vs. 1 concrete ballast board = 60kg

The composite boards can also be simply cut to length on-site, whereas slicing the length of concrete boards exposes metal reinforcement that will rust over time.

Eco-Friendly

Composite ballast boards from CCS are also environmentally friendly, as shown in the points below:

- Number of boards supplied in an 18-tonne delivery:
CCS ballast boards = 1440 vs. concrete ballast

boards = 300

(almost 5x more fuel used to deliver concrete)

- Amount of carbon dioxide emissions released into the atmosphere to produce 1 ballast board:

CCS ballast board = 3.9kg CO₂ vs. concrete ballast board = 19kg CO₂

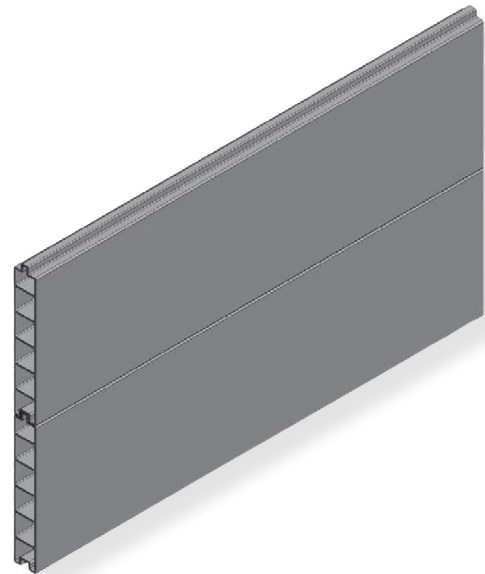
Composite Ballast Boards from CCS – Key Benefits

- Minimum lifespan of 50 years
- Maintenance-free
- Lightweight for easier handling and reducing on-site injuries and installation times
- Eco-friendly, with far less fuel required to deliver composite boards to site than with heavier concrete boards, and far fewer carbon dioxide emissions released into the atmosphere during production compared to concrete
- Structurally sound – excellent at resisting and absorbing impact
- Outer surface is coated with a polyester veil for protection against sunlight, water and corrosion
- Suited to a temperature range of -40°C to +80°C



Also available from Complete Composite Systems:

- **ARCOSYSTEM**® – elevated trackside cable troughing manufactured from pultruded glass fibre reinforced polymers (GRP), offering excellent structural and load-bearing performance and a lightweight design for flexible and efficient installation
- **TECHNO-CRETE**® – an innovative, hydrophobic-polyurethane-based foam foundation material that provides a green and cost-effective option for post mix during construction jobs
- **TouchSAFE** composite palisade fencing – long-lasting and maintenance-free fence panels designed to safely enclose electrical equipment such as railway substations and LOC cabinets
- **Composite bridges** – a wide range of extremely robust and durable designs that are great for railway bridges. We design, build, and install bridges suitable for pedestrians or vehicles weighing up to 12 tonnes. The GRP construction means the bridges are environmentally sustainable and no maintenance or repair is required



For enquiries about composite ballast boards, please **contact our technical experts at CCS**, the product's designer and developer. Design and dynamic testing data to confirm performance is available on request.



Complete Composite Systems Ltd

503 Broadway, Letchworth, Hertfordshire, SG6 3PT
Tel: +44 1462 379000 or +44 7860 147863
Email: info@completecomposites.co.uk

The exclusive UK rail stockist of our composite ballast boards is Scott Parnell:



Scott Parnell Rail Division

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RM4 1JU
Tel: +44 208 8055797
Email: rail@scottparnell.com



Pandrol

Futureproofing Non-Ballasted Track: Pandrol's Common Interface System

By John Porrill, Fastening Systems Technical Director

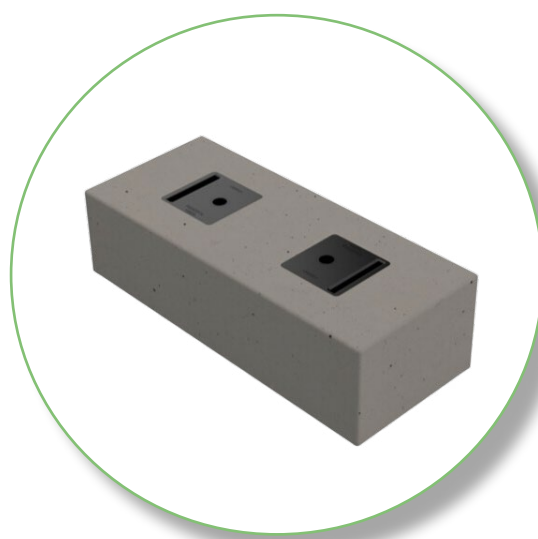
Pandrol's new Common Interface System is a game-changer for the rail industry, enabling slab track to be adapted to meet changing performance needs for the first time.

Very low maintenance requirements and long life are major advantages of non-ballasted track (NBT) over conventional ballasted systems. NBT has a higher first cost than ballasted track and is time consuming to construct, but once in place it provides a stable track system that could still be in use a century later. In theory...

In practice, the rigidity of NBT creates its own set of problems, particularly in urban areas. Once concrete has been installed, it is very costly to adjust the track geometry.

When new housing developments spring up alongside an NBT rail system, residents are prone to complain about noise and vibration. This leads to increased performance requirements. The problem? Without the flexibility to adapt to the new noise and vibration mitigation demands, the whole track has to be modified, or lifted and rebuilt from scratch.

Now, for the first time, Pandrol has a solution to futureproofing NBT. The Common Interface System allows rail infrastructure owners to adapt NBT to meet changes in performance requirements, quickly and affordably.



What Is the Common Interface System?

Currently, the concrete elements used for NBT have interfaces that are aligned to specific fastening systems and anchorages. Pandrol's Common Interface System (CIS) provides a common connection point for a range of different fastening assemblies that can be easily swapped. When vibration and noise mitigation requirements change, rather than having to modify or replace the whole track, the fastening system can simply be swapped to achieve the required performance level.

The Common Interface System consists of two engineering plastic plates with retaining features, as shown. Reinforced plastic dowels sit underneath the plates, enabling anchor screws to be installed. The CIS is compatible with all the main Pandrol fastening range, screwed and non-screwed.

Basic Configuration

Imagine a new metro station is built in an area where few people live and work. With noise and vibration mitigation requirements low, the CIS can be fitted with a simple, medium-resilience fastening solution, such as Fastclip FCA.

The Fastclip SGI shoulders locate into the plastic construction plates and are retained using anchor screws. A plastic insulator is added to the front face of each shoulder and the Fastclips, with integral toe insulators, are installed in a parked position. A resilient rail pad is introduced into the rail seat area before the rail is threaded and the Fastclips are pushed into their installed positions. The Pandrol FCA system can provide vertical adjustment of up to 10mm with the standard shoulder through the addition of shims underneath the rail pad and the shoulder. Further adjustment is possible up to 20mm using a second, taller shoulder.

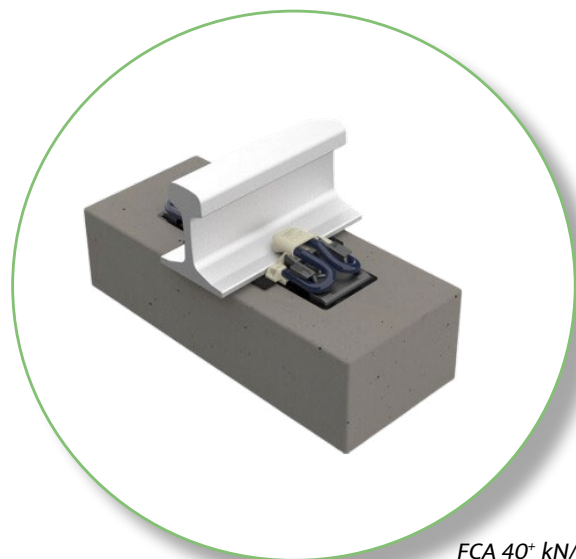
The load applied to the rail is transferred through the shoulders and dispersed into the concrete. The system stiffness is limited to 40kN/mm in the standard configuration, ensuring there is no detrimental effect on dynamic track gauge through excessive rail roll. Although the rail pad contributes to vibration reduction, the resilience limits of a single rail pad still allow transmission of some ground-borne vibration to surrounding structures.

Intermediate Configuration

What happens when the area becomes built up and local residents start complaining about noise and vibration?

Instead of having to make costly alterations to the NBT, the FCA system can simply be removed from the Common Interface and replaced with a more resilient set of components.

Here, the two cast iron shoulders are now part of a linked baseplate that sits on top of a highly resilient baseplate pad. Two cast iron clamps complete with nylon bushes attach the system to the Common Interface. The baseplate is able to move vertically about the nylon bush as the resilient pad compresses under load. This protects the clips from excessive deflection and ensures rail roll limits are not exceeded.



FCA 40* kN/mm

This stability means that a higher degree of resilience can be utilised safely to provide greater protection against ground-borne vibration and any associated secondary noise. The more resilient the fastening system the less vibration travels through the track. A stiffness of 22.5kN/mm is typical for this set-up, but it can range from 16kN/mm to 25kN/mm.

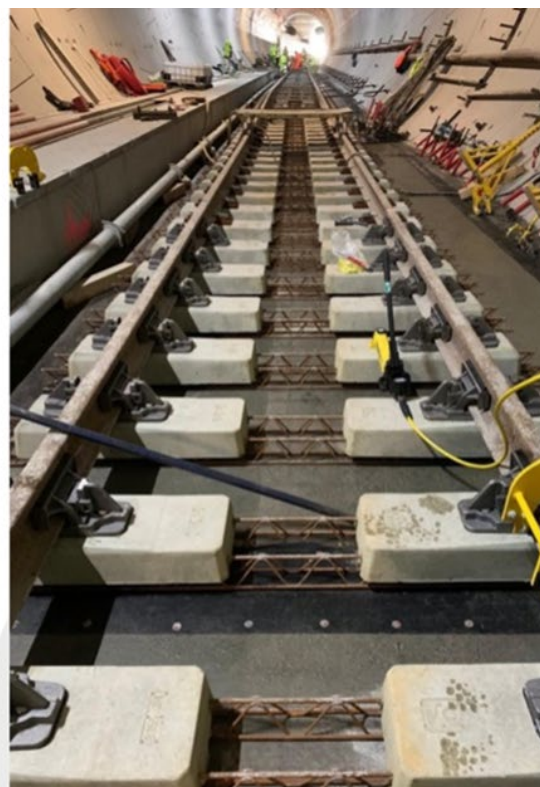
Advanced Configuration

Should noise and vibration mitigation requirements become even greater, say a hospital operating theatre is built over the metro tunnel, the existing system can be removed from the Common Interface and replaced with more resilient components.

For maximum attenuation, the FCA or DFC system can be replaced with the Pandrol Vanguard (or Bonded Rubber DFF) system. Both systems provide a high degree of vibration isolation, reducing transmission to surrounding structures. The Vanguard system supports the rail against the rail web and under the rail head. This allows the rail to be fully supported by resilient elements that attach to a cast iron baseplate. These resilient elements operate in shear, ensuring a high degree of gauge control as the resulting rail deflection is almost entirely vertical.

Rather than sitting on a pad or the baseplate, the rail is held up by the resilient blocks, producing an air gap underneath of approximately 6mm.

This system is extremely resilient, providing a stiffness of as low as 5kN/mm and can reduce ground-borne vibration levels in excess of 10dB.



Versatility in Practice

The Follo Line in Norway connects Oslo and Ski via twin 19.5km tunnels. The tunnels pass through a granite mountain on which people live and work, and it was clear from the outset that vibration attenuation would be needed to limit any impact of the railway on those living in this area.

The Common Interface System was chosen to enable the resilience of the track to be tuned to meet the strict requirements of the noise and vibration (N&V) study carried out. Three different stiffness levels were provided using the system, with post-installation measurements confirming that the N&V hotspots highlighted in the study had been effectively controlled and met the required specification.

The images above show the CIS in the Follo Tunnel with two different fastening systems – Pandrol VIPA DFC (left) and Pandrol Vanguard (right). Sitting on the same common footprint, these provide the intermediate and advanced levels of ground-borne vibration mitigation required at different points in the tunnel. A combination of two DFC assemblies and a de-tuned Vanguard assembly meet the challenging noise limit of 32dB. These systems were able to vary the track

stiffness between 22.5kN/mm, 16kN/mm and 11kN/mm using the same interface.

Summary

Pandrol's Common Interface System is set to revolutionise the future of NBT, providing the first-ever solution to the inherent inflexibility of current systems. With the Common Interface System, rail infrastructure owners can adapt the track to changing performance requirements when needed.

The benefits are clear – replacing the fastening system rather than the whole track can save millions. The process is much simpler and quicker, creating less disruption. And with concrete's high carbon footprint, increasing NBT's lifespan has immense sustainability benefits. Once removed, fastening systems can be recycled or, in some instances, reused on another project.

PANDROL

Partners in excellence

LPS

LASER PRECISION SOLUTIONS

Autumn-Proof Your Railways: Introducing LPS LaserTrain

Advanced Technology to Ensure Smooth and Reliable Train Services



Get ready for autumn! While its beautiful landscapes and falling leaves bring us joy, they also present serious challenges for rail companies that disrupt the efficiency of their operations.

Leaves on the line pose a significant problem. When compressed by train wheels they create an oily film that impacts coefficient of friction (COF) levels on the rail. Trains struggle to accelerate and brake properly, leading to dangerous slip-slide conditions. As a result,

delays and cancellations become inevitable, disrupting schedules and causing frustration among passengers. At Laser Precision Solutions (LPS), we understand the pressing need to overcome these hurdles and keep the railway industry on track.

The LaserTrain Advantage

Introducing the LPS LaserTrain, a progressive rail cleaning solution designed to combat the leaf-related issues that plague the autumn months. Equipped with an advanced control system for seamless autonomous

operation and high-intensity lasers, the LaserTrain offers precise cleaning without damaging tracks. One pass improves slip-slide conditions for 24 hours for safer and more efficient operations. By doing so, disruptions are minimised, and overall passenger satisfaction is improved.

Safety First

Safety is paramount to any rail operation. LaserTrain features such as automatic laser shut-off at speeds below 2mph prevents excessive exposure and unnecessary treatment, ensuring precise and controlled cleaning operations. The control system seamlessly transitions between 'Transport Mode' and 'Cleaning Mode' avoiding rail obstacles without operator intervention. Transport Mode raises the Laser Technology to avoid rail obstacles, while Cleaning Mode lowers it for track cleaning.

Optimised COF levels guarantee safe braking and accelerations with no speed restrictions, detection of trains and SPAD. Variable cleaning speeds are also available to accommodate the diverse requirements of rail networks.

Cut Maintenance Costs

Maintenance costs resulting from wheel truing are a financial burden for rail companies. Employing the LPS LaserTrain offers a dual benefit of enhanced safety and reduced expenses. By effectively addressing slippage risks, it ensures the availability of more operational cars, preventing delays and cancellations and optimising overall rail capacity. Improved friction levels significantly reduce the occurrence of flat spots, which in turn minimises track damage, reducing maintenance requirements and costs. In addition, the technology has lowest long-term running costs in the market, making it a financially savvy investment for rail networks.

Drive Sustainability

With no harmful by-products and minimal CO2 emissions, the LaserTrain aligns with efforts to reduce the environmental impact of rail operations. Precise cleaning capabilities consume minimal water and energy in comparison to conventional cleaning methods and by eliminating the need for harsh chemicals or abrasive methods, it reduces waste and contamination.

Leading the Way: Our Expertise in Action

At LPS we are proud to be at the forefront of innovation in rail-cleaning technology. We strongly believe in the potential of the railway industry and are committed to enabling global train networks to operate efficient, safe, and reliable services. Positively impacting network services, people's lives and the planet.

Showcasing Our Impact

The success of the LaserTrain is evident in real-world applications. Metro-North Railroad, a leading rail operator, has successfully implemented Laser Precision Solutions' LaserTrain to combat residue from crushed leaves and reduce slip-slide incidents. The retrofitted 'Comet III' train operates at 60mph speeds, safely covering over 12,000 miles without incident.

The removal of contaminants resulted in a 40% decrease in slip-slide events and the lowest wheel-true cost season on record during leaf season 2022. This achievement has garnered Metro-North the Gold Award for Rail Safety, highlighting their commitment to innovation and safety.

President and Long Island Rail Road Interim President Catherine Rinaldi said: "The LIRR led the way in using this technology and has seen an incredible decrease in delays and equipment issues brought on by slip-slide using this system prompting Metro-North's successful pilot last fall. It's a game changer."

Keeping Journeys on Track

The persistent challenge of slippage on the line has far-reaching implications for the railway industry. Safety concerns, environmental impact and operational inefficiencies demand innovative solutions. By investing in the LaserTrain, rail operators not only ensure efficient operations but also contribute to a brighter future for rail transportation. Empower your rail operations today. For compatibility, tailored installation options are available. Get in touch.

www.laserprecisionsolutions.com
sales@lasertribology.com

Keeping trains on track

Minimize the impacts of slip-slide conditions and keep performance, maintenance and safety on track with high speed rail cleaning laser technology.

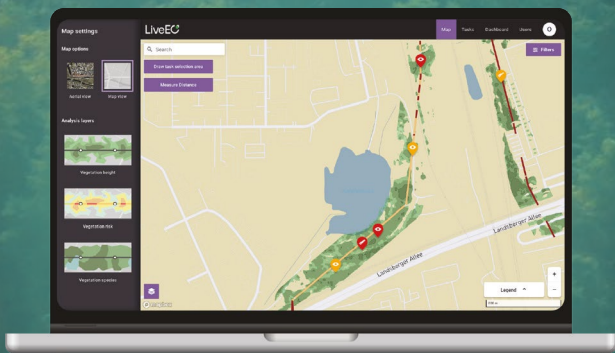
LPS
LASER PRECISION SOLUTIONS

laserprecisionsolutions.com



Keep the Trees in Check. Prevent Disruptions.

AI Vegetation Intelligence,
based on Satellite Data.



LiveEO



live-eo.com

LiveEO

The Future of Vegetation Monitoring and Analysis Is Satellite-Based

Lineside vegetation can become a substantial safety hazard if not proactively managed, and for a number of reasons.

Firstly, overgrown vegetation can reduce visibility at rail crossings and obstruct signals, increasing the potential risk of a collision. This was sadly the cause of several train crashes at the Rosedale railroad crossing in the US, including one that triggered a chemical explosion, as well as a collision **between a train and rubbish collection truck in Kawerau, New Zealand, in 2017**, which led to the death of the truck's driver.

Then there's the issue of dry vegetation near tracks, which has a higher risk of igniting from wheel sparks or maintenance works. This is more of an issue than ever before due to the rise in heatwave temperatures and regularity, which has led to an exponential growth in wildfires.

We also can't overlook the problems caused by leaves accumulating on tracks, which affects train traction. Considered a joke by many passengers, the reality is that **leaves on the track can lead to incidents such**

as the Salisbury Tunnel Junction collision, which injured 14 people and caused substantial damage to the train and railway infrastructure.

The list of risks from overgrown vegetation goes on; overhanging branches can weaken or damage rail infrastructure, unhealthy trees could fall on tracks during storms, roots can damage ballast and trackbeds, and vegetation can interfere with proper drainage of track beds, leading to premature decaying of materials.

These issues are all real, as shown by Network Rail, which **reported** that 400 trains – 34% of rolling stock – were damaged in vegetation-related incidents in 2018, and that these types of occurrence cost the railway upwards of 100 million GBP a year.

Limitations of Ground-Based Vegetation Monitoring

All infrastructure managers and owners undertake monitoring and assessment; however, this is most often ground-based, which has its limitations. Time-consuming and labour-intensive, it also causes safety risks of its own, as you're sending employees trackside.

With ground-based monitoring, field inspections usually take place at predetermined intervals. The problem with this cycle-based approach is that it doesn't take into consideration the changing environment and vegetation conditions.

Risks that come up between clearing cycles may not be addressed for a long time – especially in the case of large or large-scale networks like Deutsche Bahn's (34,000 kilometres) or Network Rail's (16,000 kilometres), leaving a greater probability of vegetation related incidents.

What's the Solution?

At LiveEO, we believe the solution lies with satellite imagery analysis. Satellite data provides a large-scale view of the state of lineside vegetation, enabling comprehensive monitoring and assessment of vegetation risks over large areas, including the most remote or inaccessible parts of a network.

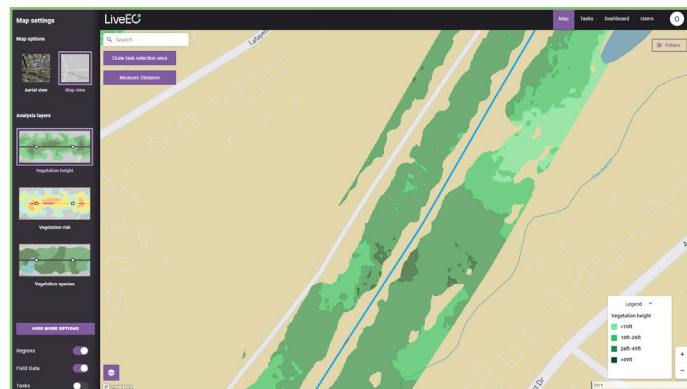
Satellite data is also regularly updated, meaning you can get up-to-date information on vegetation conditions, enabling you to **respond to issues as they arise** – very important **when extreme weather events occur and speed can be of the essence**.

It can also enable targeted interventions, which not only optimise resource allocation and improve cost efficiency but also promote environmental protection and conservation: a key focus for many rail companies today.

LiveEO's Vegetation Management Insight (VMi) Suite

LiveEO's Vegetation Management Insight (VMi) Suite uses cutting edge AI to identify potential threats using data gathered from advanced Earth observation satellites.

A variety of parameters can be set to improve risk clarification including, but not limited to, distance from track, tree height and health and even species. From here the system generates risk assessment reports and actionable insights. These are directly accessible via web and mobile app, which also doubles as an advanced work assignment and management



Vegetation next to railway tracks in the LiveEO web application

platform where managers, contractors and inspectors can work collaboratively.

The solution has been proven to help lower vegetation-related service disruptions by 15%, but that's not all. It also supports efficiency and cost savings, as it's been shown to lower contractor spend by 20% and inspection cost by 66% per kilometre.

Already Supporting the Rail Sector

LiveEO is already working with several key companies in the rail sector including **Deutsche Bahn** (DB), SNCF and ADIF. Proof of concept trials are either underway or have been completed, and in the case of DB, LiveEO has now rolled its solution out across the entire network.

If you'd like to learn more about LiveEO's VMi Suite, or book a demo, please visit live-eo.com/vmi.

LiveEO's Vegetation Management Insight (VMi) Suite offers:

- Unlimited scalability
- High-frequency updates
- Comprehensive data and analytics
- Accessibility in the form of an intuitive web and mobile app

LiveEO

Soundim

Minimising the Environmental Impact of Railway Barriers



Soundim offers the rail industry a high-impact sound barrier with a low impact on the environment.

This is because the innovative design of Soundim's barriers ensure they don't block the view from either in or outside of the train, while the majority of its components can be recycled when the barrier comes to the end of its useful life.

Recyclable Materials

Soundim's noise-blocking railway barriers offer a sustainable solution to sound reduction on railways. This is because the company places great emphasis on recycling initiatives, and its barriers are designed to be

easily disassembled and recycled at the end of their lifespan, minimising waste and promoting a circular economy.

"In the beginning when the design tender was released, the Finnish Transport Infrastructure Agency expressed a strong wish that all material in the low-height barrier should be recyclable. This was our guideline in designing and building the first prototype, which we have since approved upon multiple times," says Jarmo Airaksinen, Founder of Soundim.

Each panel is made from aluminium, steel and Ewona insulation, which is created using environmentally friendly, additive-free recycled materials.

The insulation panels consist of polyester fibres bonded

together with heat and, depending on their use, can be made of up to 85% recycled plastic. This means the insulation already offers some great sustainability credentials at the point of manufacture, as one 10m² panel can represent a CO₂ emission reduction of 23 kilogrammes.

These are extended further when the material reaches the end of its useful life, as it can then be sent on to a textile recycling facility.

No Need to Spoil the View

Soundim's award-winning barriers are also 'landscape friendly', as they allow for unobstructed views of the surrounding landscape due to their low height.

This means that both onboard passengers and anyone looking at or beyond the track won't have their view restricted. This is particularly important for scenic areas, where the natural beauty or urban skylines shouldn't be obscured.

Clear views however, don't require a compromise in sound reduction, as Soundim has proven.

Most of the noise created by trains travelling at speeds of 200km an hour or lower comes from the wheels and rails. Therefore, sound barriers don't need to be high in order to lower noise pollution in the surrounding area.

"Understanding this, we developed an innovative low-height barrier that means our customers can reduce railway sound pollution without blocking the view from either inside the train or from outside looking across the track," says Airaksinen.

Market-Leading Noise Reduction

Soundim's ability to dramatically reduce noise pollution created by the railway is the final positive

environmental impact that cannot be overlooked.

Its barriers have been designed – and proven – to reduce noise from wheels and rails by a minimum of 50%. This is thanks to the Ewona insulation's excellent absorption and insulation, which has a particularly positive impact on those high-frequency sounds human ears hate the most. This, in turn, can encourage the use of nearby outdoor spaces for relaxation and recreation that might otherwise have been left as wasteland.

Noise absorption 13 dBA (Class A4) – EN 1793 2 and EN 1793 3
Noise insulation 30 dBA (Class B3) – EN 1793 2 and EN 1793 3
Total noise reduction of up to 12 dBA – SFS-EN ISO 3095

Animals are also sensitive to excessive noise, which can disrupt breeding patterns, communication and ecosystem balance. By minimising this, Soundim also provides a healthier environment for the local wildlife.

Get in Touch

Soundim is making a significant impact in the realm of sound reduction, while also prioritising environmental sustainability. Effective, cost efficient, sustainable and landscape-friendly, its railway barriers offer the full package.

If you'd like to learn more about the company and its sound reduction solutions, please visit www.soundim.fi.





We block the noise, not your view.

No longer there is need to compromise the
performance with the esthetics.



Eliminating noise
at the source



Recyclable
materials



Light weight and no need
for special foundation



Easy and fast to install
or to dismantle and reuse

Soundim noise barrier is a perfect
solution for any rail project.

FOR MORE INFORMATION, PLEASE CONTACT

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WITT Solutions GmbH

The WITT WB-CM 3 Monitors the Insulation of Power Cables Such as Return Conductors or Supply Lines

The monitoring of cable systems in DC installations for damage is important for the early prevention of fault currents that can damage buildings and become dangerous to people, and is required by various standards.

The WITT WB-CM 3 monitors the insulation of power cables such as return conductors or supply lines.

Typical areas of application:

- Light rail (underground, tram etc.)
- Charging stations of trains, buses, trucks
- Battery buffer systems
- Solar power systems
- Wind turbines

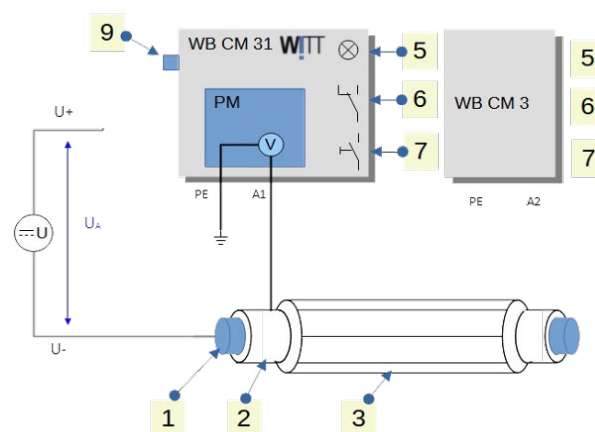
Description

The device is used for insulation monitoring of cable systems in DC installations. The insulation measurement is carried out between the insulating outer sheath and a reference earth. Different threshold values can be set for each measurement. Signalling is by means of optional potential-free signalling contacts or via a communication protocol. Operating status is indicated by LED. Operation is by means of a pushbutton. Parameters can be set at the factory or using the WTC service case and the communication protocol.

The unit is built into a top-hat rail-mountable plastic housing.

Function

Simple monitoring of the critical cable infrastructure.



To measure the cable insulation, the shield and the reference earth are connected to the WB-CM3. The WB-CM 3 determines the measurement data and evaluates them according to the stored threshold values. Up to three threshold values expressed in terms of parameters can be set for the measuring point. The message of exceeding the threshold value can be fed into the system control via a communication protocol and or a message contact extension. A time delay can be parameterised between exceeding the threshold value and triggering the signalling contacts. The leakage current flowing to earth is very low at 2mA only.

The operating and switching status is indicated by a local LED. Operating states can be reset by means of a push-button.

The WB-CM3 is used to carry out the following measurements:

- Shield and earth

Ask us about customer and application-specific system solutions **here!**



FRÄNKISCHE

INDUSTRIAL PIPES

A World Full of Solutions: FIPSYSTEMS® Certified and Reliable Cable Protection for Rail Technologies



FIPSYSTEMS® cable protection

FRÄNKISCHE Industrial Pipes has been manufacturing and developing high-quality protection products for the industrial and automotive sectors for decades. Especially in the railroad sector, where millions of people are transported every day, it is essential that sensitive lines and cables function and cannot be damaged.

Cable protection experts from FRÄNKISCHE have therefore made it their business to develop high-quality cable protection products that are available in various material qualities for a wide range of requirements and also for retrofit installations.

FIPSYSTEMS® Products for Applications Inside and Outside Trains

FIPSYSTEMS® cable protection solutions cater to various applications, both inside the vehicles and at

trackside locations, including cabling in vehicles, energy supply and data lines, ticket machines, information systems, video surveillance systems, trackbed applications, railway barriers, rail sensors, signalling, monitoring and control systems.

FIPSYSTEMS® cable protection products protect cables and wires in railway and infrastructure applications against:

- hot and cold weather
- heavy rain
- snow and ice
- mechanical influences such as stone impacts
- rodent bites
- chemical influences
- abrasions and impacts
- UV radiation

FIPLOCK® ONE Fitting: The Revolution in Cable Protection

FIPLOCK® ONE sets a new standard in cable protection

by offering a pre-mounted fitting made from specially formulated polyamide 6. This ensures reliable connections between FIPLOCK® corrugated conduits with fine and coarse profiles, covering diameter 07 to diameter 48. The pre-installed seal in the connector body guarantees secure connections, meeting the highest IP-protection categories, including protection classes 66, 67, 68 and 69. With FIPLOCK® ONE, the fitting solution covers all application requirements, simplifying the installation process and reducing storage efforts, ultimately leading to cost savings. This innovative solution provides high weather resistance, dynamic load capacity, impact resistance and pull-out strength and meets the most stringent fire characteristic standards. Moreover, FIPLOCK® ONE fittings meet the highest fire protection requirements according to EN45545-2 with HL3 for R22 / R23.

ONE FITS ALL – a versatile and efficient cable protection solution.

FIPLOCK®: Corrugated Conduits and Accessories

FIPLOCK® corrugated conduits offer highly reliable mechanical cable protection and flexible routing for wires and cables. These products are ideal for rail-technical applications, both in rolling stock and trackside installations. For additional applications, please refer to our main catalogue or visit our [website](#), where different material qualities are available to meet specific requirements.

FIPJACK®: Textile Protection Sleeves

FIPJACK® comprises a broad range of textile protection sleeves designed for simple bundling of strands and cables. These sleeves offer good abrasion protection, high resistance to sharp objects and, in some cases, meet the highest fire protection requirements. Especially for retrofit installations over already laid and connected lines FIPJACK® is a reliable choice for added safety.

FIPSPLIT®: Divisible Corrugated Conduits and Accessories

FIPSPLIT® provides an ideal solution for retrofitting cable protection. These divisible corrugated conduits effectively protect inserted cables and wires from external influences with their lockable ‘double conduit’ design. Available in diameters ranging from 4mm to

100mm, FIPSPLIT® offers flexibility and convenience in cable protection. Complementing this range, FIPSPLIT® accessories include mounting clips, conduit connectors, divisible fittings and divisible locknuts, all available in different sizes.

FIPHEAT®: High-Temperature Corrugated Conduits

FIPHEAT® is the product line of corrugated conduits meeting the highest temperature requirements. These high-tech materials offer performance features that cater to the most demanding temperature and chemical-resistance needs. Available in standard industrial nominal widths, FIPHEAT® conduits are indispensable for specific application requirements.

FIPSPECIALS®: Special Solutions

FIPSPECIALS® is the product group for extraordinary solutions, catering to segmented conduit systems, corrugated conduits with integrated thread connections, special shapes for customised installations, square, hexagonal and oval corrugated conduits, and even multi-layer corrugated conduits (co-extrusion), among others.

FIPSHIELD®: EMI/EMC Fittings and Accessories

FIPSHIELD® is the product line containing solutions for electromagnetic shielding of sensitive cables and data lines, ensuring compliance with industrial EMC guidelines (electromagnetic compatibility). FIPSHIELD® accessories offer optimal electrical transitions from the braided screen to the connection housing, resulting in high screening effectiveness with low transfer impedance. These fittings are equipped with the tried and tested FIPLOCK® ONE connection for the matching FIPLOCK® corrugated conduits.

With FIPSYSTEMS® cable protection solutions, FRÄNKISCHE Industrial Pipes revolutionises cable protection in the railway industry, providing enhanced safety, efficiency and reliability for rail and trackside applications.

Contact us for more information

www.fraenkische-ip.com
marketing.fip@fraenkische-ip.com
+49 9525 88-0

McCulloch Turnout Solution



A new way to lift, install
and remove S&C.



The MTS can access and egress almost anywhere on track. It can move with ease pre-built panels in any direction before installation, allowing you to handle S&C installation with ease. The MTS also removes the need for large work areas, or temporary track along with associated planning challenges.



Combined 50,000kg
lifting capacity.



No set up
time.



Increased
manoeuvrability.



Remote control
operation.



Tilting wagon
unloading.



Caterpillar
tracks.

Find out more at
mccullochgroup.com



McCulloch Group

Scottish Innovators ‘Do It Again’

Scottish-based McCulloch Group, which has been operating since 1992 in offering rail solutions including contracting services, has developed a reputation for the creation of bespoke on track plant which utilises the group’s unique methodology.

Having successfully rolled out a range of kit including their Track Rail Transformers (TRT™), Panel Lifters, Track Cable Transporters, and the McCulloch Multi-Purpose Vehicle their latest innovation is due to be finished testing this September.

Following a rigorous development process which has been strongly influenced through their thirty plus years of experience working on the infrastructure, the McCulloch Group is proud to unveil the McCulloch Turnout Solution (MTS). The MTS has been designed by their in-house design and engineering team following an initial concept from inventor and co-owner Billy McCulloch. With each individual piece of plant able to lift an impressive 25 tonnes – and when working in pairs 50 tonnes – the MTS has been designed to alleviate many of the problems known when installing, removing and moving turnouts across the infrastructure. The MTS has been uniquely designed to lift off tilting wagons, move larger panels in multiple directions and work within confined spaces – without the need for additional pieces of equipment such as cranes.

Following a successful unveiling at this year’s Rail Live in June with their two prototype machines, McCulloch has been inundated with enquiries for the MTS across the globe. The once small family business based in Ayrshire, Scotland, now regularly works across America, Australasia and Europe to name but a few of the far

stretched areas of the globe their track has made its footprints. The MTS, like all McCulloch plant, will begin its life working on the UK infrastructure with the first job planned for the end of October; following which a strong demand from client partners in Australia will see several of the machines heading ‘down under’.

“As a business we are known for our innovations, and it is truly within our daily lifeblood to continue innovating. The development of the McCulloch Turnout Solution is testament to this, and we look forward to rolling this out across our work with clients over the coming months,” shares David Girdler, Chief Executive Officer of the McCulloch Group.

The McCulloch Group continues to update progress on the development of the MTS via their social media channels and website.

For further information contact
enquiries@mccullochgroup.com or
visit mccullochgroup.com



Harsco Rail

Harsco Rail's Successful Partnership with SAR in Improving Rail Quality



Harsco Rail had the opportunity to collaborate with Saudi Arabian Railways (SAR) in December 2022 to enhance rail conditions across their network.

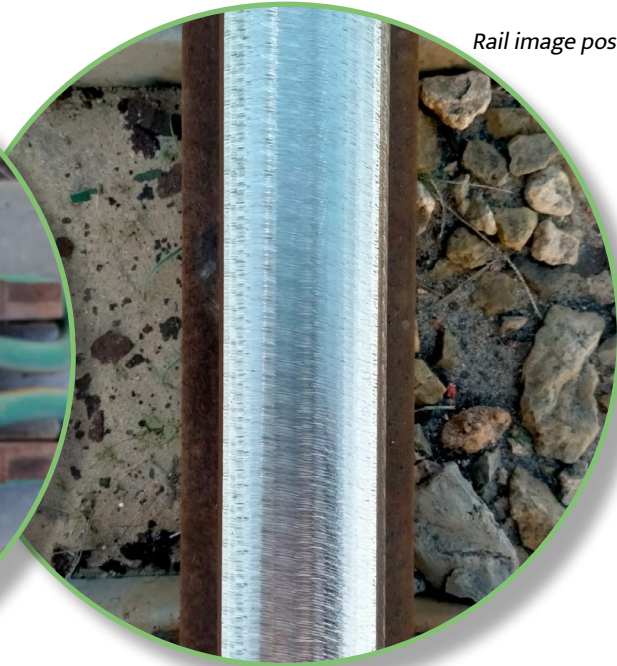
As an infrastructure owner, SAR has the responsibility to ensure that the rails are in excellent condition, without defects, which result in improved ride quality

and the prevention of potential incidents due to rail failure. Therefore, SAR engaged with Harsco Rail to perform a high-quality grinding process to achieve their rail quality goals.

After initial consultations, Harsco Rail's team recommended the 20-stone Transit Switch Grinder, which was specially designed for the type of tracks in Saudi Arabia. This grinder has advanced features,



Reading of surface roughness post-grinding



Rail image post-grinding

including precision controls, automated functions and durable construction that could withstand the demands of heavy use. Additionally, it is highly effective in removing rail defects such as RCF, corrugation, lipping, etc., both in plain lines and switches.

Harsco Rail made sure that the machine was sufficiently crewed with a team of experienced operators and mechanics, established a local stock of spare parts and consumables, built a mobile warehouse and workshop, and planned 235 shifts per year. As a result, the machine had an availability rate of 98.6% until today,

and ongoing support is provided to ensure the grinder continues to perform optimally over time.

To date, Harsco Rail has performed rail grinding on over 250kms while reprofiling the rails to industry standards, achieving an average rail roughness of 4 microns. Well-maintained rails will result in significant savings for SAR, as grinding removes rail surface defects, which are a common cause of rail failures, and significantly reduce wear on running components on rolling stock.

In the words of SAR's representative: "We are very content and happy with the progress and grinding quality provided by Harsco Rail. It has helped us to significantly improve the quality of our tracks. We appreciate the ongoing support provided by Harsco Rail's team."

At Harsco Rail, we are thrilled to have been able to assist SAR in achieving their grinding goals, and we look forward to continuing to work with them in the future. We are committed to providing our customers with the best-possible equipment, services and support to help them achieve success.

www.harscorail.com



Harsco Rail Transit Switch Grinder (20 stone)

HARSCO RAIL
Enabling TECHNOLOGY IN MOTION

High-Quality Used Rail Maintenance Equipment at Affordable Prices

If you're in the market for rail maintenance equipment but don't want to break the bank, you're in luck! We offer a wide selection of high-quality used machines at affordable prices.



Our used machines are carefully inspected and refurbished to ensure they are in top working condition. We have a variety of equipment available, including:

- ✓ **Tampers**
- ✓ **Rail grinders**
- ✓ **Ballast regulators**
- ✓ **Track renewal trains**
- ✓ **And more!**

No matter what type of equipment you need, we have options available to suit your needs and budget. Plus, with our experienced team of technicians, you can rest assured that your equipment will be well-maintained and ready to perform when you need it.

Don't wait to take advantage of our great deals on used rail maintenance equipment! Contact us today to learn more and find the perfect equipment for your needs.



Scan this code to contact us:

ZÖLLNER

Safety Revolution for Track Renewal Worksites



With more than 20 years of experience in France, ZÖLLNER has established itself as one of the leading experts on automatic warning systems.

Located in Amilly since 2006, ZÖLLNER has long-lasting relationships with partners such as SNCF and SFERIS. Striving for innovation and constant improvement, ZÖLLNER developed the newest generation of automatic track warning systems ATWS which have been authorised on SNCF infrastructure since 2022.

The Mission

One of ZÖLLNER's areas of expertise is the flexibility and modularity of its products, allowing the system to be adjusted to fit all worksite conditions. From small, fast-moving and temporary worksites (for example patrolling rounds) to large worksites with a length of several kilometres (for example track renewal) – the ZÖLLNER mobile radio warning system (MRWS) is the perfect solution.

ZÖLLNER avec plus de 20 ans de présence en France a su s'imposer comme étant la référence en système de sécurité d'annonce ferroviaire.

Implanté historiquement à Amilly depuis 2006 dans le Loiret, ZÖLLNER France entretient une relation de confiance avec ses partenaires historiques (SNCF, SFERIS). Dans un souci d'amélioration et d'innovation constante, la SNCF a ainsi autorisé depuis 2022 la dernière génération de dispositif d'annonce portatif radio (DAPR).

L'objectif

L'expertise de ZÖLLNER est axée sur l'évolution, la modularité et la compatibilité de ses produits pour répondre aux problématiques de tous les chantiers. En anticipant les besoins futurs du secteur ferroviaire, ZÖLLNER a développé une nouvelle génération de DAPR qui apporte des fonctions supplémentaires.

All warning devices in the MRWS are equipped with the Autoprowa® effect meaning that the environmental noise level is continually measured using microphones integrated into the warning device. Warning signals are then issued exactly as loudly as they need to be yet as softly as possible in order to minimise noise pollution.

Innovations and Ambitions

Faced with the constant evolution of the rail sector, ZÖLLNER remains at the forefront of innovation, developing solutions adapted to the ever-increasing challenges in terms of safety for personnel on and around worksites. The complexity and density of infrastructure works are constantly growing with increasing investments, making it essential to offer products capable of meeting these new requirements.

The newest warning device in the MRWS portfolio can therefore be easily installed on any track vehicle which means that the warning signal can be directed exactly where it needs to be heard and thus minimises noise pollution surrounding the worksite. The warning device is SIL4-certified, eliminating the risk of human error and creating a much safer work environment for everyone.

In 2022, ZÖLLNER introduced a solution which implements the warning system directly into ERTMS level 2, allowing the warning to be triggered by the interlocking system. This solution was developed together with SYSTRA. It brought with it a significant time and costs reduction for each worksite. ZÖLLNER has developed similar solutions for customers in Austria and Belgium as well.

With the new CLARIS system, it is now also possible to integrate the warning device directly into the protection gear of vegetation workers.

Large construction companies are relying on one of one of ZÖLLNER's newest solutions for quickly moving consecutive track renewal. The ZPW126-10, a new generation of warning devices, can be attached directly to the construction vehicle. The warning signal is therefore delivered exactly where the work is carried out, creating a safe work environment. The simple set-up allows for maximum flexibility while keeping installation times short.

Par exemple, elle permet de sécuriser des petits chantiers tels que les tournées d'inspection jusqu'aux chantiers mécanisés de plusieurs kilomètres (type GOP ou Suite Rapide). Cette version intègre également le réarmement automatique pour des chantiers allant jusqu'à environ 1000 m pour chaque dispositif.

L'effet AUTOPROWA permet aux avertisseurs d'annonce ZÖLLNER d'adapter le niveau sonore de l'annonce automatiquement au niveau du bruit de fond. L'annonce sonore n'est aussi élevée que nécessaire pour avertir les travailleurs en toute sécurité.

Innovations et Ambitions

Face à l'évolution constante du secteur ferroviaire, ZÖLLNER reste à la pointe de l'innovation, développant des solutions adaptées aux défis toujours croissants en matière de sécurité sur les chantiers. La complexité et la densité des travaux d'infrastructure ne cessent de croître avec l'augmentation des investissements, rendant primordiale l'offre de produits capables de répondre à ces nouvelles exigences.

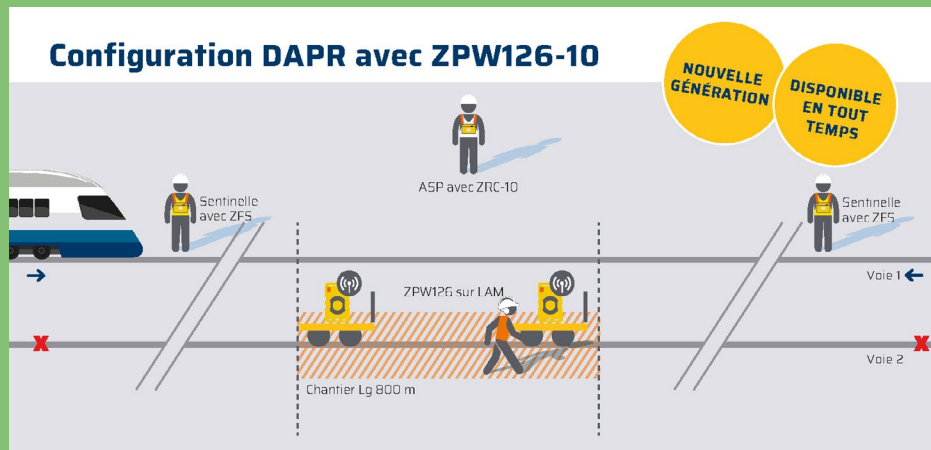
Dans cette perspective, la dernière version du DAPR peut être aussi installé sur le matériel roulant. Cette innovation respecte le niveau de sécurité SIL4. Elle minimise les risques liés à l'erreur humaine tout en réduisant les nuisances sonores, faisant ainsi des chantiers ferroviaires des environnements plus durables.

En 2022, ZÖLLNER a pu présenter une solution codéveloppée avec SYSTRA repoussant les limites des systèmes existants en implémentant son système d'annonce sur les lignes équipées d'ERTMS niveau 2. Ce système (SCWS) permet de nouvelles configurations d'annonces tout en réduisant le temps et les coûts d'utilisation. ZÖLLNER a déjà déployé des systèmes similaires en Autriche et en Belgique.

En outre, ZÖLLNER a développé le système CLARIS pour les chantiers de débroussaillage que permet aux utilisateurs de communiquer par voix vocale (radio) entre eux et d'éviter ainsi des accidents.

C'est pour des chantiers clé français de suite rapide nationale et de rénovation de voie que des grandes sociétés ont décidé de faire confiance à la dernière innovation technologique de ZÖLLNER. Les équipes de sécurité peuvent maintenant assurer l'annonce des trains, grâce à la nouvelle version du DAPR de

Configuration DAPR avec ZPW126-10



The diagram above shows a construction site with warning devices installed on two LAMs. The warning devices thus follow along with the personnel as they continue their work on a worksite stretching over 800m. The lookouts carrying the radio transmitters ZFS remain at the same spot throughout the duration of the work being carried out along this stretch.

Le schéma ci-dessus montre un chantier avec des avertisseurs installés sur deux LAM. Les avertisseurs suivent les personnes en fonction du travail dans une zone d'enveloppe de 800m. Les sentinelles portant les boîtiers d'annonce ZFS restent aux mêmes points d'origine d'annonce pendant toute la durée du chantier.

More Safety for Track Renewal Worksites

The French operator SNCF and its partners have approved and certified the system for deployment on their infrastructure which has drastically increased the level of safety for everyone involved in the construction project. The SIL4 system does not require cable connections as it works solely by radio signal and therefore makes it possible to secure a fast-moving worksite with all its large machines, railroad excavators, trucks, etc.

The ultimate objective for developing this specific system was to secure worksites of tens of kilometres without requiring an unmanageable amount of hardware all while keeping the noise pollution at a minimum.

The ZÖLLNER MRWS allows companies to choose a solution that best matches their work situation, whether that includes warning devices on the ground, on board construction vehicles or a combination thereof.

Click [here](#) for more information.

ZÖLLNER, directement embarqué sur les trains de travaux. L'annonce est délivrée au plus près des opérations, permettant un gain de sécurité, tout en diminuant le temps de mise en place des dispositifs et en maximisant la flexibilité.

Renforcement de la Sécurisation des Chantiers de Renouvellement de Voies

Les équipes SNCF et partenaires ont validé avec succès le concept, préparant ainsi les chantiers de demain avec un niveau optimal de sécurité (SIL4). Le signal d'annonce, transmis directement par liaison radio, permet de supprimer un grand nombre de câbles le long de la voie et facilite donc les déplacements de l'ensemble des intervenants et les travaux.

A terme, l'objectif est une couverture totale de toutes les opérations de suite rapide sur plusieurs dizaines de kilomètres. En assurant l'annonce au cœur même des chantiers, le système ZÖLLNER augmente globalement la sécurité de ceux-ci. On peut sécuriser au plus près tous les acteurs terrain, pelles rail-route, lorries à main, en plus des trains de travaux et des opérateurs au sol.

Le DAPR nouvelle génération permet aux entreprises de choisir la méthode la plus adaptée pour sécuriser leurs chantiers, avec un système au sol, à bord des trains ou les deux.

[Plus ici.](#)

ZÖLLNER
signal system technologies

Columbus McKinnon

Columbus McKinnon Engineered Products Manufactures Lifting System for the First Time via Local Partners under the 'Make in India' Initiative

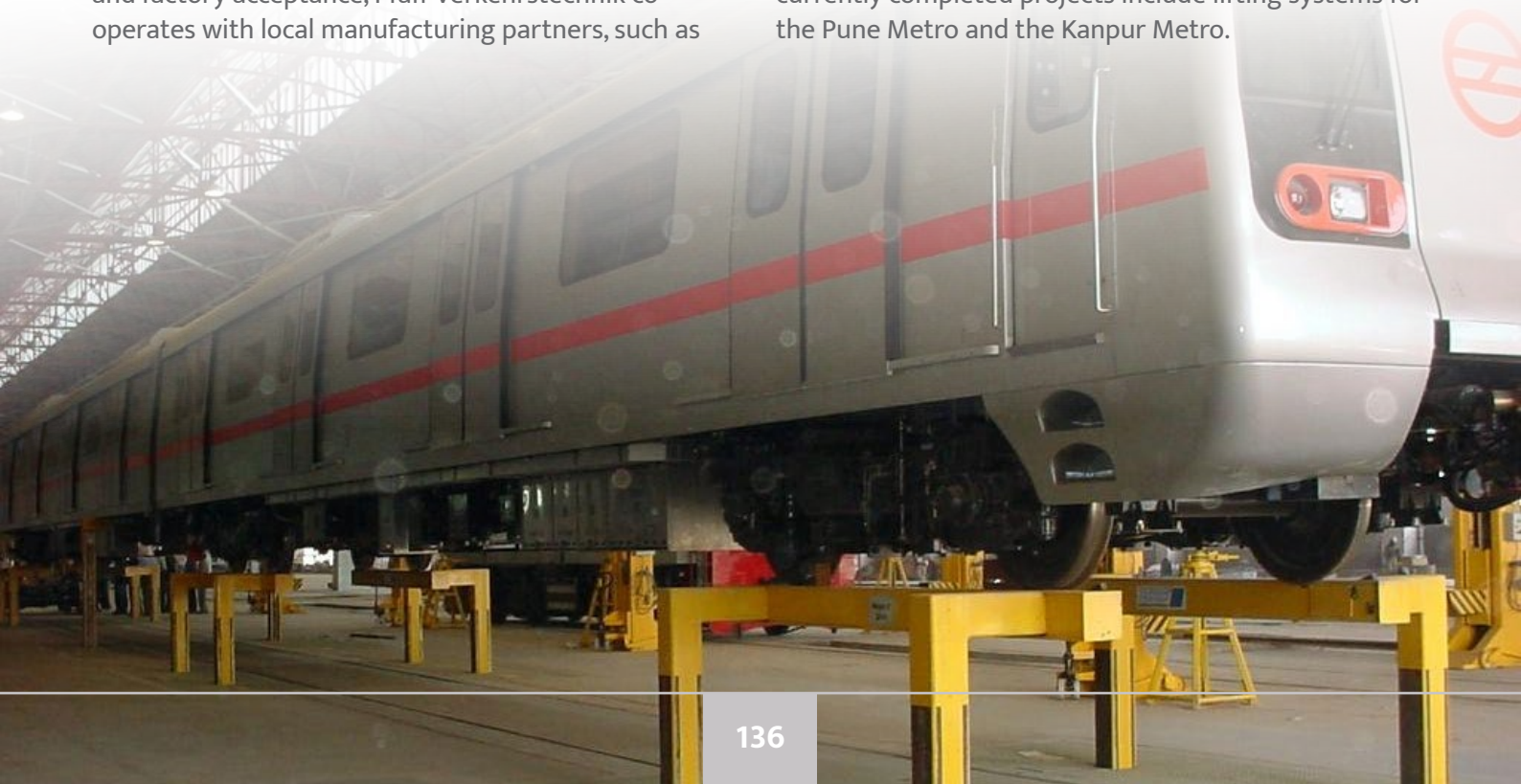
Pfaff Verkehrstechnik, which now trades as Columbus McKinnon Engineered Products, has delivered an underfloor lifting system to the Indian customer HYT Engineering Company, which, for the first time, has been manufactured locally under the 'Make in India' initiative, i.e. where the Indian manufacturing contribution is more than 50%.

For the first time, the factory acceptance test of an underfloor lifting system including load tests was carried out on site in India in June 2023 and was approved at the first attempt in Ahmedabad without any flaws. To meet the requirements of the initiative and factory acceptance, Pfaff Verkehrstechnik co-operates with local manufacturing partners, such as

Stahl India, part of Columbus McKinnon, and Techno Industries, a leading Indian manufacturer of cranes, lifts and escalators.

First Factory Acceptance Test on Site in India

In previous and already completed projects with underfloor lifting systems, the acceptance tests were still carried out in Europe, for example in 2002 for the Delhi Metro at the Shastri Park Depot, which is still in operation there after more than 20 years. Pfaff was also the supplier of India's first six-carriage lifting system, built in 2013 to connect New Delhi Airport. This was followed by an eight-carriage system in 2021, which was commissioned at the Badli depot in New Delhi. Other currently completed projects include lifting systems for the Pune Metro and the Kanpur Metro.



The pre-assembled system, which was accepted in Ahmedabad, is currently on its way to HYT Engineering, where it will be prepared for final assembly at the Shakurbasti depot near New Delhi. From the end of 2023, it will be used there for the maintenance and servicing of eight-carriage Vande Bharat trains. The end user of the lifting system is the state-owned railway company Indian Railways. It operates most of the nationwide rail transport.

Initiative for Economic Growth in India

The 'Make in India' initiative is a campaign launched by the Indian government in 2014 to make the country a global manufacturing hub by strengthening the domestic manufacturing industry, creating jobs and promoting economic growth. The initiative has led to some significant investments in India and positioned the country as an attractive manufacturing location. The Vande Bharat Express is a domestic high-speed train – also 'Made in India'. It reaches top speeds of 180km/h, with an operating speed of 130km/h on its short routes for safety reasons.

The Vande Bharat Express connects major Indian cities within a day's travel, which is extremely important for commuting. For example, it runs between New Delhi and Varanasi – a distance of about 800 kilometres, which it covers in about 8 hours – compared to up to 14 hours required by other trains. The train offers a range of passenger conveniences, including air-conditioned carriages, comfortable seats, large panoramic windows, Wi-Fi, GPS-based information systems and a modern entertainment system.

Pre-Assembled Modules on the Way to Assembly

With the new underfloor lifting system from Pfaff Verkehrstechnik, complete Vande Bharat trains with a total length of 192m can be raised to an ergonomic working height, for example for inspection or to comfortably carry out maintenance work such as the replacement of bogies. The synchronisation of the wheel lifting platforms is controlled within a narrow tolerance range of $\pm 5\text{mm}$, meaning that over the entire length, the maximum height deviation of the lifting platforms is only 10mm. The cantilever design ensures that the removed bogies can be pushed underneath the lifted train for separate maintenance.



Depot Equipment

Pfaff Verkehrstechnik produces lifting system for the first time via local manufacturing partners in India under the 'Make in India' initiative



Example of a project that has already been completed: an 8-carriage system at the Badli depot in New Delhi

Commissioning Planned before the End of the Year

The underfloor lifting systems comply with the highest safety regulations, such as the European standard for vehicle lifts DIN EN 1493. Delivery in pre-assembled modules minimises assembly times on site. Thanks to this modern system, the Vande Bharat trains can be maintained in a much shorter time than before. Due to short setup times, the vehicles are quickly ready for operation again, and their operating times in transport use are extended. When not in use, the systems can be retracted into foundation pits flush with the ground.

The delivery and installation of the lifting systems at the Shakurbasti depot is scheduled to be completed by August 2023, so that operations can begin in the workshops after handover and training of the operating crew.

About Columbus McKinnon Engineered Products

Columbus McKinnon Engineered Products GmbH, Kissing/Germany, is a company of the listed **Columbus McKinnon Corporation (CMCO)**, Charlotte/USA, a leading supplier of lifting and materials handling equipment. The company has ranked with its brand

Pfaff-silberblau for many decades amongst the technology leaders in components and system solutions for mechanical motion and lifting technology. The portfolio ranges from sophisticated screw jack elements to innovative linear drives through to powerful lifting tables and wire rope winches. Based on these components, Columbus McKinnon Engineered Products also offers customized solutions for a wide range of different fields of application and supplies complete planning, installation and maintenance of turnkey jacking systems for rail vehicles used worldwide.



Scan or click the QR code to find out more about Columbus McKinnon





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Totalkare

Snowdon Mountain Railway Invests in Lifting Jacks

Visitors to Mount Snowdon in North Wales can continue looking forward to one of the most scenic railway journeys in the world after the **Snowdon Mountain Railway** invested in lifting jacks from rail depot equipment experts Totalkare.

The Snowdon Mountain Railway operates both traditional diesel services and heritage steam experience trips to the summit of Snowdon between April and October each year, the latter pushed by an original Swiss steam locomotive from 1896.

To ensure continuation of service, timely and efficient maintenance of the locomotives is essential and the investment in a set of railway lifting jacks from Totalkare will help to facilitate this by providing access to the underside of both the locomotives and carriages.

Totalkare's railway lifting jacks are made to order and are available in lifting capacities from 5,000–50,000kg per jack. While a set of four lifting jacks is sufficient to lift a single carriage, the jacks can be connected in series up to 128 jacks, enabling an entire train to be lifted at once if required. They feature a computerised control unit, providing easy synchronicity, and carry an IP55 level of electrical protection.

The 5,500kg railway lifting jacks for Snowdon Mountain Railway replace a previously supplied solution from Totalkare, based on the company's road vehicle mobile column lifts with bespoke anvil attachment, which has reached end of life. The new lifting jacks will be supported by a Totalkare service package which includes two field service engineer visits per year as standard.

"Our previous locomotive lifting equipment served us very well but was nearing the end of the line,"

commented Hugh Jones of Snowdon Mountain Railway. "We've always been pleased with the quality-of-service support provided by Totalkare, so it was a natural choice to return to them for our new rail lifting jacks."

Brian Young, National Accounts Manager and rail specialist for Totalkare, said: *"Our railway lifting jacks are a versatile and effective way of raising rail vehicles into the air for the purposes of essential repair and maintenance. We are delighted to continue supporting such an iconic rail service at one of the UK's premier tourist destinations."*



TOTALKARE

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a2b Global Media Editorial Calendar

Magazine Schedule

The publication dates and the associated content-submission deadlines are provided below. We frequently focus our magazines around major industry shows. Please feel free to enquire if you want to know what these shows will be.

Issue	Content Deadline	Publication Date
2023		
 Issue Two	21 August	25 September
 Issue One	21 August	26 September
 Issue Four	25 September	31 October
2024		
 Issue One	04 December	09 January
 Issue One	01 January	06 February
 Issue Two	15 April	21 May
 Issue One	24 April	30 May
 Issue Three	08 July	27 August
 Issue Two	20 September	28 October
 Issue Four	28 October	03 December

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