

Railway-News

M A G A Z I N E

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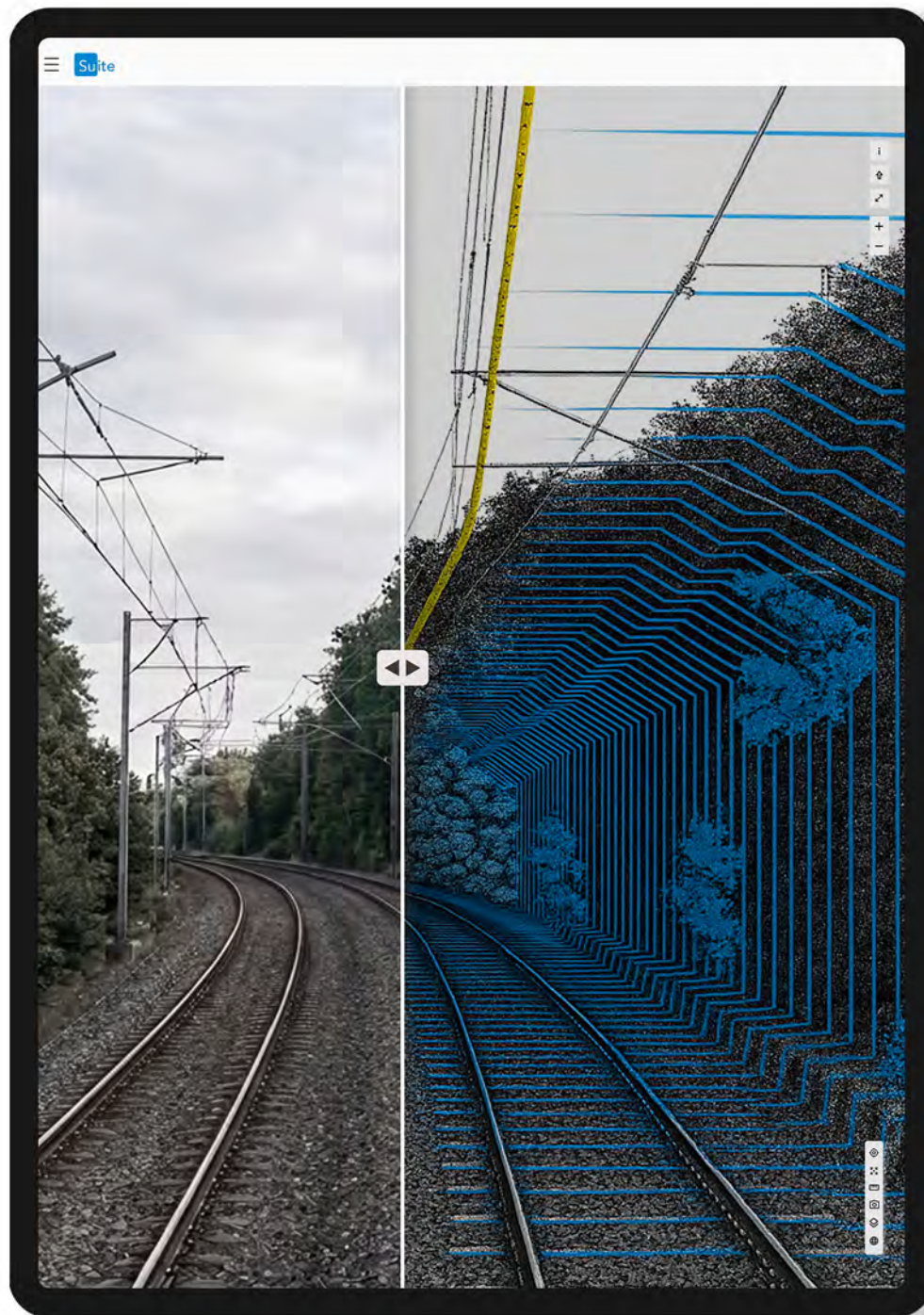
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Switch to at-scale LiDAR data analysis with production-grade software to dramatically improve maintenance performance!

Letter from the Editor



Dear Readers,

InnoTrans returns to Berlin from 22 to 25 September 2026 and this year the show marks its 30th anniversary: it is the 15th edition of the event since it first opened in October 1996. That milestone runs through much of this issue, in which we are featuring many of the industry supply chain exhibiting at the event.

imc Test & Measurement sets out its long-running relationship with TÜV SÜD Rail, and how a co-development project solved a packaging problem that had been causing costly downtime during wheelset homologation testing (p.14).

Hexagon (p.160) writes about its partnership with Track Forward on predictive wheelset maintenance. Hexagon's CALIPRI system takes non-contact, rapid wheelset measurements in operation; that data feeds into Track Forward's WheelSense analytics platform, which places individual measurements in operational context to flag wear development early and support

forward-looking maintenance planning rather than reactive inspection. The two companies are exhibiting the joint solution together at InnoTrans, Hall 23, Stand 530.

voestalpine Railway Systems writes about track and special trackwork at system level rather than component level (p.52). Gradall TrackStar looks at the shrinking maintenance window facing track teams and its case for a single-machine approach to track access (p.90). In Rolling Stock, Grueber marks nearly 200 years in spring manufacturing and plans to unveil its Steel Spring Generation 4.0 technology alongside iSpring, a digital measurement and monitoring system for in-service springs, at the show (p.113). HANNING & KAHL, family-owned since 1898, will be in Hall 27, Stand 610, debuting its new BrakeMaster braking system and a new filter flushing system for hydraulic brakes (p.151).

If you are attending the show, you can find all of our suppliers attending this year's InnoTrans in the Supplier Spotlight (p.7). As always, thank you for reading.



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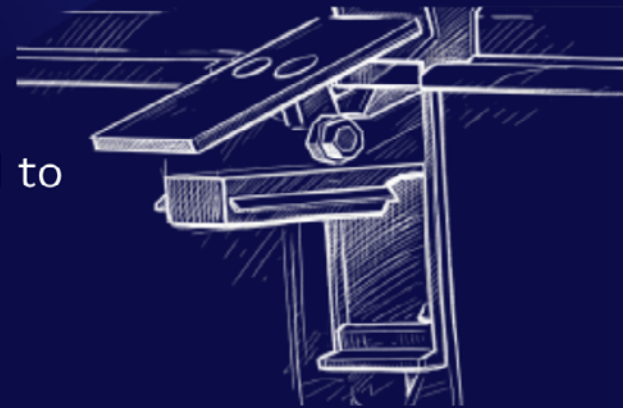


OPENING DOORS TO THE FUTURE OF MOBILITY

MEET BODE AT INNOTRANS 2026

From **22–25 September 2026**, BODE will once again be showcasing innovative solutions for the rail industry at InnoTrans in Berlin.

This year, we are excited to present a brand-new innovative product, designed to enhance passenger access and comfort while supporting the future of rail transportation.



Visitors can also discover our BMU-3, an intelligent multi-functional sensor that combines several monitoring functions in one compact solution to improve safety.

Join us at our stand to explore these solutions in more detail and be among the first to discover our latest innovation.



Scan for more Information



VISIT US AT HALL 2.2 | BOOTH 110



InnoTrans 2026 Supplier Spotlight

	EXHIBITOR NAME	HALL NUMBER	STAND NUMBER
A	ABB	9	320
	ASC Sensors	27	690
B	Bender UK	9	350
	Blastman Robotics Ltd	6.2	375
	BODE UK & Ireland	2.2	110
	Blue & Green AB	6.2	250
C	Otto Christ AG, Wash Systems	10.2	235
	cn-mobility	2.1	720
	Construcciones y Auxiliar de Ferrocarriles (CAF)	4.2	130
D	Daktronics	2.1	840
	DSRailTech a.s.	23	415
	Dual Inventive	Outdoor Display	0/362
	Diab Group	3.1	790
	Dellner	1.2	210
E	EAO Group	27	750
	Evident Inspection Technologies	1.2	210
	Expretio	2.1	435
F	Finnblast Oy	6.2	750
	FLENDER	20	340
	Frauscher Sensor Technology	27	270
	FreiLacke	8.1	310
	Frequentis	4.1	740
	FORTEC UK	11.1	360
G	GCF Generale Costruzioni Ferroviarie	26	315
	Goldschmidt	25	485
	Gradall Trackstar	26	225
	griwecolor	8.1	310
	Güde GmbH	25	170
	Grueber GmbH & Co. KG	9	425

	EXHIBITOR NAME	HALL NUMBER	STAND NUMBER
H	HANNING & KAHL GmbH & Co. KG	27	610
	HellermannTyton	12	420
	Hexagon	23	530
	Holland	26	170
	Holmatro	23	630
I	Icomera	22	340
	imc Test & Measurement	CityCube A	350
	infraView	CityCube A	110
	intreXis AG	17	165
J	J. LANFRANCO & Cie	8.2	120
	JUMO Group	CityCube A	240
K&L	Kiel Americas	1.1	270
	LA-CO Industries Europe	8.1	305
M	MAE. Maschinen- und Apparatebau Götzen GmbH	23	760
	MATTEI GROUP	1.2	201
	MAURER MAGNETIC AG	23	970
	Mechan	4.2	150
	Mersen	9	220
	MoniRail	2.2	460
	Mosdorfer Rail Ltd	21	350
N	netwiss	6.1	210
	NEXCOM International Co., Ltd	4.1	615
	Nokia	4.1	360
	Nomad Digital	4.1	260
P	Palfinger Passenger Lifts	26	525
	Pandrol	23	250
	Plasser & Theurer	26	270
	Polarteknik	3.1	730
	PowerRail	18	210
	Premium Power Supplies	17	425

	EXHIBITOR NAME	HALL NUMBER	STAND NUMBER
R	Rail Vision	27	760
	Rex-Royal AG	1.1	570
	ROBEL	26	470
	Rowe Hankins Ltd	2.2	460
	RECOM	17	320
	Roediger Vacuum	CityCube B	220
S	SCHURTER TrenoLux	1.1	220
	Sécheron	9	240
	SEKISUI KYDEX, LLC	27	701
	SENSIT s.r.o.	23	415
	Sensonic	27	310
	SGS	22	700
	Siemens Mobility	7.1c	200
	Škoda Group	3.2	600
	Southco Manufacturing Ltd.	3.1	300
	Stäubli	12	350
T	Televic Rail	2.1	505
	Texelis Transport	20	570
	TransCore	23	215
	Transmission Dynamics	7.1a	520
	TÜV SÜD	CityCube A	645
V & W	voestalpine Railway Systems	21	150
	Wavetrain Systems AS	22	375
Z	ZAUGG AG	26	425
	ZF Group	20	580
	ZÖLLNER Signal GmbH	25	570

See you there!

a2b Global Media will also be at Innotrans 2026! To book in a meeting with one of our Account Managers at the event you can do so via this [link](#) then we'll be in touch to finalise the time, date and location!

InnoTrans 2026

By Joey Stoaate



Where: Messe Berlin Exhibition Grounds
When: 22–25 September 2026
Who: Messe Berlin

Returning for what is simultaneously its 15th and 30th anniversary; InnoTrans is back following a record-breaking event in 2024, bringing to the fore new innovations, new solutions and new networking opportunities.

Held every two years at the Messe Berlin Exhibition Grounds; InnoTrans brings together industry professionals, experts, companies and leaders to celebrate the international rail sector, offer the chance to get an early look at brand-new technologies, experience insightful conferences and network with individuals from across the globe.

Exhibition Structure and Highlights

Divided into five separate segments; InnoTrans 2026 will turn its focus to Railway Technology, Railway Infrastructure, Public Transport, Interiors and Tunnel Construction. The exhibition will showcase technology from across this wide spectrum, from propulsion systems, maintenance equipment and track construction to ticketing systems, passenger information and equipment for underground construction.

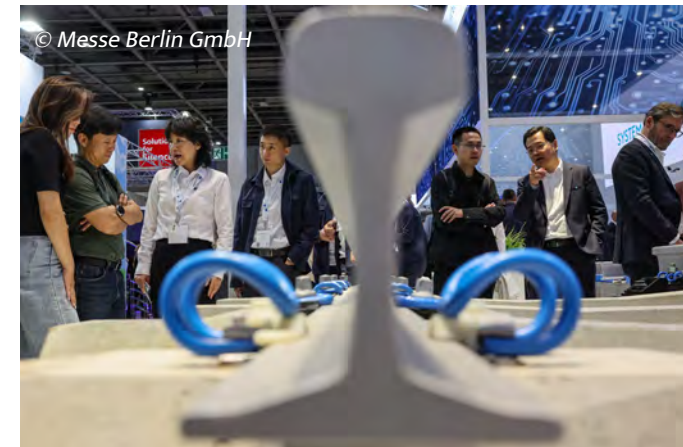
This year, attendees can expect to witness displays and

discover new products across all 200,000 square metres of the Messe Berlin Exhibition Grounds' 42 halls. In 2024; the event hosted more than 2,900 exhibitors from over 50 countries, with a total of 169,214 visitors from 128 different countries – making it one of the largest gatherings of rail professionals anywhere in the world.

The show as a whole is spread across six different areas: an Outdoor Display, a Bus Display, the InnoTrans Campus, Mobility+, the AI Mobility Lab and Travel Catering & Comfort Services, where both products and their representatives will be on hand to discuss any potential collaboration and answer any burning questions that might need an answer.

Exhibitors

With every InnoTrans event attracting some of the brightest and best the industry has to offer, 2026 is sure to be no exception. Notable exhibitors set to be in attendance this



year include Siemens Mobility, Hitachi Rail, CRRC Academy, Vossloh AG, Continental, Bozankaya and ABB Schweiz AG.

In addition to hosting their own respective stands, exhibitors in attendance will also have the opportunity to present solutions via a number of different presentation formats, with this year seeing the return of InnoTrans' Speakers' Corner, which offers exhibitors free opportunities to demonstrate their content and products to the audience on site and in front of screens; the Talent Stage, which allows companies the chance to present themselves to interested, young career professionals; and the aforementioned Mobility+ Corner and AI Mobility Corner, a set of hall forums for presentation and discussion rounds lasting a maximum of 60 minutes in which companies present products and industry news from the respective subject areas.

The InnoTrans Convention

From its famous Opening Ceremony to its plethora of talks, discussions and panels; InnoTrans' convention programme promises to offer yet more insight into the state of the international rail sector in 2026.

This year, the EU Commissioner for Sustainable Mobility and Tourism, Apostolos Tzitzikostas will officially open the event, with opening discussions set to feature industry figureheads such as DB Chief Executive Evelyn Palla, marking her first major industry trade fair in the role, and Martin Sion, CEO of Alstom, who is also attending InnoTrans in his new position.

Other participants are set to include Michael Peter, CEO of Siemens Mobility, and Škoda Group Chief Executive Petr Novotný.

Elsewhere, the annual convention programme will include a number of themed programmes, such as the Dialogue Forums, which will feature sessions hosted by the Association of the German Railway

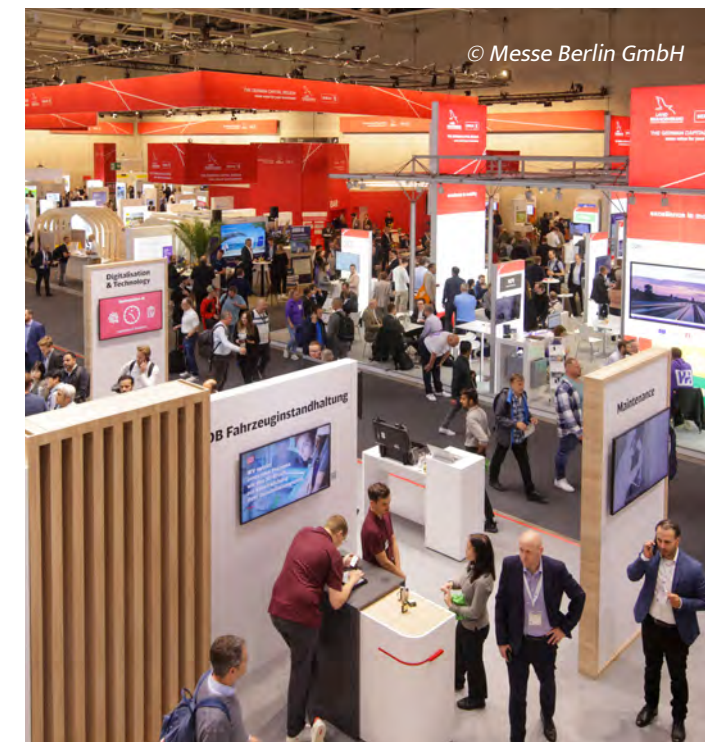
Industry (VDB), the German Transport Forum (DVF), the European rail supply industry association UNIFE, and the electrical and digital industries association ZVEI.

Planned sessions are set to include discussions on subscription-based rail technology, efficiency in rail operations, the evolution of the European Rail Traffic Management System (ERTMS), resilience in transport systems, and cybersecurity challenges in the rail sector.

A Rail Leaders' Summit will bring together senior representatives from government, railway companies and infrastructure operators. The summit, which has been organised by Deutsche Bahn AG, the German Federal Ministry of Transport, and Messe Berlin, will include a session on high-performance rail infrastructure and system resilience.

The show will also play host to the Railway Influencer Festival, which, for the second time, will see the crowning of a number of recipients of the Railway Influencer Award, with winners honoured for their outstanding contributions to the transport industry. Categories for the award include Best InnoTrans Video, Best Brand Video, Best Mobility Channel, and Best Urban Mobility Video.

With InnoTrans 2026 shaping up to be one of the biggest outings in its history, and the last before the debut of InnoTrans Asia in 2027; this year is sure to set an entirely new bar for the world's biggest rail showcase – and you won't want to miss it!





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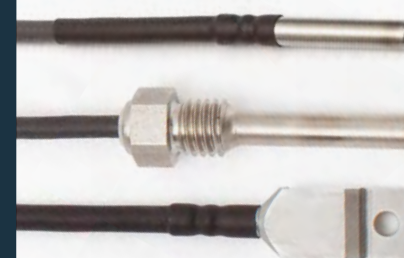
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22–25 September
Hall 27 | Stand 701

We'll be pleased to tell you more about our latest products.



Measurement & Testing Services

imc Test & Measurement

When Partnership Drives Innovation



imc MTP-NT-XS Telemetry System in a road test, installed on a wheel set ©TÜV SÜD Rail

When downtime during homologation testing costs thousands a day, the packaging of your telemetry system matters as much as its performance.

Unplanned downtime during train homologation is a costly problem, as when test programmes stall, instrumented trains sit idle and bills mount up.

TÜV SÜD Rail's test centre in Berlin is where wheel-rail force measurement underpins the safety certification of new vehicles entering service. The measuring wheelset system at the heart of that process needs to work every time.

The challenge begins with the measurement itself. There's no way to instrument the wheel-rail contact zone directly, so the wheelset is used as a force transducer: strain gauges measure its deformation, from which the acting forces are calculated. A rotating wheelset

can't be cabled, so telemetry is the only solution, and it's an unforgiving environment: dust, moisture and the extreme accelerations of steel wheels on rail tolerate nothing less than purpose-built equipment.

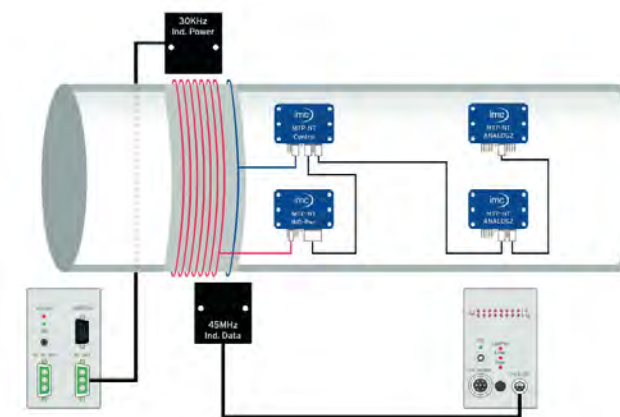
In such an environment, failures of electronics happen. The duration of the downtime however, must be kept low to minimise testing costs.



imc MTP-NT-XS housing variants for transmission and amplifier modules; © imc Test & Measurement

The downtime TÜV SÜD Rail was experiencing wasn't caused by the quality of its imc Test & Measurement telemetry components, but how they were packaged.

Earlier systems, including Caemax's P-32, required drilling through the axle, adding significant preparation time before a single measurement run could begin.



Installation Principle for imc MTP-NT Modules on a Shaft, Inductive Power Supply, and Data Transmission
© imc Test & Measurement

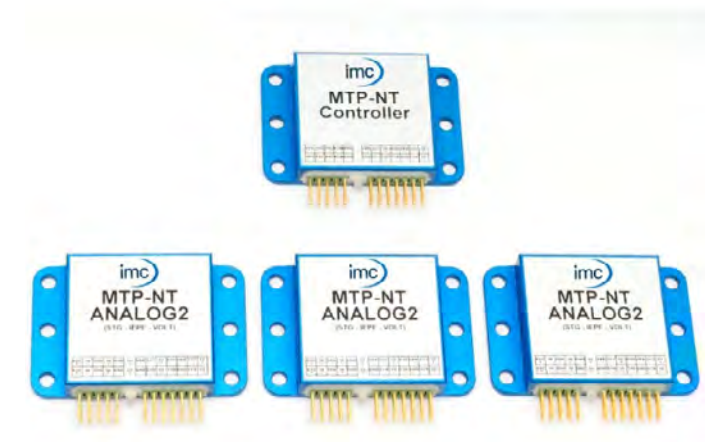
Later radially mounted discrete solutions addressed that but brought their own difficulties: bespoke enclosures built from scratch for every project, with limited accessibility that complicated maintenance mid-programme. If anything needed changing out, recovery meant bringing the train to a pit, desoldering and resoldering connections, and recommissioning before testing could resume.

A co-development project produced a solution: standardised, field-swappable housing for imc's MTP-NT-XS modular telemetry platform, designed specifically for the rail test environment and proven in deployment.

A Partnership Built on Precision

TÜV SÜD Rail's relationship with imc dates back to the 1990s, evolving through successive generations of hardware. When imc acquired specialist telemetry manufacturer KMT Kraus Messtechnik, with whom TÜV SÜD Rail had also worked closely, the different strands of the relationship came under one roof.

MTP-NT platform is designed for flexibility, supplying high-quality components that customers integrate into their own housings, but for TÜV SÜD Rail, that flexibility was a burden. What the centre needed was a standardised housing, rapid to deploy and built for the rail environment, and crucially, something like it had existed before.



imc MTP-NT Telemetry Modules
© imc Test & Measurement

Before imc acquired KMT, the later used compact housing, packaging the telemetry electronics onto a dedicated PCB with integrated connectors, small enough to mount directly to a wheelset and fast enough to swap out when needed. *"It was just screwing eight screws and detaching eight connectors,"* says André Rohrbeck, Team Lead Measuring Wheelsets at TÜV SÜD Rail. *"Then you have the whole amplifier in your hands, you could simply swap something out and continue the measuring runs."*

That housing wasn't carried forward when imc took over KMT's product line. *"We wanted the good old days back,"* says Rohrbeck, *"but with imc technology."* imc responded by inviting TÜV SÜD Rail into a co-development project to do exactly that.

The result is a compact, ruggedised enclosure built around the MTP-NT platform. The BASE unit powers the system, manages data exchange, and accepts up to two measurement modules; EXT extension units each accommodate up to four further amplifier modules. The housing is rated to IP68, operates across -40°C to 85°C, and is built to withstand the accelerations generated by steel-on-steel contact at speed.

Put to the Test

TÜV SÜD Rail put the new housing to the test last autumn on a customer project that had previously seen reliability issues with earlier KMT-era telemetry. *"We were quietly confident,"* says Rohrbeck. *"We mounted the telemetry systems in the new housing and it worked really well. There were no failures during the whole run."*

For imc, the demanding nature of the rail environment is itself part of the point. Wheelset measurement subjects equipment to extreme shock and acceleration loads, with no suspension or damping between wheel and rail, combined with spray water at speeds of up to 400 km/h and ballast impact from track debris.

"If a telemetry solution performs reliably in this kind of railway environment," Florian Sailer, Strategic Product Manager Telemetry and Sensors at imc notes, *"it's well prepared for demanding applications in many other industries as well."*

Benefits of Collaboration

For TÜV SÜD Rail, the new housing represents a transition in how the centre deploys and maintains its telemetry rather than a change in underlying technology. The MTP-NT platform remains the same; what's changed is how it's packaged and managed in the field.

For imc, the collaboration illustrates the value of its customer-led approach: the platform's modularity – scalable from a two-module BASE unit through multiple EXT extensions, configurable for strain gauges, voltage, IEPE or potentiometer inputs – gives it the flexibility to serve demanding, application-specific deployments without sacrificing the standardisation that keeps costs manageable.

Homologation testing sits at the foundation of rail safety, and the data underpinning it must be gathered in some of the industry's most demanding conditions. The partnership between imc and TÜV SÜD Rail, built over more than two decades, is a working illustration of what that standard requires.

"They're focusing on bringing a good product to market," says Rohrbeck, *"and that, in the end, also helps us."*

To find out more about imc's solutions please visit the company's [Railway-News profile page](#) or get in touch via their [contact form](#).

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www.imc-tm.com



Condition Monitoring

ImpactSentinel by INGLAS

The Continued Evolution of ImpactSentinel™



Ryan Anderson, CEO of INGLAS, explains how ImpactSentinel™ can transform rockfall barriers, nets and fences from passive structures into active safety assets.



INGLAS' customer base has grown a long way from that first deployment. It now works with rail operators, infrastructure managers, engineering partners and geotechnical specialists.

Why Real-Time Matters

The key distinction for INGLAS is where detection happens, and what 'real-time' actually means. Many monitoring technologies observe hazards from a distance, providing valuable insight into long-term changes and trends INGLAS takes a different approach. ImpactSentinel™ is installed directly on or around the protection structure itself, so when a barrier experiences an impact or significant movement, the system detects that physical interaction immediately.

That's the difference between observing risk and detecting a real event that demands an operational response.

Demand for this kind of immediacy is growing, and it's being driven by a combination of factors. Climate is a major one: more intense rainfall, freeze-thaw cycles and increasingly unpredictable weather are putting greater pressure on slopes and the structures designed to protect against rockfalls and landslides. At the same time, infrastructure managers are being asked to demonstrate active risk management and greater resilience, not just compliance on paper.

The practical reality for operators is that they're being asked to keep routes safe and reliable in conditions that are becoming harder to manage. Rockfall barriers, nets and fences have traditionally been passive structures built to absorb an impact and little else. INGLAS' view is that they no longer have to stay that way. Fitted with ImpactSentinel™ technology, they become active safety assets, capable of telling operators not just that something has changed, but that something has happened.

INGLAS exists to help rail operators make faster, safer decisions when natural hazards strike. Rockfalls and landslides rarely announce themselves, and in mountainous or exposed terrain, the difference between a near-miss and a serious incident often comes down to how quickly an operator can act once a rockfall barrier has been hit.

That's the problem INGLAS set out to solve when it developed its real-time ImpactSentinel™ hazard monitoring system in collaboration with Swiss Federal Railways (SBB) in the mid-2000s.

The railway company was looking for a way to enable an immediate operational response when a rockfall barrier is impacted. Within a year of installation, the concept was validated, as ImpactSentinel™ detected a rockfall that would otherwise have resulted in a train collision.



Seconds, Not Minutes

ImpactSentinel's™ 2–4 second alarm speed is one of its clearest differentiators, and its significance depends on what happens in those first seconds. On a busy corridor, trains can pass the same point only minutes apart. If a barrier is struck and the alarm takes minutes to arrive at the control room, the next train may have already entered the section. The warning is technically delivered, but it's too late to act on.

That's where the gap becomes critical. When a protection structure is hit, those first seconds determine whether a controller can still slow or stop a train, or whether it's already in the danger zone. ImpactSentinel™ raises an initial warning within about half a second, with the full alarm reaching the control room, operations team and train drivers directly within two to four seconds. That window gives operators the chance to make a decision while the event is still unfolding, rather than learning about it after the fact.

Reliability matters just as much as speed, particularly in the conditions where other systems struggle. Many

INGLAS deployments sit in remote areas with difficult access and no mobile coverage, often making routine inspection impractical. ImpactSentinel's™ sensors are built for harsh weather and rely on their own dedicated communication network, with redundancy built in throughout the system to ensure the data gets through. The objective is straightforward: dependable operation in the places where reliability matters most.

Building on a Proven Real-Time Detection Platform

ImpactSentinel™ has gone through several generations of development since its early days with SBB, but INGLAS' guiding principle has not changed: keep it robust, keep it fast, and keep it reliable when conditions are at their worst.

Rather than replacing a proven system, INGLAS is building on an existing platform, with developments in communication range, flexibility and ease of deployment designed to make implementation and long-term operation simpler.

INGLAS welcomes conversations with anyone interested in understanding and managing risk around infrastructure. To find out more about INGLAS and ImpactSentinel™, contact the team directly at info@inglas.org.

Contact Information

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Condition Monitoring

One Big Circle

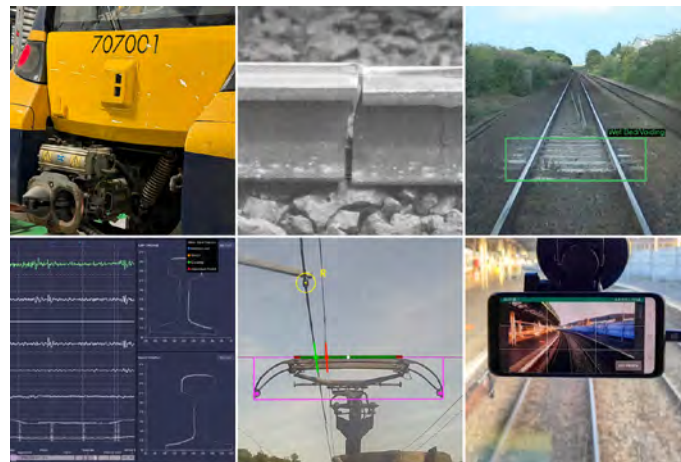
AIVR by One Big Circle: Delivering Your Railway Insight

One Big Circle is a UK rail technology company and the creator of AIVR® – Automated Intelligent Video Review – a multi-award-winning end-to-end railway monitoring platform that is changing the way the industry monitors infrastructure, improves operational performance, and delivers safer, more reliable railways.

Founded in 2017, One Big Circle designs and manufactures AIVR® in-house, combining hardware engineering, software development and deep railway domain expertise within a single team – working closely with customers to develop technology that solves real operational challenges.

AIVR® is an integrated system combining bespoke video, sensor and laser data capture with cloud infrastructure and advanced AI-powered analytics – all accessible through a smart, easy-to-use online platform that also integrates other data sources. Captured data is time and location-stamped, providing a precise, evidential record of network condition that can be reviewed remotely, annotated using built-in digital tools and exported for reporting, analysis and integration with wider asset management workflows.

Together, these capabilities span every railway discipline – from track and infrastructure condition monitoring to overhead line inspection, conductor rail health, lineside structures and signalling sightlines. Experts can monitor the complete rail environment remotely and



safely, giving infrastructure owners, train operators and maintenance teams the insight they need to move from reactive to preventative maintenance.

One Big Circle works in close partnership with organisations including Network Rail, Transport for Wales, Siemens and South Western Railway, and AIVR® has been deployed internationally across North America, Europe and Australia, strengthened by a strategic partnership with Loram Maintenance of Way.

Visit One Big Circle at InnoTrans 2026 (Hall 2.2, Stand 560H) to see AIVR® in action, and discover how the innovative end-to-end technology is delivering railway insight.

[Learn more on our website.](#)

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AIVR®

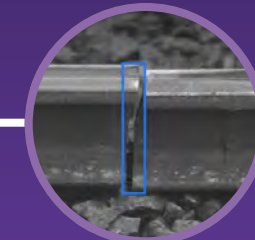
500+ devices
deployed globally



Delivering Your Railway Insight



£70M+
saved annually



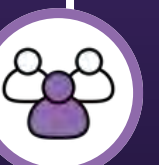
50K+ km
of track monitored globally



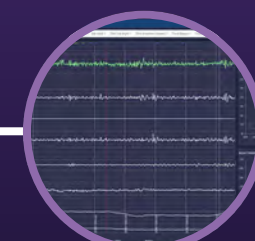
4M+ hours
saved annually



13K+ users
globally



100K+ issues
identified & alerted



OneBigCircle
Hall 2.2, Stand 560H



Communications Technology

cn-mobility



Rethinking Passenger Audio

Passenger audio and communication technology is undergoing a fundamental shift from legacy PA infrastructure to intelligent, integrated systems that deliver accessible, personalised information across stations and rolling stock, writes Henning Franke, Head of Hardware Manufacturing at cn-mobility.



Henning Franke
Head of Hardware Manufacturing

Poor quality announcements have long been an accepted fact of rail travel, but evolving passenger expectations, new accessibility obligations and emerging technologies are driving a long overdue change.

Over the years, rail passengers have adapted to scratchy, unintelligible announcements by picking out patterns, glancing at the nearest display and piecing together what they can. But the gap between what's technically possible and what passengers actually experience has become impossible to ignore. Used to wireless earbuds that deliver high-quality audio and smartphones that can answer any question in seconds, passengers find rail's poor quality PA systems increasingly hard to excuse.

Why the Status Quo Persists

The issue isn't a lack of available technology – the digital tools to deliver clear, reliable audio in a rail environment have existed for years. The problem is that legacy systems were never fundamentally rethought. Components were updated, specifications revised at the margins, but the underlying logic of how passengers receive travel information has remained largely unchanged.

One bottleneck lies in procurement. Rolling stock tender documents are routinely copied from previous versions, with audio specifications carried forward unchanged from earlier generations of vehicles. Vehicle manufacturers have little commercial incentive to propose upgrades beyond what the specification demands, and within the broader passenger information

ecosystem, audio has consistently been treated as a secondary concern rather than a strategic priority.

On a train, a passenger who mishears an announcement adapts, guesses or checks their phone. The inconvenience is real but invisible to the operator, and what they can't measure, they rarely fix. Breaking that cycle requires movement from both sides: operators willing to write a higher standard into their tenders, and a supplier community ready to meet it.

Leave No Passenger Behind

Accessibility requirements are adding a new dimension to the conversation. For visually impaired rail passengers, audio is the primary means of receiving safety-critical information on board. For those with hearing impairments, current provision centres on induction loops: analogue technology dependent on the passenger being within range, correctly positioned and using a compatible device set to the right mode. In a moving, crowded train those conditions aren't always met, but regulatory compliance can be achieved without delivering reliable audio to the passengers who need it most.

What's shifting is the relationship between accessibility obligations and technological possibility. For much of the past decade the two have operated on separate tracks: regulations set a floor, technology advanced beyond it, and the gap widened quietly. The emergence of personal audio delivery technologies means genuine inclusion and next-generation infrastructure are now pointing in the same direction. Accessibility is no longer an argument for incremental improvement; it's becoming an argument for a fundamentally different approach.

Auracast – A Step-Change in Passenger Audio

Rather than optimising the acoustic environment and hoping the result is good enough for everyone in the carriage, our Bluetooth Auracast solution transmits audio directly to the passenger's own device.

For hearing aid users in particular this is a step change: rather than straining to extract an announcement from ambient noise, they receive it as a personal audio stream at the volume and profile their device is set to deliver. The multilingual potential is equally significant.

Parallel channels can carry the same announcement in multiple languages simultaneously, removing the need for repeated announcements in sequence.

Intelligent Systems, Smarter Environments

While Auracast addresses the personal audio channel, it's important to note that room-based PA is not going away. Safety-critical announcements must be audible to everyone, regardless of what they're carrying, and the loudspeaker remains essential infrastructure. What's changing is how intelligently it can be managed.

A train isn't an acoustically uniform space. cn-mobility's zone-based systems allow announcements to be directed to the areas where they're needed, at levels appropriate to the local noise environment. Adaptive level control adjusts output in real time, responding to tunnel noise, door cycling and passenger load, rather than running at a static setting throughout the journey. The result is more consistent intelligibility with less cabin noise overall.

Where integration with displays, apps and other passenger information channels is concerned, the industry is still finding its way. Some operators are

already combining announcement audio with on-screen content; others are exploring how personal device notifications might complement cabin announcements.

But the direction is clear even if implementation remains uneven. What's now technically possible is a coordinated passenger information environment where audio, visual and personal channels work together, but getting there requires operators to think about audio as one layer of a broader information architecture, and to specify accordingly.

The constraint is no longer capability, it's will, specification and the readiness of operators to demand something better.

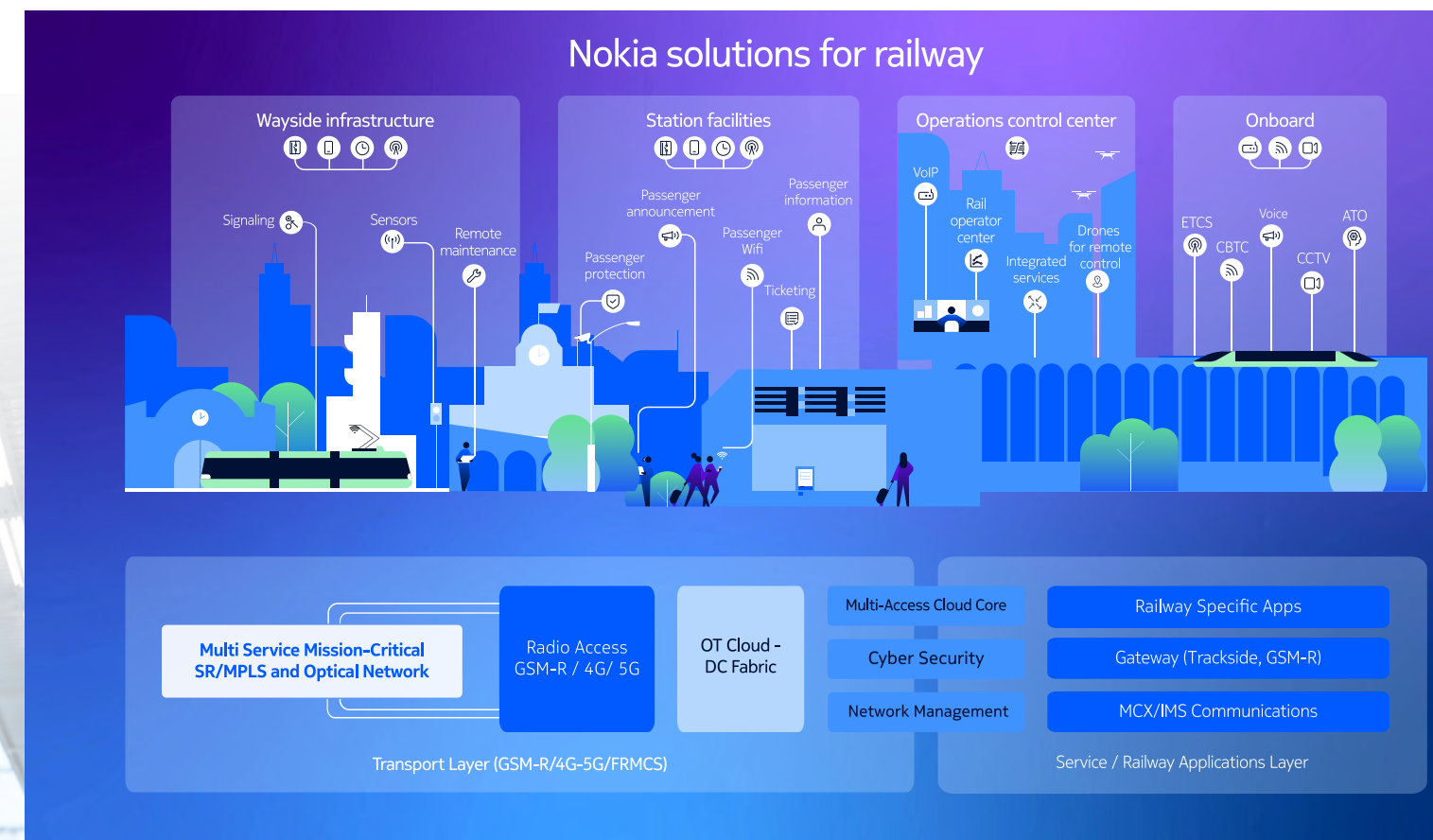
Someone will be first. The question is whether it's you. **cn-mobility will be at InnoTrans in Berlin this September – find us at Hall 2.1, Stand 620/720**, and let's talk about what better passenger audio looks like for your network.

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Nokia

Are You Ready for FRMCS?



FRMCS will replace GSM-R across Europe's railways, but readiness requires far more than a radio swap. From backbone infrastructure to baseband architecture, here's a practical guide to preparing for the transition.

The 'Future Railway Mobile Communication System' (FRMCS) is the next-generation standard for railway communications, unlocking smarter operations, improved customer services and new business opportunities.

Standardisation is progressing through the International Union of Railways (UIC), with the Morane 2 project testing an intermediate release across four major European operators, ahead of the European Railway

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NOKIA

Agency's (ERA) Technical Specifications for Interoperability (TSI), expected around 2028.

This is because FRMCS is a transformation of the entire communications architecture, touching every layer of the network stack. The lead times, therefore, are substantial, and some elements can and should be addressed now.



Start with the Transmission Backbone

Take the IP and optical backbone. This fixed network is the foundation everything else will be built on, and trying to roll out FRMCS on top of an unstable or underprepared backbone is a recipe for complexity.

So, what does backbone readiness require? First, IP/MPLS connectivity needs to be in place at every base station site. Second, routers must support the synchronisation demands of 5G. Third, the physical topology of the IP network may need to change: ring sizes in particular will need to match strict 5G synchronisation requirements.

Rethinking RAN

A common misconception in early FRMCS planning is that moving from GSM-R's 900 MHz band to FRMCS at 1900 MHz (n101) requires doubling the number of radio sites. In most cases, it doesn't. For operators focused on

ETCS signalling and mission-critical voice, existing GSM-R cell sizes can often be reused – provided the original network was designed to support ETCS effectively.

Additional sites come into play when operators introduce higher-throughput use cases. For example, an operator planning for automated train operation (ATO) higher Grade of Automation (including video) will need a denser network than one simply replacing GSM-R. Therefore, the starting point for any radio access network (RAN) planning is to define what the network needs to support. Know this, and the infrastructure requirements follow logically.

Choosing BBU Architecture

Within the RAN, one of the most consequential planning decisions is how to deploy baseband units (BBUs). In a distributed architecture, each radio site has its own BBU, which is straightforward but costly. In a hotel architecture, BBU resources are pooled across multiple sites, typically three to five, connected via fibre. The cost saving is significant: roughly half the number of BBUs compared to a fully distributed setup.

The trade-off is dependency. If a pooled BBU fails, every connected site goes down, potentially leaving up to 20 kilometres of track without coverage. That makes redundancy non-negotiable: a second BBU in a separate location must be ready to take over in the event of failure. With this in place, hotel architecture delivers a stronger balance of cost and resilience, and is the approach most operators are adopting.

Deploying a 5G Core

FRMCS depends on a resilient 5G core designed for the specific requirements of railway operations. Unlike a GSM-R core network, the FRMCS 5G core is cloud-native and can run on an on-premises cloud platform.

It must deliver high throughput and low latency for safety-critical services, while supporting high availability, resilience, security, predictable operational behaviour, and clear testing and rollback procedures. A cloud-native FRMCS core also enables a more flexible operating model: software functions run in containers, with spare capacity built into the platform. Because the core is modular, software-defined and standards-based, updates, security fixes, capacity changes and new railway applications can be managed as part of normal lifecycle operations, without repeated platform replacement or core redesign.

Enhancing Mission-Critical Communications

The 3GPP-defined MCX framework provides standardised, interoperable voice, data and video capabilities for railway operations, with the resilience and prioritisation safety-critical use demands.

Mission-critical push-to-talk (MCPTT) is the 5G evolution of railway's group voice communications, delivering better audio quality, faster setup and features such as dynamic group management and user prioritisation. Mission-critical data (MCData) carries operational information such as ETCS train control and critical messaging, while mission-critical video (MCVideo) streams real-time video to and from moving trains for applications from CCTV to automated train operations.

Staying Secure

Another important consideration is security, because moving to a 5G IP-based network expands your attack surface.

GSM-R's time division multiplexing (TDM) foundation offered a degree of natural protection, but FRMCS changes things and operators need a more deliberate security posture from the outset.

The 'Third Generation Partnership Project' (3GPP) standard requires IPsec encryption from radio to core, and European regulation is increasingly framing secure rail communications as a matter of national infrastructure protection. But compliance alone isn't enough.

The more robust approach is zero-trust: limiting an attacker's ability to enter the network, and using zoning to contain any damage if they do. Every element of the network should contribute to that protection, not just a single measure such as a firewall. For large, complex organisations running legacy applications, this is a significant undertaking, but one that must be addressed at the infrastructure level, not bolted on afterwards.

Don't Get Ahead of Yourself

When it comes to applications, the temptation is to plan for everything at once. Don't. The immediate priority is getting ETCS signalling and mission-critical voice operational, because until these are running reliably on

FRMCS, GSM-R cannot be switched off step by step.

Once it does, the picture opens up. As GSM-R is decommissioned line by line, the 900MHz spectrum (n100) it occupied becomes available for FRMCS too, adding capacity for higher grades of train automation, driverless services and IoT-based predictive maintenance. The architecture should be designed with this evolution in mind, but operators that try to build for everything from day one risk losing sight of what needs to happen first: start with the critical, prove it works, then build on that.

Managing the Transition

At first, operators will need to run FRMCS and GSM-R simultaneously for a couple of years, but managing two networks in parallel can put real pressure on internal teams, and for some operators, capacity will be a genuine constraint.

The practical approach is to deploy FRMCS without touching the existing GSM-R infrastructure, then decommission it in stages as FRMCS services are proven and stable.

For operators still running GSM-R over an obsolete SDH network, there's a well-proven migration path to IP/MPLS requiring no changes to the GSM-R infrastructure itself, often as simple as moving cable connections, maintaining connectivity until the last day of operation.

Where internal resources are stretched, managed services can ease the burden, covering planning, deployment and operations, and freeing operators to focus on running their railway.

See the Full Stack at InnoTrans

For operators looking to understand what end-to-end FRMCS readiness looks like in practice, Nokia will present the full stack at InnoTrans 2026. The exhibit is designed as a journey through the complete architecture, opening up conversations about which layers are most relevant to each operator's programme.

Nokia experts will be on hand throughout the event at Hall 4.1, Stand 360.



Frequentis

Three Capabilities Railways Need for FRMCS Transition

FRMCS will unlock new levels of flexibility, data exchange and connectivity



The future of railway communications is taking shape. Yet the most difficult phase may still lie ahead. Markus Myslivec, Head of Public Transport Solutions, Frequentis, explores the capabilities needed to make FRMCS a success.

From Concept to Implementation

For years, Future Railway Mobile Communication System (FRMCS) has been shaped through research, standardisation and industry collaboration. Now, the focus is shifting from definition to real world operations.

Built on 5G and IP-based, broadband mission-critical communication services, named MCX, FRMCS will unlock new levels of flexibility, data exchange and connectivity. But success will depend

on more than deploying new technology.

Railways cannot stop operations while communication systems evolve. GSM-R must continue supporting safety-critical services as FRMCS capabilities are introduced, tested and scaled. The operators best prepared for this future are the ones that build three essential capabilities.

Capability One: Operating Between Worlds

FRMCS will not replace GSM-R overnight. Railway operators are already preparing for a period of coexistence, where current and future communication environments must work together for many years.

Successful operators will need:

- seamless interoperability between GSM-R and FRMCS
- migration paths that avoid operational disruption
- the ability to introduce new capabilities gradually

What Does It Require?

A transition strategy built around coexistence and parallel operation rather than replacement and silo networks. Railway operators need communication architectures that allow current and future systems to interwork, enabling a controlled migration at a pace that reflects operational priorities, infrastructure readiness and national rollout plans.

Frequentis Perspective

This approach is reflected in Frequentis' FRMCS service layer architecture, which enables interworking between GSM-R and FRMCS environments through components such as the Interworking Function (IWF), allowing operators to evolve their communication systems without disrupting today's operations and guaranteeing interoperability.

Capability Two: Keeping People at the Centre of Change

FRMCS will change the tools available to railway operations teams, but successful migration depends on maintaining confidence and usability in the control room.

Successful migration will require:

- continuity of dispatcher workflows
- intuitive, adaptable and unified user interfaces
- solutions that evolve alongside operational needs

Why Technology Should Work for People

A human-centred approach to technology adoption, ensuring that new capabilities enhance operations rather than complicate them.

Frequentis Perspective

With decades of experience supporting safety-critical control rooms, Frequentis understands that communication technology must be designed around operational needs. The evolution towards the next generation dispatcher reflects this approach, providing a flexible environment that supports today's GSM-R operations while preparing teams for future FRMCS capabilities.

Capability Three: Building Flexibility for the Future

FRMCS will not be a one-time technology change. As standards mature, operational requirements evolve and new capabilities emerge, railway operators will need communication systems that can adapt.

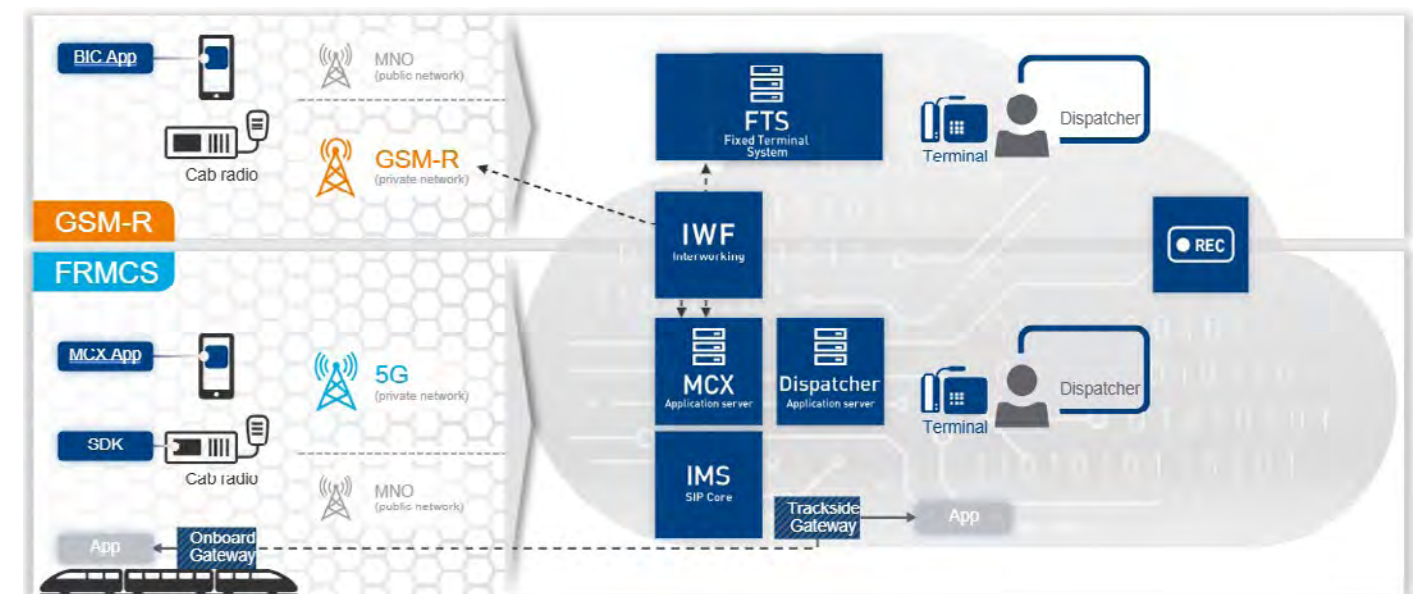
Successful migration will require:

- open, standards-based architectures
- freedom to evolve within a multi-vendor ecosystem
- software-driven systems that can adapt over time

Why Flexibility Matters

The technology foundation must be built around interoperability and flexibility: Railway operators need solutions aligned with open standards such as the European Standards Organisation ETSI, the global

Bridging legacy and next-generation rail communications



3rd Generation Partnership Project (3GPP) and the International Union of Railways (UIC), enabling them to integrate different technologies and avoid dependency on a single supplier, while still being able to integrate specific communication and information systems.

Frequentis Perspective

Frequentis designs its FRMCS solutions for multi-vendor ecosystems, based on open standards and modular architectures, as well as integration of legacy systems. This gives operators the flexibility to evolve their communication environments while maintaining control over long-term investment decisions.

Different Starting Points, One Destination

FRMCS migration will not look the same for every railway. Network infrastructure, operational priorities, spectrum availability and investment cycles will all shape the path forward.

What early adopters demonstrate is that progress does

not require waiting for a single moment of change. It requires a strategy that allows organisations to introduce future capabilities while protecting current operations.

Planning Your FRMCS Journey

As FRMCS testing accelerates across Europe, with national programmes as well as MORANE2 among other European Rail Joint Undertaking (ERJU) projects, the industry is proving that the technology works. The next challenge is ensuring it works at scale, in live operations, and throughout a migration period that will span many years. Success will be defined not only by technical validation, but by the ability to maintain continuity while introducing change.

Every railway will follow its own path to FRMCS. The organisations best positioned for success will be those that start planning early, build flexibility into their migration strategy and prepare for coexistence from day one. Frequentis supports operators in turning that strategy into operational reality.

About Frequentis Public Transport

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. The company also holds the number one market share in GSM-R dispatcher terminal positions; more than 10,000 units have been delivered to customer control centres in over 25 countries. Railway customers include UK Network Rail, German Rail (DB Deutsche Bahn), Swiss Federal Railways (SBB), Austrian ÖBB and Wiener Linien, and Australian Sydney Trains.

[For more information visit our website.](#)



Markus Myslivec is the Head of Public Transport Solutions at Frequentis. Markus has a long history in railway communications, ranging from software development for GSM-R mobile terminals to technical leadership in fixed line operational communication projects. He also represents Frequentis within UIC FRMCS working-groups, ETSI TC RT and the UNITEC committee of UNIFE.



Esri

GIS Gives Irish Rail a Clearer View of Its Lineside Risks

Fabiola Costa
Data Analyst



Irish Rail is using drone imagery, AI and GIS to move from reactive inspections to network-wide vegetation intelligence – and one data analyst is leading the way.

Running alongside much of Irish Rail's 2,378-kilometre network are thousands of trees that, left unmanaged, pose a risk to safe operations by blocking sightlines, encroaching on overhead lines and in the worst cases, falling onto the track.

To avoid the delays, emergency closures and safety hazards these issues can cause, Irish Rail has long relied upon boots on the ground manual inspections. However, these can be slow, inconsistent and hard to scale across a network of this size.

The pressure on Irish Rail intensified with the spread of ash dieback. Unlike many tree diseases, this causes rapid structural failure with little visible warning, and an affected tree can fall without prior indication during a storm or high winds, giving maintenance teams no opportunity to intervene.

With EU regulations also tightening around biodiversity and environmental stewardship, Irish Rail knew that a reactive, inspection-led approach was no longer sufficient. The answer, it turned out, was already sitting in the network operator's own data.

Using the Data That's Already There

Irish Rail had accumulated a substantial library of high-resolution journey imagery that was detailed, georeferenced and largely untapped. Fabiola Costa, a data analyst in Irish Rail's Data Analytics unit, saw what it could become. *"We had the imagery, but we didn't really know what we could do with it,"* she says. *"That's where the idea for my project came from."*

Costa's project brought together three converging pressures: the growing ash dieback safety threat, Irish Rail's broader shift towards data-driven infrastructure management – of which vegetation was the last remaining area still relying on manual surveys – and the opportunity to finally put that imagery library to work.

She pitched the idea of piloting a GeoAI-powered vegetation risk management system that could shift the railway from reactive emergency response to planned, scheduled maintenance, which management quickly approved.

Migration stories:

Austrian Federal Railways (ÖBB): Preparing through validation and gradual migration

Through trials and validation activities, ÖBB is exploring the technologies and operational concepts needed for future FRMCS deployment.

Swiss Federal Railways (SBB): Evolving the operational workplace

SBB's focus on dispatcher evolution and interoperability using FRMCS ready architecture demonstrates the importance of preparing the control room alongside the communication network.

Lower Austrian Transport Company (NÖVOG): Exploring new models for regional rail

NÖVOG demonstrates how mission-critical communication services can already be delivered over public mobile networks, opening new possibilities for regional operators.

Queensland Rail: A data-first approach

Queensland Rail highlights how FRMCS principles can support incremental adoption, with data capabilities introduced as an early step.

This system, built on Esri's ArcGIS platform, was designed to analyse drone imagery at scale, identify at-risk trees and prioritise intervention.

For Costa, the platform choice came down to one thing: everything she needed was in one place. *"ArcGIS was the first platform that had the deep learning packages, Python and Jupyter Notebooks, etc all built in,"* she says. *"Everything's in the same place, and for the work I'm doing, that's a huge benefit."*

Starting Small, Thinking Big

The pilot began last December, and Costa expects the model to be validated by the end of this year. It centres on

a 10-kilometre corridor, selected because it contained the full range of conditions the model would eventually need to handle: different stages of ash dieback progression, varying tree density and a mix of track-side environments.

Using multispectral drone imagery captured at high resolution, training data was generated by manually digitising 200–500 trees per health class. Costa used a convolutional neural network (CNN) architecture with transfer learning within ArcGIS Pro Deep Learning to perform inference and output a risk-scored tree inventory: a spatial map of which trees needed attention and how urgently.

Accuracy was set as a target of over 85%, and the way that figure is defined matters. *"We always work with error,"* says Costa. *"A false positive means a healthy*

tree gets inspected unnecessarily. A false negative means an at-risk tree gets missed. We designed the model to minimise false negatives, even if that means more inspections than strictly necessary. When it comes to safety, that's the right trade-off."

Closing the Loop

But detection alone isn't enough. One of the core design principles of the system is that AI output must feed directly into operational action, and that field teams must be able to feed their findings back into the model.

When the CNN flags a tree as 'at-risk', field teams receive the location via ArcGIS Field Maps, inspect it on the ground and record what they find. That verified data is then used to retrain the model, improving its accuracy with every cycle.

"It's not just about what the AI can see," says Costa. *"The field teams are part of the system. Their knowledge makes it better."*

The integration with Field Maps also addressed one of the most common barriers to GIS adoption: the fear of duplicated work. When Costa demonstrated that changes made in their existing operational app were automatically reflected in ArcGIS, the scepticism eased. *"Once they could see it, they got it,"* she says.

Just the Beginning...

The pilot is only the beginning. Costa's roadmap sets out three phases: ash dieback detection on the 10km corridor, network-wide deployment across all 2,378km, and ultimately comprehensive bioecological monitoring capability covering all tree species, invasive plant tracking, habitat assessment and carbon accounting.

That final phase is where EU regulatory pressure becomes a driver as much as an operational one. Irish Rail faces compliance obligations under the EU Biodiversity Strategy 2030 and the Nature Restoration Law, and the vegetation data being built today will form part of the evidence base for meeting them.

Vegetation management is also one layer within something larger. The data feeds into iTRAK, Irish Rail's broader digital asset management

programme, which is building towards a full GIS-based digital twin of the network.

"The wider picture is infrastructure management and building something that can really tell you what is happening across the whole railway. When you bring together environmental science, AI and public infrastructure, you can do so much more than maintain trees. Biodiversity monitoring, carbon counting, climate adaptation – with GIS and AI, all of this is possible."

A Model for Others to Follow

Irish Rail is, by its own admission, at an early stage of its GIS journey. But that, says Ian Koeppel, Transportation Business Development Manager at Esri Europe, is precisely what makes it valuable.

"Irish Rail shows that you don't need to be at an advanced stage of digital transformation to start generating real value from GIS," he says. *"Start with a focused problem, demonstrate what's possible, and the case for going further captures broader support."*

Costa has already seen momentum build. Presentations at Esri's IMGIS conference in Frankfurt and an invitation to represent Dublin at the Smart Cities World Forum have brought her work to a wider audience, accelerating interest internally. *"Everything's coming together now,"* she says. *"I can see that the work is being recognised, and that we can add so much value."*



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Computers, Sensors, AI

Rail Vision

Driving Operational Continuity – The Strategic Role of Advanced Yard Perception

The consequences of a shunting yard incident ripple far beyond the immediate site. David BenDavid, CEO of Rail Vision, explains how AI-powered perception is giving operators the situational awareness to stop incidents before they happen.

In the complex and high-stakes environment of a modern rail yard, operational continuity is everything. The ability to keep trains, crews and cargo moving safely and without interruption is the bedrock of an efficient logistics network.

However, even a minor incident can cause significant disruption, delay shipments and impact productivity across the entire supply chain. It's a world where limited visibility, complex movements and human error can have costly consequences.

To address these challenges, operators are increasingly turning to advanced technology. Rail Vision, a leader in AI-based safety systems for the railway industry, has developed its ShuntingYard system to provide the real-time situational awareness needed to prevent incidents and ensure a predictable flow of traffic. The system transitions rail safety from passive detection to active intervention, creating

David BenDavid
CEO, Rail Vision



a more resilient and efficient operational environment.

Overcoming Human Limitations

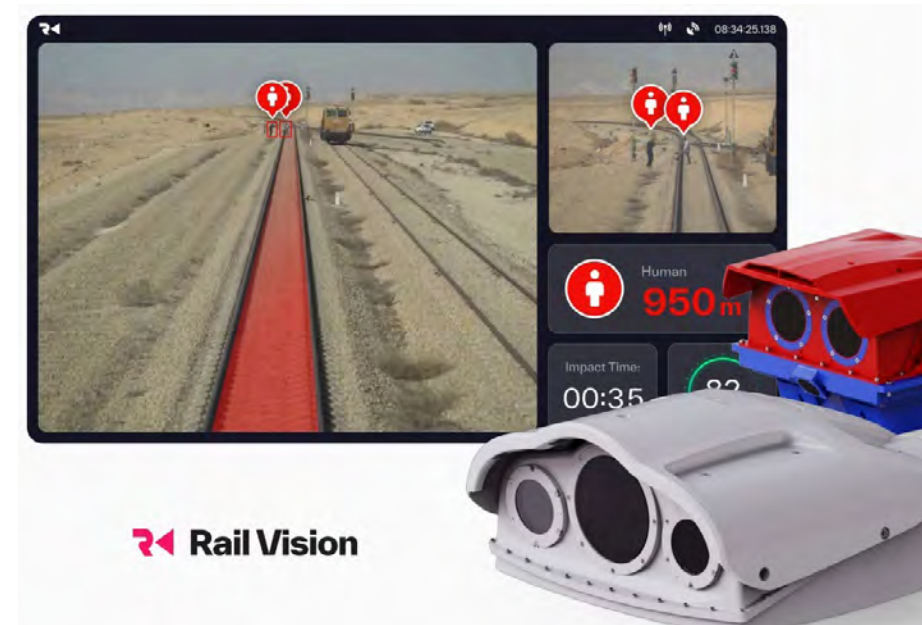
At its core, ShuntingYard is designed to overcome the inherent limitations of human sight in a busy yard. Rail yards are very complex environments where operators often face visibility challenges due to rail car movements, infrastructure, weather, or poor lighting. The ShuntingYard system continuously analyses the environment using advanced sensors and AI.

Providing a clear view of the track and its surroundings up to a range of

200 metres, the system automatically detects and classifies objects, including yard staff, misaligned switches and unexpected obstacles, identifying emerging risks before they become incidents. By providing this critical layer of real time intelligence, the platform enables earlier decisions and safer operations.

More than Hazard Notifications

Crucially, this technology has evolved beyond just providing warnings. While alerts are useful, Rail Vision recognised that they're not always enough to prevent an accident. Even experienced operators can become distracted or overloaded with

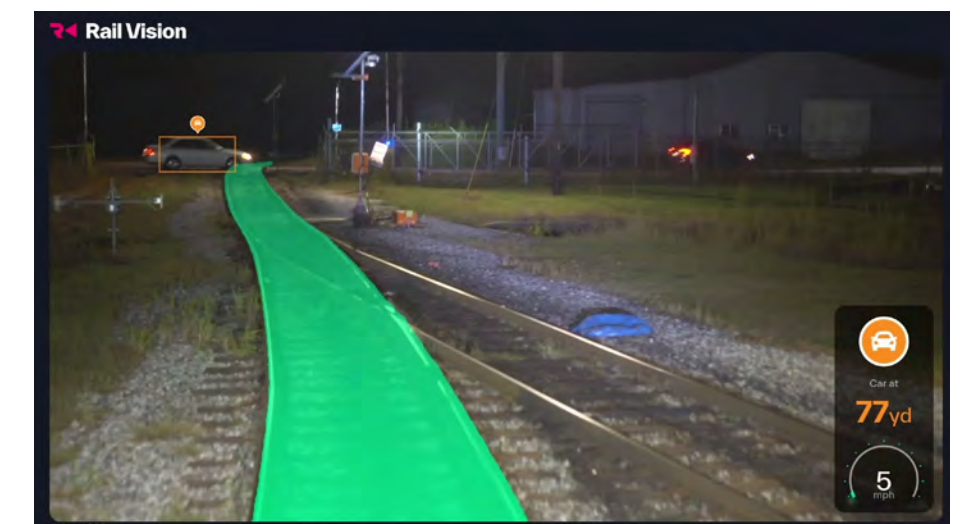


information. Our goal has always been accident prevention, not just hazard notification. This ambition drove the evolution of ShuntingYard into an active intervention platform capable of automatically applying the brakes if an operator fails to respond to a critical alert.

To ensure smooth integration into daily workflows, the system follows a structured escalation process that allows time for an operator response before initiating automated braking actions tailored to the operator's specific yard policies.

Making this leap required an AI perception layer of exceptionally high quality. The system's models had to be trained on vast datasets captured across a diverse range of operational scenarios and environmental conditions to reliably distinguish genuine threats from normal yard activities. Every hour the platform is deployed in the field helps strengthen the AI models, making the entire system more accurate and effective over time. A shunting locomotive coupling with a wagon, for example, should not trigger an emergency stop.

The system's algorithms are designed to identify standard operational movements, preventing unnecessary disruptions while ensuring that true emergencies are met with an immediate response. Built on deep learning models and advanced sensors, this robust perception system provides the critical situational awareness required for daily safety, while laying the technical foundation needed to scale locomotive operations from driver assistance to fully autonomous execution.



Vehicle detection at night

Real-Time Visual Intelligence

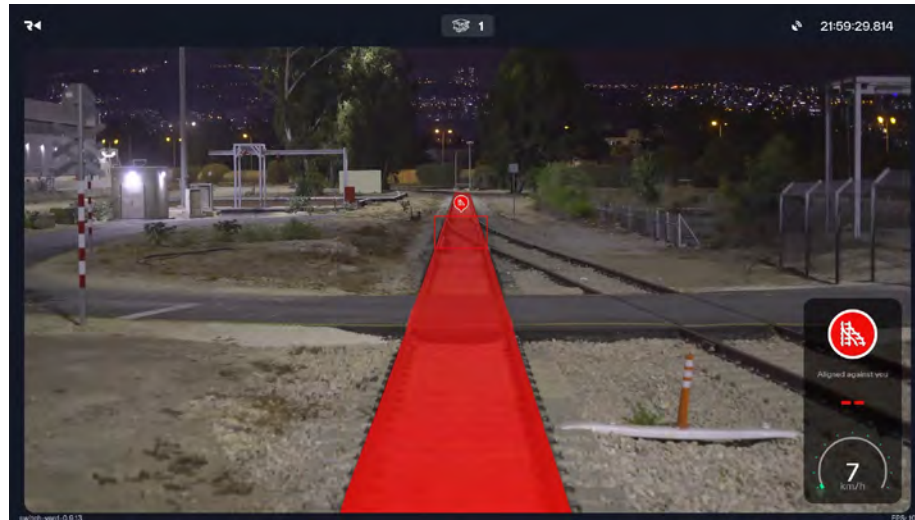
The system's value extends far beyond the locomotive cab. ShuntingYard is designed for deep integration with existing yard management and locomotive control systems. It can function as the 'perception layer' for larger safety and automation platforms providing critical data to other systems.

This was recently highlighted through Rail Vision's partnership with Railserve, a Marmon Rail company. ShuntingYard has been integrated as the core perception component within WatchGUARD, which is part of YardGUARD, Railserve's commercially launched safety intelligence system, providing the real-time visual data required to trigger automated safety actions.

Alongside these real-time safety interventions, the system automatically sends metadata and short video clips of incidents to a cloud-based intelligence portal.

This allows safety and maintenance teams to analyse historical data,

Industry-first switch state detection at night



generate heat maps of high-risk areas and gain a deeper understanding of operational patterns. It transforms the system from a real-time safety tool into a powerful resource for long-term process improvement.

Rail Yard Digitisation

As Rail Vision prepares for InnoTrans 2026, the focus is on positioning

ShuntingYard as a key enabler for the digitisation of both European transit hubs and industrial yards. With Europe pushing to shift more freight from road to rail, optimising yard safety and efficiency across all rail and industrial operations has become a critical objective. Rail Vision's technology is engineered for these regional requirements from day one, handling specific challenges like congested track

layouts, complex switching zones and severe weather. In these demanding environments, the ShuntingYard system is highly optimised for close range dynamics, providing real time track path validation and switch monitoring to protect ground crews, reduce accidents, and prevent costly equipment damage across complex industrial operations.

By providing a reliable foundation for automation, Rail Vision's ShuntingYard system offers a clear path towards transforming high-risk shunting yards into safer, more predictable and highly efficient logistical hubs.

Preventing yard incidents entirely allows operators to eliminate direct consequences like physical damage and worker injuries, ensuring that operational continuity is not just a goal, but a reality.

For more information about how Rail Vision can benefit your rail operations, [visit our website](https://www.railvision.io) or contact marketing@railvision.io.

Rail Vision

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Computers, Sensors, AI

Transcore

From Asset Tracking to Enabling Rail Condition Monitoring

For decades, TransCore has been recognised for helping rail operators identify and track rolling stock through proven RFID technology. Today, that same expertise is enabling a new generation of rail condition monitoring applications that help operators gain greater insight into the health and performance of their assets.

"The future of rail is moving from asset tracking to condition monitoring," said Greg Blocker, Senior Vice President International Business Development with TransCore. "Our role is to provide the RFID identification that enables those systems to know exactly which railcar or wagon generated the event."

Modern railways increasingly rely on sophisticated trackside technologies to monitor equipment condition and identify maintenance

needs before they become operational issues. These systems may detect conditions such as:

- Hot bearing conditions
- Wheel flat spots
- Dragging equipment
- Weigh-in-motion measurements
- Acoustic wheel-condition monitoring



While these monitoring technologies collect the operational data, they depend on accurate asset identification to make that information actionable. That's where TransCore's RFID readers and tags provide value.

"We're not providing the condition monitoring system," Blocker explained. "We're providing the RFID component that's used by those systems. We're feeding information to another system that associates the detected condition with the correct asset."

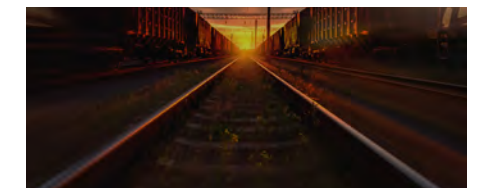
By serving as the identification layer, TransCore RFID technology enables third-party monitoring platforms to connect inspection data with the specific railcar, wagon, axle or onboard asset being evaluated. That

information can then be incorporated into an operator's maintenance and operational processes.

This flexible approach supports a wide variety of passenger and freight applications around the world. Whether integrated with heat-signature monitoring, laser profiling, acoustic detection, weigh-in-motion systems or other trackside inspection technologies, TransCore's RFID solutions help ensure that the right information is connected to the right asset.

"As these applications continue to evolve, reliable identification remains the common denominator," Blocker said. "Our readers and tags provide that foundation, allowing technology partners to build smarter condition monitoring solutions for rail operators worldwide."

As rail networks continue adopting more advanced monitoring technologies, TransCore remains focused on delivering the reliable RFID identification solutions that help connect assets with the operational intelligence generated across today's modern railway.





INERTIAL SENSOR SOLUTIONS



ASC RAIL Series:

Accurate. Precise. Certified.
Unlocking Superior Railway Performance

With the ASC RAIL series of MEMS-based precision accelerometers and gyroscopes **certified to EN 50155** and other relevant industry norms, ASC Sensors empowers railway networks across the world. These robust analogue, digital and smart sensors set **new milestones in railway safety, capacity and productivity.**

Analogue accelerometers



- MEMS capacitive
- uniaxial, biaxial, triaxial
- wide measurement range
2 | 5 | 10 | 25 | 50 | 100 | 200 | 400 g
- outstanding noise density
7 | 12 | 18 | 25 | 50 | 100 |
200 | 400 $\mu\text{g}/\sqrt{\text{Hz}}$
- select to fit a wide variety of applications
- from low noise ride comfort to high shock load measurements on the bogie

Analogue gyroscopes



- MEMS vibrating ring
- uniaxial, biaxial, triaxial
- wide measurement range
75 | 150 | 300 | 900 $^{\circ}/\text{s}$
- enables angular rate measurements for running characteristics, derailment protection and track quality

Digital accelerometers and smart sensor solutions



- MEMS capacitive
- triaxial
- CAN interface
- flexible measurement range
2 | 4 | 8 g or 10 | 20 | 40 g
- real-time data processing
- smart through integrated algorithms e.g. for FFT frequency analysis

ASC RAIL sensors meet key railway standards including

EN 50155

- evaluated for climatic resistance and dynamic-mechanical robustness
- maximum operational reliability and system availability
- robust sensors prevent failures caused by weather or vibration in demanding railway operations

EN 50121-3

- tested for electromagnetic compatibility (interference emission, interference immunity)
- ensures neither the sensors nor other critical on-board systems are affected by electromagnetic environment

EN 45545

- robust, non-flammable, laser-welded stainless-steel housing
- protection class IP68
- rail-certified cables and PG cable glands
- meets latest fire protection standards for electronic equipment on rolling stock

Train Monitors Track:

Infrastructure monitoring without service disruption

Inertial sensors play a critical role in accurately measuring vibrations – impacting vehicles as well as rail infrastructure. Beyond their key role in the testing and certification of new train models, ASC's RAIL accelerometers and gyroscopes are ideally suited for permanent installation on regular and high-speed trains. They are integrated in tailored measurement systems to enable **continuous track monitoring from regular in-service trains** without service disruption. Based on accurate results, deviations in longitudinal height, dynamic direction or distortion of tracks are calculated. Applications include:

- Characterising track geometry (EN 13848)
- Specifying structural requirements for bogie frames (EN 13749)
- Dynamic interaction pantograph/overhead contact line (EN 50317)

As across the globe, a substantial share of network delays and disruptions are owed to track alignment errors and related issues. These necessitate low-speed zones and service discontinuations that further compound delays and inefficiencies. Based on ASC RAIL sensors dedicated and certified to rail applications, tracks and infrastructure assets can be monitored from active trains in real time. This means they are maintained predictively and issues addressed proactively, before service disruptions or more serious consequences happen.

Train Monitors Train:

Safety-critical driving dynamics evaluation on the bogie

Rolling stock, too, is constantly being monitored to ensure **safe, efficient operation and cost-effectiveness**. Particularly on high-speed trains, inertial sensor technology helps achieve appropriate driving dynamics, running stability and to avoid derailment.

This is because rail vehicles at higher speeds tend to exhibit what is known as 'sinusoidal motion', which in unstable systems can turn into dangerous

swaying. This motion around the z-axis is sinusoidal at small amplitudes with a constant wavelength; its frequency, therefore, increases with travel speed. At top speeds, the dynamic forces can cause hunting oscillation, potentially leading to a zigzag motion with the wheel flanges forcefully striking the rails.

Extremely robust inertial ASC sensors installed at the axle box, bogie frame and various points across the vehicle body accurately determine all relevant acceleration forces. They feature an excellent signal-to-noise ratio and a precise frequency response below 10Hz – essential requirements for the demanding measurement of low frequencies and lateral accelerations of a few tenths m/s^2 . Applications include:

- Running characteristics of railway vehicles (EN 14363)
- Passenger ride comfort (EN 12299)

The ASC RAIL Series

Meeting diverse relevant railway norms, the ASC RAIL series' performance significantly facilitates implementation. Vehicle manufacturers, infrastructure and railway operators, system integrators as well as engineering and testing service providers rely on a proven set of precise, stable sensors ready for installation that **drastically reduces individual documentation requirements**.

ASC RAIL sensors have been designed to resist the toughest challenges – for optimal performance and long-term use in harsh conditions. With this flexible, dedicated sensor portfolio, rail operators can realise custom solutions. The outcome:

- enhanced safety
- stable long-term performance
- increased profitability of rolling stock

Superior sensor technology made in Germany, solving complex measuring challenges across the world. To ensure the highest precision paired with great customer focus, flexibility and rapid delivery.

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Ingenuity. Intelligence. Inspiration.

The best trains are connected by Icomera.



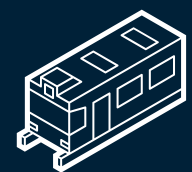
**30 +
COUNTRIES**

with active
Icomera installs



**30 +
PATENTS**

within mass
transit connectivity



**28,000+
VEHICLES**

connected with
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Satellite, cellular, and trackside connectivity unified on board as a single, trusted, fleet-wide service layer. **Find out more...**

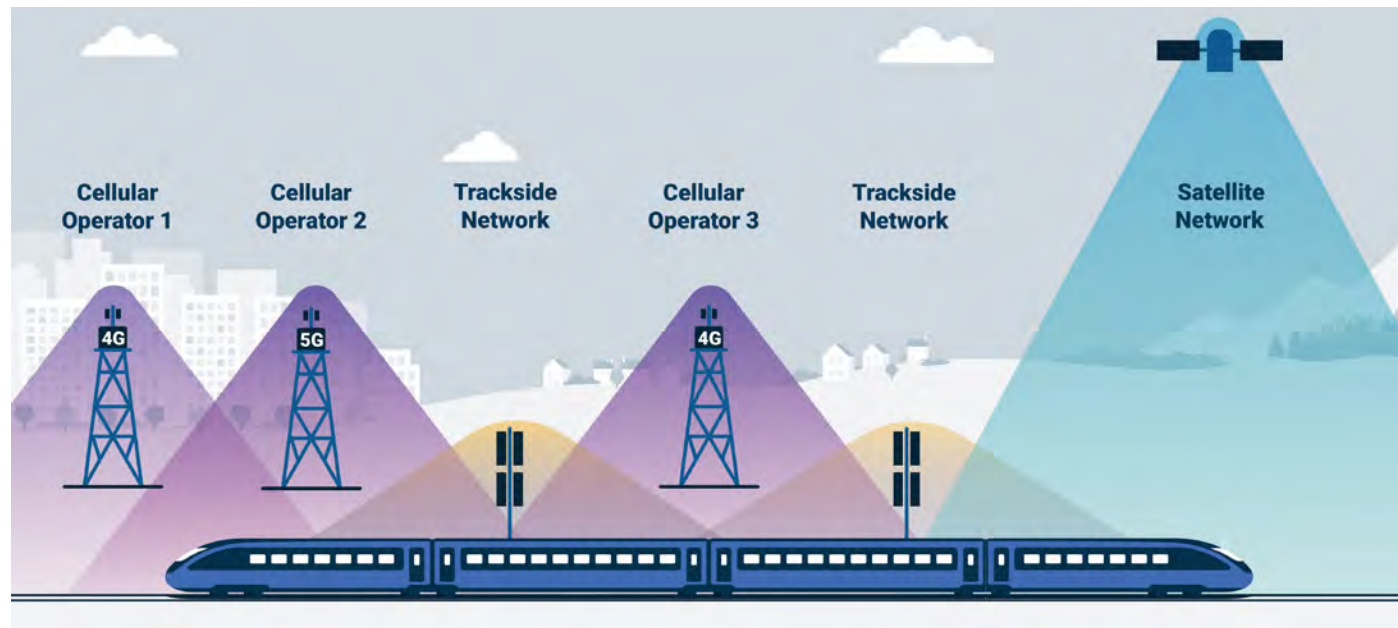




Connectivity & Wi-fi

Icomera

Icomera XS1: A Connectivity-First 5G Rail Router for the LEO Satellite Era



As LEO satellite becomes part of the onboard internet connectivity mix, rail operators need router architectures that can combine 5G, trackside and satellite networks in the right way for each fleet. Icomera's XS1 has been developed for connectivity-first deployments, extending a portfolio built around different onboard requirements.

After years of working within the constraints of terrestrial coverage alone, low-Earth-orbit (LEO) satellite networks are beginning to reshape what is possible for onboard Internet connectivity, particularly when combined intelligently with cellular and trackside networks. As operators explore how these new capabilities can be integrated into onboard systems, a wider challenge is becoming clear: connectivity requirements are becoming increasingly diverse.

Rail operators are now balancing differences in fleet type, vehicle architecture, available installation space, passenger expectations and operational priorities, all of which influence the onboard technology choices that need to be made.

One Architecture No Longer Fits Every Fleet

Rail operators should not be forced into a one-size-fits-all approach to onboard internet connectivity. Some deployments require high-performance onboard computing, virtualised applications and large-scale storage. Others need reliable, secure connectivity in a compact form factor that is easier to install, retrofit and operate across a fleet.

To address this, Icomera has developed a router portfolio designed to support this full range of requirements, with products built on a common X-series software foundation and lifecycle operating model.

XS1: Designed for Connectivity-First Deployments

The newly available Icomera XS1 has been designed specifically for connectivity-first deployments. A compact, rail-grade 5G router, the XS1 is well suited to fleet modernisation projects, space-constrained vehicles such as metros, light rail and regional trains, and modular or distributed onboard connectivity architectures. Its smaller and lighter form factor supports easier installation and retrofit, while dedicated migration designs help simplify transitions from earlier-generation Icomera routers.

Crucially, connectivity-first does not mean connectivity-limited. The XS1 brings together aggregated connectivity across 5G cellular, private trackside and LEO satellite networks into a single onboard service layer. This includes support for Starlink, where Icomera is an authorised reseller, alongside other satellite connectivity options. Rather than treating satellite as a standalone overlay, Icomera integrates it alongside terrestrial networks as part of a unified onboard architecture.

Combining Cellular, Trackside and Satellite Connectivity

This matters because the rail environment rarely offers one perfect connectivity option across an entire route. Cellular capacity, private trackside coverage and satellite availability each have a role to play. The value lies in combining these networks intelligently, managing them consistently, and presenting them to onboard systems as a trusted connectivity layer. For passenger Wi-Fi, crew applications, telemetry, digital information systems and operational services, this approach helps support more resilient connectivity as trains move between different coverage conditions.

A Portfolio Approach to Onboard Connectivity

Icomera's router portfolio, which also includes its flagship X7 mobile connectivity router, has been developed to support these different onboard requirements.

"The XS1 expands our portfolio of rail-specific connectivity products, complementing the flagship Icomera X7 router," explains Damien Convert, Chief Business Officer at Icomera. "While the X7 combines high-perfor-



mance connectivity with substantial built-in computer processing power and storage to support multiple, resource-intensive applications, the XS1 is optimised for deployments where reliable connectivity is the priority, and onboard computing plays a less central role."

Together, this approach gives operators greater flexibility to select the right connectivity architecture for different vehicles, service patterns and operational requirements, rather than forcing a single solution across an entire fleet – an increasingly important consideration as onboard systems continue to evolve.

Proven at Fleet Scale

Both Icomera routers share the same proven software foundation. The XS1 is built on Icomera's established X-series software architecture, already deployed at scale across live rail fleets worldwide, supporting large numbers of onboard systems and millions of passenger journeys every day. Like other Icomera products, it also operates within the company's 'People, Processes and Tools' model for managed rail connectivity: dedicated service delivery teams, clearly defined operational processes and purpose-built cloud tools working together to support predictable performance, lifecycle management and clearly defined service levels.

Preparing for the Next Generation of Connected Rail

As rail operators prepare for the next generation of connected services, the challenge is no longer simply how to connect a train. It is how to select the right onboard architecture for each fleet, integrate new technologies such as LEO satellite, and operate connectivity reliably over the full lifecycle of the asset.

With the XS1, Icomera is extending its router portfolio to meet that broader range of needs, offering a compact, connectivity-first product built on the same trusted foundation that supports its most demanding onboard deployments.



Track & Infrastructure

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Works Vehicles & Machines

LPS

Go Beyond Traditional Rail Cleaning with LaserTrain

Enable longer, more flexible cleaning operations without relying on consumables. No more system downtime or route restrictions for chemical, water or sand refilling.

With growing pressure to maintain reliable adhesion while minimising disruption, many rail operators are rethinking how they approach rail cleaning during critical low-adhesion seasons.

Save up to €15 per km compared to traditional methods with LaserTrain. Designed to remove contaminants for optimal rail adhesion and reduced slip risk without added water, chemicals or abrasive materials it can:

- Remove rust, crushed leaf and black rail contamination
- Cleaning speed max: 40, 80, 100, or 120 km/h
- Clean through stations and over switches and crossings
- Improve adhesion for up to 24 hours after one treatment

The laser-based rail cleaning system can deliver 2,000km of uninterrupted cleaning per day without line closures, downtime or route restrictions.

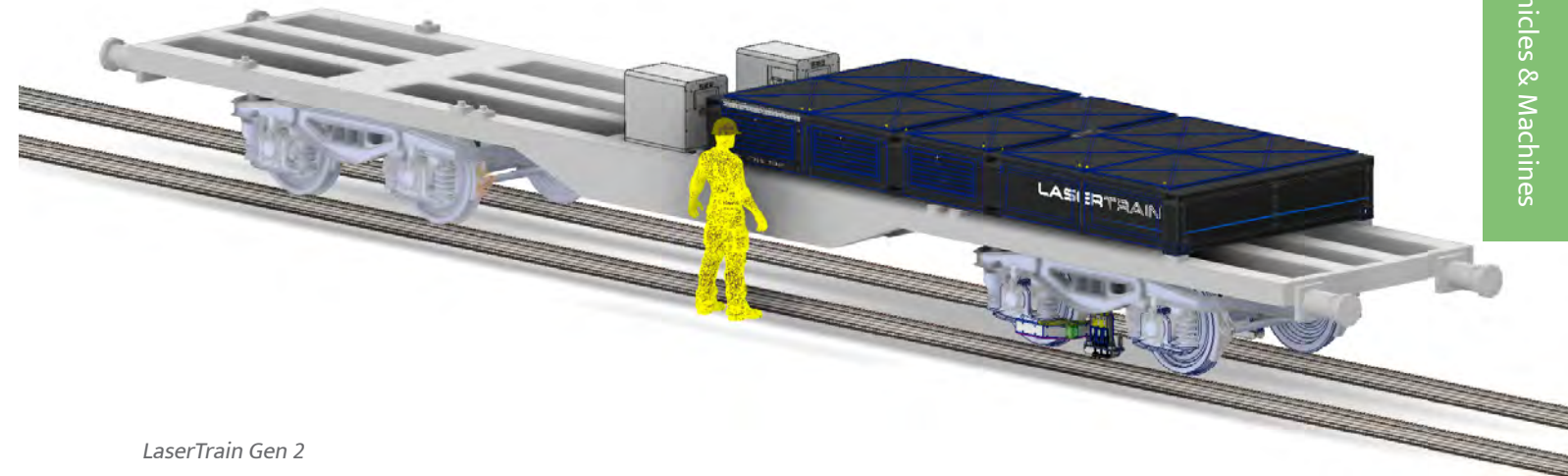
Two models are available via lease or purchase for operation across freight, passenger and metro networks in Europe, North America and UK regions.

Client Performance: MTA Metro North Railroad 23-'25

Since adopting LaserTrain, the MTA Metro-North Railroad see continued improvements in On-Time Performance and fleet wheel life and have reported a 50% reduction in delay minutes and reductions of 70% in both slip-slide events and train delays.

“We more than doubled the amount of track miles cleaned from last year and cleaned more than 5 times our best year utilising water jets (Water World).”

Justin R. Vonashek, EVP & Chief Operating Officer at Metro-North Railroad. (2023)



LaserTrain Gen 2

Upgraded Compatibilities

The latest evolution, **LaserTrain Gen 2**, comes as a 20 ft quarter height containerized unit, introducing greater deployment availability through enhanced vehicle compatibility, flexible power options and bi-directional operation, making it easier to integrate and adapt to existing maintenance fleets and schedules.

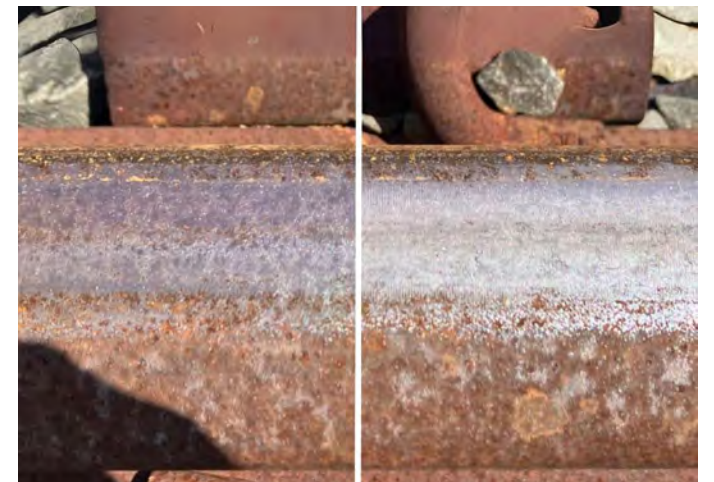
- Enhanced vehicle compatibility: Y25 / R141, MPV, Unimog
- Flexible power options
- Bi-directional operation

It is scheduled to launch in the UK with Network Rail at the Tuxford Rail Innovation & Development Centre on November 30th, 2026.

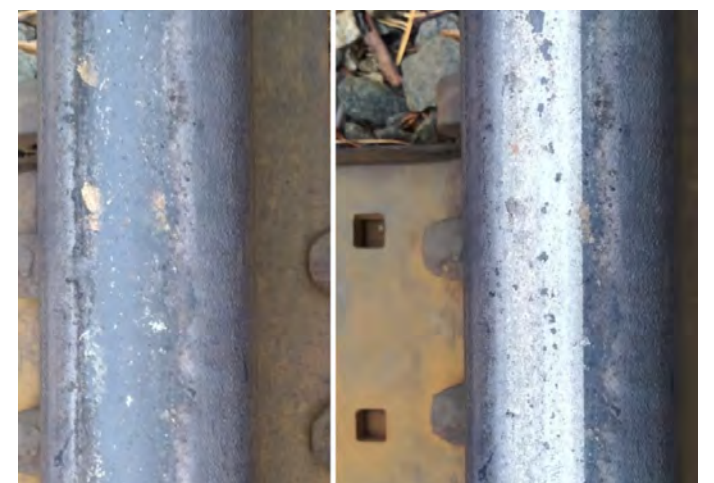
Find out how LaserTrain can help your rail operations.

- Visit LPS at Innotrans 2026 Hall 23, Stand 470
- laserprecisionsolutions.com
- Info@lasertribology.com

LPS
LASER PRECISION SOLUTIONS



Before and after LaserTrain cleaning: (above) black rail contamination, (below) rust.



Beyond Traditional Rail Cleaning

LASERTRAIN

Hall 23. Stand 470

Ensure optimal rail conditions with LPS cleaning technology. **Discover LaserTrain Gen 2 at InnoTrans 2026**, explore new features and view a live demonstration.

SCAN HERE



LaserTrain Gen 2 UK Launch

Tuxford Rail Innovation & Development Center
November 30th 2026



Track & Trackside Materials

GCF Generale Costruzioni Ferroviarie



GCF: Building Railways as One Integrated System

Railway infrastructure has long been delivered in pieces. One contractor lays the track. Another installs the overhead lines. A third handles signalling. The result is a project landscape defined by interfaces, dependencies and the ever-present risk that where one scope ends, problems begin.

GCF (Generale Costruzioni Ferroviarie) has built its identity around a different proposition.

The Rome-headquartered group brings together multiple areas of expertise within a single integrated organisation. This reduces contractual handoffs, tightens coordination across disciplines and gives infrastructure managers a single point of accountability across the full infrastructure stack.

This isn't a recent rebranding exercise. Over more than seven decades, GCF has grown by deliberately expanding



its technical capabilities through sustained investment in specialist machinery, strategic acquisitions and the development of proprietary technologies, building an organisation where each discipline reinforces the others rather than operating in isolation.

The result is a group that can take on large-scale turnkey projects: designing, constructing, electrifying and commissioning complete railway infrastructure, from high-speed intercity lines to metro systems threading through dense urban environments. As the complexity of modern rail projects continues to grow, that capability is becoming harder to replicate, and increasingly valuable to the clients who need it.

Four Core Disciplines – One Organisation

A modern railway is a complex, interconnected system where infrastructure, energy and technology must work together seamlessly, and GCF's strength lies in its ability to integrate four highly specialised disciplines.

At its foundation is track construction and renewal. From new high-speed lines to the rehabilitation of existing networks, this remains GCF's historic core and the discipline around which everything else was built.

Complementing this is railway electrification: overhead contact lines, traction power substations and the energy systems that keep trains running reliably and efficiently. As electrification becomes central to sustainable mobility strategies across Europe and beyond, this capability's only growing in relevance.

The third discipline is signalling, telecommunications, automation and control – covering the installation

and integration of technologies that contribute to the safe and reliable operation of railway infrastructure.

Finally, there's urban mobility – metro, light rail and tramway projects – where all of the above must be delivered within the particular constraints of dense city environments, such as limited possessions, live operations overhead and an unforgiving public eye on disruption.

Bringing these four capabilities together under one roof means GCF can manage complex interfaces more effectively, reduce delivery risk and support clients across the entire lifecycle of a project, from early planning and design through construction, commissioning and long-term maintenance. The group works with operators, infrastructure managers, general contractors and system integrators as long-term partners rather than counterparties on a single contract, with a shared focus on transparency, responsiveness and performance.

Fleet, Technology and a Philosophy of Practical Innovation

GCF is best known not for a single product or solution, but for its ability to deliver highly specialised railway infrastructure projects, underpinned by one of the most advanced fleets of railway construction and maintenance equipment in Europe. Continuous investment in track renewal trains, electrification equipment and construction technologies has allowed the group to work faster, reduce possession times and maintain consistently high standards across increasingly complex programmes.

Because GCF designs, builds and maintains railway infrastructure, it has a direct understanding of the operational pressures its clients face, and that field experience shapes how the group approaches innovation.

Whether the objective is increasing productivity, reducing possession times, improving asset performance or enhancing safety, the starting point is usually something encountered on a live project rather than in a laboratory.

That thinking is formalised through GCF's dedicated technologies division, which develops tailored solutions for specific railway challenges. A notable example is its level crossing protection system: a SIL4 certified, radar-based safety technology that detects potential obstacles within a crossing area and interfaces directly with signalling systems to prevent unsafe train movements.

Tested Across Europe's Most Demanding Markets

GCF's integrated model has been put to the test across some of Europe's most demanding railway environments, and a consistent theme runs through its international project portfolio: core expertise applied with genuine sensitivity to local conditions. Railway infrastructure is shaped by national standards, certification procedures and operating practices, and GCF has built the flexibility to adapt its methods, equipment configurations and safety procedures to meet local requirements without compromising on quality or performance.

In France, GCF leads the Transalp Renouvellement Consortium and plays a key role in SNCF's Suite Rapide network renewal program, one of the continent's most technically exacting operating environments. The company deploys specialised high-performance renewal trains and machinery to deliver track renewals to exceptionally demanding schedules.

In Switzerland, GCF contributed to the railway infrastructure of the Monte Ceneri Base Tunnel. This was a landmark alpine project that demanded tight coordination across multiple disciplines and left little room for error.

Its urban transit credentials are equally strong. Work on the Copenhagen Metro and Denmark's first modern light rail transit (LRT) line in Aarhus showed that GCF's railway expertise translates effectively into city environments.

Further afield, the group has more than a decade of experience in Morocco starting in 2014. Work ranges from conventional lines and stations renovation and upgrades to design and construction of high-speed lines, as the ongoing HS line Kenitra - Marrakech, Lot 2.

Closer to home, GCF secured its first Deutsche Bahn contract in Germany — no small achievement in a market widely regarded as among the most rigorous in European rail.

North America represents GCF's latest strategic frontier. Building on a well-established presence, the company is now expanding its operations across both the US and Canadian markets.

Building for the Long Game

The direction of travel for GCF is clear. Investment in people, technology and specialist machinery continues, with a particular eye on the opportunities opening up from large-scale electrification programmes across Europe and North America.

People are part of that investment too. GCF is building out its internal academy programmes to make sure technical expertise, safety culture and operational know-how keep pace with the complexity of the projects coming down the line. In an industry where qualified and experienced people are every bit as important as the right equipment, that's not a nice-to-have, it's a strategic priority.

GCF will be at InnoTrans 2026 to present its integrated offer to the global rail community, explore new partnerships, and spend time with the infrastructure managers, operators and engineering companies that will define the next wave of major railway projects.

The goal isn't simply to show what GCF does today. It's to build the relationships that will carry the group into the next phase of its international growth – in Europe, in North America, and wherever rail investment is accelerating and the demand for capable, integrated contractors is strongest.

Visit GCF at InnoTrans Hall 26B, Stand 315





Track & Trackside Materials

voestalpine Railway Systems



From Nanometres to Networks: A Holistic Vision for Railway Infrastructure

As global railway networks face unprecedented demands and shrinking maintenance windows, simply supplying better track components is no longer enough, explains Albert Jörg, Senior Vice President Railway Systems and Product Solutions voestalpine Railway Systems.

The modern railway is a paradox. It's a system under constant pressure – from rising traffic demand and ever-shrinking maintenance windows to relentless budget constraints and the known shortage of engineers across the engineering sector. At the same time, it's a system that's expected to deliver unprecedented levels of safety, availability and efficiency. Analysing how best to deliver in this challenging environment helped voestalpine Railway Systems recognise a fundamental truth – simply supplying better individual components is no longer enough.

We've therefore deliberately repositioned ourselves from a component supplier to a true systems provider. But possessing a large portfolio of products is not the same as being a genuine system house. The real shift is a philosophical one – a steadfast commitment

to thinking bigger, broader and deeper to build better, more resilient track and special trackwork.

Thinking Across the Full Scale of Rail

This isn't just a theoretical exercise; it's the physical reality of railway engineering. The planning and construction of a new line can take decades; with the strategic decisions we make today profoundly influencing asset performance forty years into the future. At the other extreme, the critical physical interactions in the wheel-rail contact – the immense stresses, strains and temperature spikes that ultimately determine wear and tear – happen in mere milliseconds.

This same radical shift in scale applies to distance. We must consider everything from the hundreds of kilometres of a network's alignment down to the nanometres of a material's microstructure. Understanding the physical processes at this micro-level – how loads are transferred, the forces acting on sleepers and ballast – feeds directly back into our macro-level infrastructure planning. It forms a continuous, vital feedback loop. This allows us to prepare robust solutions for future applications and, just as importantly, to advise planners on what's beneficial for the system as a whole, rather than just a single stretch of track.

A Framework for Value

voestalpine Railway Systems' philosophy is built squarely on four pillars: safety, financial viability, environmental sustainability and systems availability. Whenever we approach a new project, the hierarchy of these pillars remains crystal clear.

This safety-first mindset is absolutely non-negotiable. However, the other three pillars represent a constant

balancing act, a series of complex trade-offs informed by tight budgets, specific operational contexts and long-term strategic goals. Finding the overall optimum in financial viability (investment vs. life-cycle-costing), sustainability or availability, depending on the client's immediate needs is a core activity, but in safety, there's zero room for compromise.

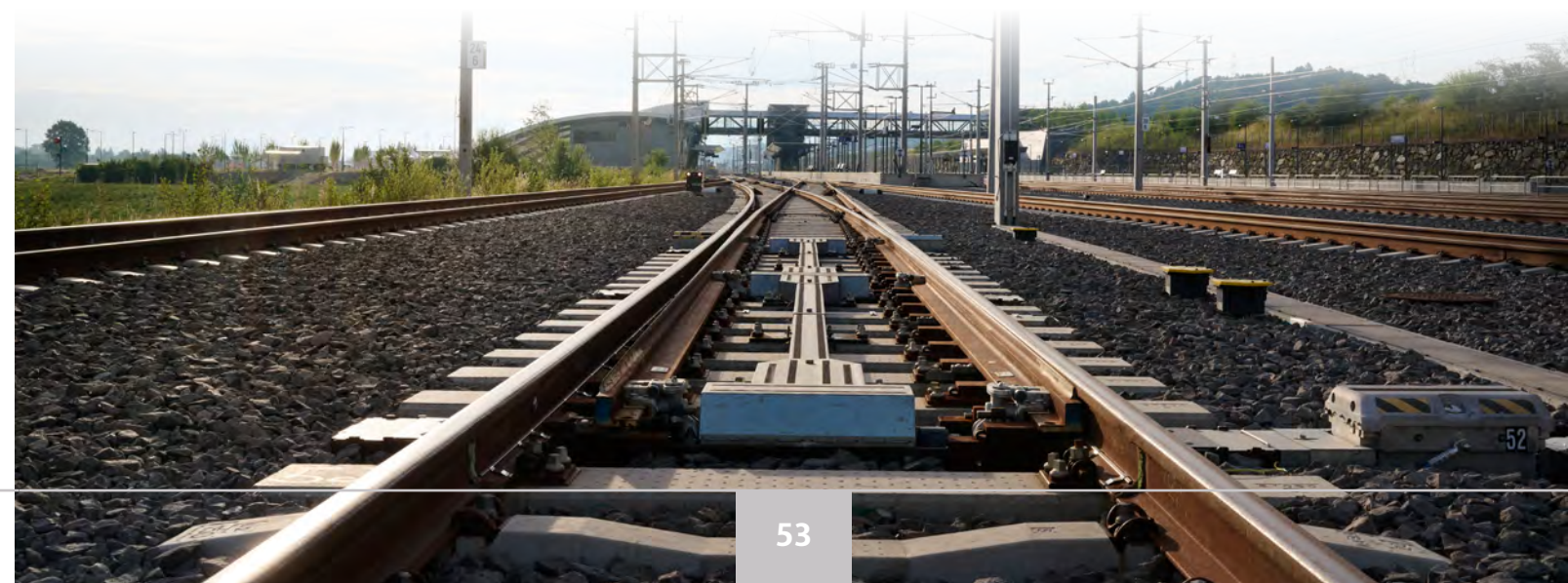
This framework provides us with a clear set of values, guiding every engineering and commercial decision towards delivering a solution that's not just technically sound, but holistically optimised for our customer's daily reality.

What It Means to Be a Systems Provider

The railway is an incredibly complex, interconnected system. Trying to make an isolated optimisation might improve the specific component you're looking at, but it might not have the same positive impact on the entire network. In fact, more often than not, it simply shifts the problem to another area, accelerating wear elsewhere.

This realisation is the central tenet of our systems provider approach. Instead of focusing on a single part in isolation, we combine the knowledge and experience of all our varied disciplines to find the absolute optimum at the system level. This means extending our boundaries beyond our traditional remit to understand what's happening at the operator and even the passenger level. It transforms the commercial dynamic from a simple, transactional client-supplier relationship into a deep, collaborative partnership.

We leverage the collective intelligence within the entire voestalpine group and work hand-in-hand with the customer to define the exact measures



that will tackle the root of a problem and optimise the entire system simultaneously. This approach directly mitigates the significant operational risk of rapid degradation, which inevitably occurs when a component, no matter how impeccably manufactured, doesn't harmonise with the system it's placed within.

Embedding the System Mindset

Possessing the extensive portfolio required to become a system provider is one thing; executing on that promise is another entirely. voestalpine Railway Systems' transformation wasn't overnight, but rather an organic evolution. It was a rigorous process that required a clear, unwavering vision from top management and the enthusiastic buy-in of our teams around the world.

Acquiring companies and expanding a portfolio doesn't automatically create a system approach. That's when the real work starts. Bringing together the brilliant minds involved across a large global group to create a unified system approach required a conscious, dedicated effort to break down ingrained internal silos and foster a culture of holistic thinking.

Delivering Relief for Operators

The result is an organisation that has become a true system house. This shared DNA is now so deeply embedded in our corporate culture that even when we sell a single component, it carries our system mindset with it. Every product we produce is developed and engineered with a profound understanding of its role in the wider infrastructure, its future maintainability

and its long-term operational robustness.

The primary benefit of our system solution is the active prevention of rapid, costly deterioration. By ensuring all elements work in concert, from the advanced material science of the rail profile to the complex, dynamic behaviour of the rolling stock, our system provider approach builds in resilience and longevity from day one.

This proactive, integrated optimisation directly leads to greater system availability, significantly reduced downtime and far more predictable maintenance schedules, giving operators the financial stability and operational performance they need to keep the world moving.

A Glimpse of the Future at InnoTrans 2026

This guiding philosophy will be on full display at InnoTrans 2026. Visitors to the voestalpine Railway Systems stand can expect to see not just exciting, cutting-edge developments at the individual component level, unique digital solutions but also clear, tangible demonstrations of how these innovations are seamlessly integrated into our overarching systems approach.

It serves as the perfect illustration that cutting-edge component technology and a holistic system mindset create railway infrastructure that is far greater than the sum of its parts. For us, InnoTrans is not just an exhibition, it's the ultimate proof point for a thesis we are proving every single day on tracks around the world.

Meet voestalpine Railway Systems at InnoTrans on Booth 150, Hall 21b.

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Track & Trackside Materials

Amorim Cork Solutions

The Cork Advantage Beneath Every Track

Engineering More Predictable Railway Performance

As railway networks evolve to accommodate higher traffic volumes, heavier axle loads and increasingly demanding environmental conditions, infrastructure managers face a common challenge: delivering long-term track performance while reducing maintenance needs, controlling noise and vibration, and improving sustainability. Achieving these objectives requires more than robust track design, it demands materials capable of maintaining consistent mechanical behaviour throughout decades of service.

For more than 150 years, Amorim has transformed cork into high-performance engineered solutions across multiple industries, including construction, aerospace, mobility, energy, sealing and railway infrastructure. Within Amorim Cork Solutions (ACS), decades of material science have shaped advanced cork composites for some of the world's most demanding applications. ACS expanded into railway infrastructure

almost 30 years ago, applying the same proven material expertise to create a comprehensive portfolio of resilient solutions for heavy rail, metro and light rail systems.

Today, with manufacturing facilities in Portugal and in the USA, the company combines advanced engineering with flexible production capabilities to support railway projects worldwide. This dual manufacturing footprint enhances supply chain resilience, shortens lead times and enables efficient customer support across global markets.

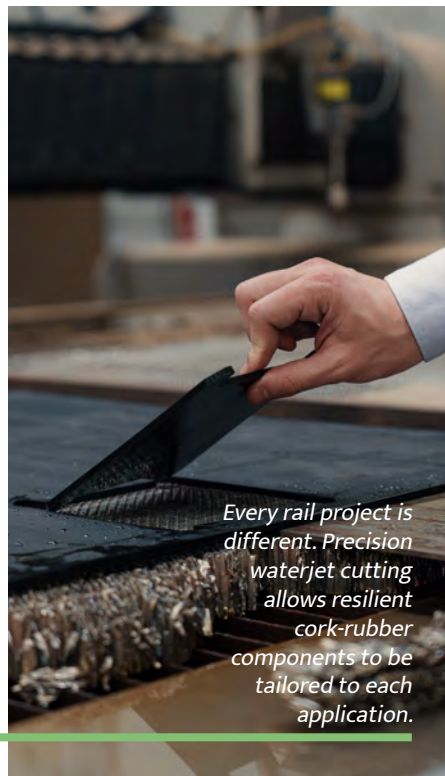
Engineering Materials for Modern Railway Infrastructure

Resilient components such as rail pads, baseplate pads, under ballast mats, floating slab mats and precast slab mats play a key role in optimising load distribution, controlling track stiffness and reducing the transmission of noise and vibration throughout the infrastructure.

Modern railway materials are expected to withstand millions of

Amorim's expertise in producing cured-to-thickness cork-rubber sheets ensures consistent material properties, dimensional stability and manufacturing efficiency.





Every rail project is different. Precision waterjet cutting allows resilient cork-rubber components to be tailored to each application.

loading cycles while maintaining stable mechanical properties despite changing temperatures, humidity and operational conditions. In today's railway infrastructure, long-term predictability has become just as important as initial performance.

At Amorim Cork Solutions, this philosophy has guided the development of a complete portfolio of cork-rubber and other resilient solutions engineered to deliver reliable behaviour throughout the service life of the infrastructure. By combining the natural cellular structure of cork with advanced elastomer materials, these materials provide an optimal balance between elasticity, damping capacity, fatigue resistance and long-term dimensional stability.

To meet the diverse requirements of modern railway infrastructure, components are manufactured in multiple formats – including sheets, rolls, blocks and cylinders – and can be customised to suit specific project requirements.

Cork-Rubber Rail Pads and Baseplate Pads

Rail pads and baseplate pads are fundamental resilient components within the railway fastening system, designed to optimise load transfer, control track stiffness and reduce the transmission of vibration and structure-borne noise. Installed directly beneath the rail and the fastening assembly, they help protect both the superstructure and supporting infrastructure from dynamic loads while contributing to longer service life and improved ride comfort.

Amorim Cork Solutions has developed an extensive portfolio of cork-rubber rail pads and baseplate pads (from VC91 to VC96) engineered to accommodate a wide range of stiffness requirements, axle loads and operating conditions. Combining cork's natural damping capacity, low density and elastic recovery with the mechanical strength of rubber compounds, delivering reliable performance under demanding railway environments.

Designed for both heavy rail and urban transit applications, the portfolio includes standard references as well as fully customised solutions manufactured through advanced CNC machining and waterjet cutting. This flexibility enables the production of complex geometries and project-specific components that integrate seamlessly with different fastening systems and infrastructure designs.

Engineered to withstand millions of loading cycles, cork-rubber pads offer excellent fatigue resistance and maintain stable mechanical behaviour despite temperature fluctuations and changing environmental

conditions. Their ability to preserve consistent stiffness over time contributes to predictable wheel-rail interaction, effective vibration attenuation and reliable long-term infrastructure performance.

Performance is verified through internationally recognised testing methodologies applicable to resilient elements within railway fastening systems, ensuring compliance with project specifications while providing engineers with confidence in long-term operational behaviour.

Predictable Performance Under Changing Temperatures

Research¹ evaluating the influence of temperature on rail pad performance has shown that cork-rubber composites maintain a more consistent mechanical response than conventional rubber alternatives across varying operating temperatures. As temperature changes, the stiffness and damping characteristics of rail pads also change, directly influencing vibration transmission, wheel-rail interaction and, ultimately, rolling noise.

Comparative studies indicate that, while both rubber and cork-rubber rail pads are affected by temperature, cork-rubber composites provide greater stability throughout the operating range of -20 °C to +40 °C. Their ability to maintain higher stiffness at elevated temperatures, combined with improved damping around transitional temperatures, contributes to more consistent acoustic performance under changing environmental conditions.

For railway engineers and infrastructure managers, this

translates into a more predictable track system. By reducing the influence of temperature on rail pad behaviour, cork-rubber composites help minimise seasonal variations in rolling noise while supporting stable track dynamics and long-term operational performance.

Under Ballast Mats and Floating Slab Mats

Installed beneath the ballast, Under Ballast Mats distribute loads more uniformly, reduce ballast degradation and help preserve track geometry under repeated traffic loading. Their resilient behaviour mitigates dynamic stresses transmitted to the substructure while contributing to lower maintenance requirements and improved long-term track performance.

Floating Slab Mats are designed for applications where higher levels of vibration isolation are required, particularly in metro systems, tunnels and densely populated urban environments. Positioned beneath the concrete slab, they effectively decouple the track structure from the surrounding environment, significantly reducing the transmission of vibration and structure-borne noise to adjacent buildings and sensitive facilities.

To meet the specific requirements of each project, Amorim Cork Solutions manufactures UBMs and FSMs in customised roll lengths and widths, optimising material yield while reducing installation time and on-site waste. Solutions are available in both flat and profiled (wavy) configurations, enabling engineers to select the geometry best suited to the track interface and required dynamic behaviour. These engineered surface profiles

improve contact conditions between interfaces, contributing to optimised vibration attenuation and overall system performance.

Both solutions are characterised according to internationally recognised standards. Under Ballast Mats are tested in accordance with EN 17282 and DIN 45673-5, while Floating Slab Mats are characterised according to the EN 17682 and DIN 45673-7 series, providing engineers with verified mechanical and dynamic performance data for accurate project specification.

Moreover, to support more informed specification decisions, Amorim Cork Solutions provides independently verified Environmental Product Declaration (EPD) for its Under Ballast Mats and Floating Slab Mats. Developed in accordance with ISO 14025 and EN 15804, this EPD provides transparent, third-party verified life-cycle assessment data, enabling infrastructure managers, designers and contractors to incorporate environmental performance into procurement and project evaluation while maintaining the highest engineering standards.

Engineering Support Through the Track Design Assistant (TDA)

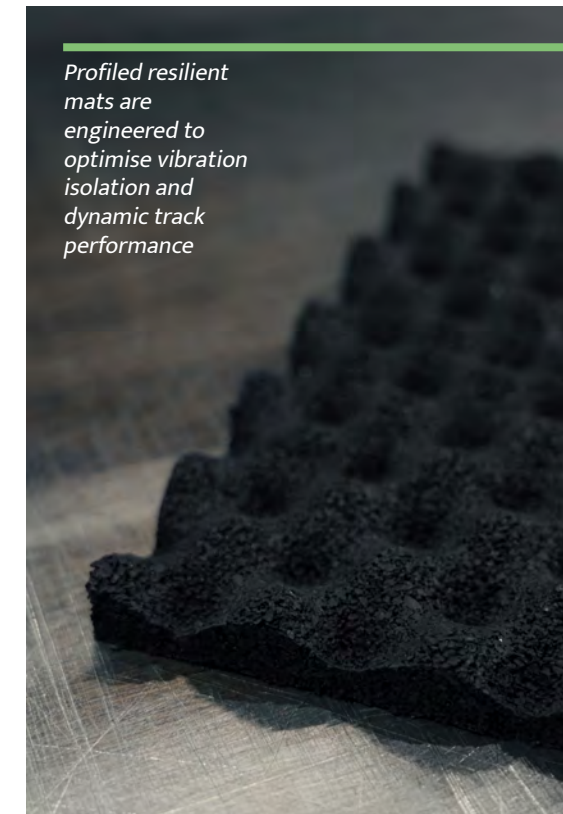
Selecting the appropriate resilient solution requires more than choosing a stiffness value. Every railway project presents a unique combination of track configuration, vehicle characteristics, operational loads and acoustic performance requirements.

To support this process, Amorim Cork Solutions, in collaboration with the Institute for Sustainable Construction (ICS) at the Faculty of Engineering

of the University of Porto (FEUP), developed the Track Design Assistant (TDA) – an engineering tool designed to optimise the specification of Under Ballast Mats (UBMs) and Floating Slab Mats (FSMs) from the earliest design stages. By combining project-specific parameters, such as vehicle type and track characteristics, the tool predicts key performance indicators including insertion loss, maximum rail deflection and the natural frequency of the track system. Based on these results, engineers can identify the most suitable UBM or FSM solution for each application, ensuring the required vibration and noise mitigation performance while avoiding unnecessary over-specification of the system.

1. Squicciarini, G., Thompson, D.J., Toward, M.G.R. & Cottrell, R.A. (2015). The effect of temperature on railway rolling noise. Proceedings of the Institution of Mechanical Engineers, Part F: Journal of Rail and Rapid Transit, 229(6), 627–639. DOI: 10.1177/0954409715614337

Profiled resilient mats are engineered to optimise vibration isolation and dynamic track performance





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Stations & Station Furniture

Daktronics

Streamlining the Passenger Experience Through Daktronics Innovation

You arrive at a busy train station. You know where you're going, but you don't know exactly where you need to go to get there. You immediately look for some sort of sign to point you in the right direction. A crisp, bright Daktronics display catches your attention and shares the information you need. You go in the right direction, find the right platform and are on your way to your destination.

This scenario plays out every day in the lives of commuters and tourists. A quick guided tour from the entrance of the station to the concourse, navigating multiple platforms and finding the door to the correct train or bus. Clear, full-colour electric signage helps guide the way and get people where they need to go by showing time of day, train information, arrival and departure times, and updated information as the day goes on.

The passenger experience is very different than it once was, well before digital technology was available in the station. Today, these signs can change as information changes about the availability and departing times of trains and buses. And with it, passengers are aware of these changes as they move about the station and get to where they need to go.

These full-colour LED displays create a welcoming, even entertaining, environment. The text size can be changed and adjusted to best fit the display and its location to

maximise communication with patrons. Branded images and additional weather, timing and current data can be shared with people as they move along their way from the entrance to the concourse to the platform.

Behind all of this technology and communication, Daktronics has been developing and innovating over the years. From flip technology to single-colour to full-colour LED technology – and now tighter pixel spacing between those LEDs for better resolution and image clarity – the development of the best-possible solution for public transport applications continues. This includes the control system on the back end to ensure those images appear correctly and legibly for passengers.

With seamless access to news, weather data and multiple video feeds, the possibilities for information shown on these displays is exponential. From digital displays to control rooms and all the locations patrons see, Daktronics provides everything a transit station could need for keeping its passengers informed and getting to their destination in an easy, stress-free way.

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Stations & Station Furniture



Stations & Station Furniture

i-vision Lighting Solutions Limited

What Happens When Lighting Is Part of the Design Conversation

A new modular footbridge design, a lighting brief balancing dark-sky requirements, a tight budget and a curved composite structure, and three online meetings that shaped the outcome. Geoff Jones, Director of i-vision Lighting Solutions, explains why involving lighting specialists early can influence far more than the lighting itself.

Network Rail's Flow footbridge is a modular design built from fibre-reinforced polymer rather than steel, intended to replace high-risk rural footpath crossings at a fraction of the weight and cost of a traditional structure. It's still in development, but the lighting for

it has already been through a proper design process. It's a useful illustration of what early involvement can achieve when the brief is genuinely difficult.

A Brief with Several Competing Demands

The designers came to the table with a clear concept and a demanding set of objectives to satisfy alongside it. The lighting had to support the designers' architectural intent rather than sit on top of it, run on very low power, control light spill carefully given the rural, often dark-sky settings the bridge is aimed at, work within a tight budget, install quickly and simply, and adapt across the different module sizes the modular system allows for. None of these were negotiable, and several pulled in different directions at once.

Two further constraints came from the structure itself rather than the brief. A composite footbridge moves through a significantly wider range of



© Network Rail – Network Rail's first deployed FLOW bridge © Network Rail

Stations & Station Furniture

expansion and contraction than a steel or concrete equivalent, and this particular structure can sit over a live high-speed line, meaning it also has to tolerate the substantial vibration of trains passing beneath at speed. Both had to be designed for from the outset.

What Three Meetings Produced

That brief, discussed early with the right people from the project over just three online meetings, led i-vision to develop a bespoke lighting approach specifically for the bridge's curved composite geometry — something no off-the-shelf linear luminaire could have followed, and one that also had to accommodate the structure's greater thermal movement and the vibration of high-speed trains passing beneath. Although the detailed design remains confidential while the project is live, the process resulted in a bespoke lighting solution developed around the bridge's geometry and operating environment, rather than adapted from an existing product.

Feedback from those early conversations was folded straight back into the design — refining fixing positions and clearances before anything was committed to production, rather than after.

Identifying Constraints Beyond the Original Brief

The most telling part of the process wasn't something the client asked for. Rural crossings are often a long way from a mains power connection, and running power to a remote site can cost more than the lighting itself. i-vision raised this early, before it became a problem, and proposed stand-alone solar and battery options as an alternative — including the possibility of solar-active glazing built into the bridge's own glass panels, so the power source becomes part of the structure rather than an addition to it.

It's the kind of constraint that often only emerges once someone with relevant experience is involved early enough to look beyond the immediate brief.

What It Took to Get There

None of this needed a lengthy engagement. Three online meetings, with the designers, engineers and technical leads who actually held the answers, were

enough to work through a genuinely unusual structure, a demanding set of constraints, and a problem the brief hadn't even mentioned. The same ingredients that made those meetings productive apply to any project reaching feasibility or early concept stage:

A clear concept or outline design — doesn't need to be finished, just enough to show the geometry and intent.

The real constraints — budget, power availability, site conditions, planning or environmental policies.

A sense of what has to stay flexible — modular sizing, phased delivery or anything likely to vary between sites.

The right people in the room — whoever actually holds the answers to the above.

The main factor at this stage is to resolve any issues early. As the Flow project demonstrated, that's often considerably easier than revisiting them later.

The Difference Timing Makes

Lighting rarely represents a large proportion of a rail project's capital cost, but decisions made during the earliest design stages often determine how straightforward, efficient and maintainable the final installation will be. Bringing a lighting specialist into the conversation while ideas are still flexible can uncover opportunities, avoid unnecessary constraints and help ensure that the lighting package reaches procurement fully resolved rather than still evolving.

For further information about i-vision Lighting Solutions, visit ivisionuk.com or email rail@ivision.com.

Starting the Design Conversation

What you need to take to the first meeting

- A clear concept or outline design
- The real constraints
- Areas that need to remain flexible
- The right people in the room

Two or three conversations — no cost, no obligation, no site visit required.



Cabling Solutions

Complete Composite Systems (CSS)

Rail cable containment done the modern and easy way with the GRP-manufactured ARCOSYSTEM®



ARCOSYSTEM® rail cable troughing post-mounted trackside at Jungnau in southern Germany

Laying cable troughing along a railway route can be a complex project, especially where trackside access is compromised by obstacles or topographical difficulties. That's where the lightweight yet sturdy ARCOSYSTEM® comes in.

The composite construction of the elevated ARCOSYSTEM® troughing allows for flexible on-site handling, meaning tight trackside spaces are accessed efficiently and height or directional changes can be easily made during installation, especially with the customised range of laser-cut steel brackets providing a multitude of fitting angles.

Being lighter in weight also ensures the troughing can be post-mounted up to 6 metres between supports, or fastened to a variety of line-side features such as [bridges](#), [noise barriers](#), [railings](#), tunnel walls, [rock faces](#) or steep [hillside slopes](#).

Manufactured from pultruded glass fibre reinforced polymers (GRP/FRP), the sleek ARCO troughing is robust enough to protect all types and thicknesses of electrical cables, with the cell's resistance to heat, water, corrosion and UV rays increasing its long-term durability.

The system's array of accompanying specialist bracketry has recently been updated with an innovative 'ClickFit' style option. This allows site operatives to simply click the troughing cells into place with a gratifying snap, instead of sliding the troughs into the shoes of the brackets, making installation more straightforward on slanted ground and when working in slippery conditions.

The drive for technological advancement never stops, and the [Rapid Route](#) technique – fitting ARCOSYSTEM® via Sigma Posts atop specially designed Anchor Screws developed by our partners Anchor Systems Ltd – speeds up installations without the need to excavate and use cast in-situ posts, further reducing a project's carbon emissions.



ARCOSYSTEM® installed via the 'Rapid Route' method with ground-screwed Anchor Screws, near Castleford



ARCOSYSTEM® attached to a rock wall along the bank of the Danube river in northern Austria

ARCOSYSTEM® safely clamped to a lengthy steel railway bridge over the River Lesum near Bremen



Key benefits of ARCOSYSTEM® :

- Safely encloses & protects all types of high-voltage power, signalling and digital communication cables for lengthy runs alongside railway tracks
- Carries cable loads of up to 90kg/m
- Engineered GRP construction provides strong resistance to heat, water, corrosion, and UV rays compared to more common materials
- Can work reliably in temperatures between -40°C and +80°C
- Long lifespan and environmental sustainability
- Twin-walled troughing design ensures the system can resist lateral forces from embankment subsidence, high snow loads and wind effects from high-speed trains
- Unaffected by continuous freeze-thaw cycles, and a wide range of chemicals
- Troughing is available in various cell sizes to accommodate a wealth of cable load requirements or space restrictions
- Composite construction helps reduce carbon emissions – an independently verified life cycle assessment (LCA) carried out as part of an official [Environmental Product Declaration \(EPD\)](#) is available to view

To discuss your rail cable containment requirements, contact the experienced technical experts at CCS, the exclusive UK distributor of ARCOSYSTEM®



[Complete Composite Systems Ltd](#)

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Email:
info@completecomposites.co.uk



The exclusive UK rail stockist of ARCOSYSTEM® is the [Scott Parnell Rail Division](#)



ARCOSYSTEM® is developed by CCS's Swiss partners, [Castioni Kabelführungssysteme GmbH](#)



The 'Rapid Route' cable containment installation technique is developed in partnership with [Anchor Systems Ltd](#).



Rail Demagnetisation

Maurer Magnetic

Undetected magnetism can disrupt communication between track magnets and onboard receivers and produce costly maintenance loops, yet the fix takes less than two minutes, writes Christian Spiess, Chief Operating Officer of [Maurer Magnetic](#).

Modern rail safety systems rely on track magnets to trigger automatic responses. These magnetic markers communicate with a train's onboard systems as it passes, confirming position, relaying speed information and activating safety systems such as automatic braking. They form a critical link in the communication chain between track and train, and if that link is disrupted, the consequences can be serious.

Disruption occurs when surrounding rail or train components become magnetised. Components may arrive with residual magnetism if handling during manufacture or logistics involves electromagnetic lifting gear, for example. High-current DC welding is a common cause during maintenance, as without proper grounding or post-process demagnetisation, the welding current permanently aligns the magnetic domains within the steel. Electrical faults such as short circuits can also leave significant residual magnetism in infrastructure at points of high current density.



Once present, unintended fields interfere with detection in two ways. Where rail near a detection point is magnetised, its field superimposes onto the track magnet's field, distorting the signal and potentially causing a sensor to miss a pass event or trigger a false positive. Where train components are magnetised, they can generate a localised static field that acts as background noise, preventing the receiver from accurately reading trackside signals.

When Magnetisation Goes Undetected

On the track, residual magnetism in vehicle components can blind the onboard receiver – the static local field

prevents the sensor from reaching the threshold needed to trigger when passing a track magnet. The typical result is a forced emergency brake application, as the system interprets the missed signal as a malfunction.

The reverse is equally disruptive. Highly magnetised rail segments or welds can mimic the signature of a track magnet, causing sensors to register signals that aren't there. In axle counter systems, this produces 'ghost occupancies' – track sections shown as occupied when no train is present. In automatic train protection (ATP) systems, a 'phantom' magnet signal triggers an immediate emergency stop. A third failure mode occurs where magnetisation distorts rather than masks the signal: the magnetic telegram sent from trackside to train becomes corrupted, and the onboard computer rejects it as invalid.

In depots, the damage tends to be financial. If localised magnetisation interferes with a pre-release go/no-go test, the train fails, not because anything is broken, but because the magnetic environment is too noisy for the sensor to read correctly. Technicians frequently replace perfectly functional sensors or cables because the actual root cause, such as a magnetised bogie frame, is never checked. These 'no fault found' scenarios are among the costliest consequences.

The Solution – Magnetic Field Measurement

Measurement is the only way to turn magnetic fields into actionable data. Without it, teams cannot distinguish between a hardware defect and magnetic interference, which is why so many cases end in unnecessary component replacement.

Attempting demagnetisation without prior measurement is equally unreliable: without knowing the field strength and orientation, critical local hotspots cannot be identified, often forcing full-length track sections to be treated resulting in significantly higher cost and effort.

Maurer Magnetic M-Test LL

To address this problem [Maurer Magnetic](#) developed the M-Test LL, a precision handheld magnetometer for detecting residual magnetism. It audits rails,

welds and vehicle components before service entry, verifies demagnetisation through before-and-after measurement, and pinpoints magnetic hotspots for targeted intervention. A standard check takes one to two minutes, making it easy to integrate into existing maintenance protocols.

Three patterns indicate a problem reading. High field strength (above around 1 mT) suggests significant interference risk, particularly where the field extends beyond the material surface. A polarity reversal across a short section indicates a magnetic dipole, which is especially disruptive to axle counters, while a localised inconsistency at a weld points to a maintenance-induced issue requiring attention.

Measurement should be treated as a quality gate, not a one-off check. At commissioning, all incoming ferromagnetic parts should be screened on delivery to prevent built-in faults from being embedded in the system. For trackside infrastructure, measurement is most critical before and after high-current work such as welding, and whenever signalling anomalies suggest magnetic interference.

The Case for Acting Now

You cannot manage what you don't measure, and undetected magnetic interference leads to unnecessary component replacement, disproportionate interventions and direct compromise of ATP systems where reliable signal detection is a safety requirement.

At one to two minutes per check, the barrier to measurement isn't technical, it's awareness. For operators who've not yet included magnetic conditions alongside electrical and geometric checks, the question isn't whether it's worth doing, but how much undetected magnetism is already costing them.

[Maurer Magnetic](#) is a leader in the [demagnetisation of railway components](#), and its M-Test LL magnetism measurer is available for both rental and purchase. For more information, please contact Christian Spiess at info@maurermagnetic.com or via maurermagnetic.com/en/contact/.



Worksite Protection

Ninehundred Communications Group

Lighting Towers That Outperform the Competition

Trackside maintenance crews working in low light face real risks: missed defects, increased accidents and fatigued workers. 900 Communications' high-output LED lighting towers are changing what's possible.

As the nights draw in and the clocks go back, the rail industry faces a familiar yet critical challenge – ensuring the safety and efficiency of night-time operations. For trackside maintenance and inspection crews, the shorter, darker days of winter amplify the inherent risks of working in low-light conditions. Inadequate lighting isn't just an inconvenience; it's a direct threat to worker safety, operational reliability and the quality of essential maintenance. For rail infrastructure managers still relying on legacy lighting solutions, the message is clear: it's time for an upgrade.

Since 1979, 900 Communications has been dedicated to meeting the evolving needs of various sectors, and a key part of this has been its commitment to providing comprehensive solutions that solve real-world problems. With over 45 years of experience in high-performance lighting, the company understands the unique demands of harsh environments like construction sites, quarries and especially, rail depots and trackside locations.



The High Stakes of Poor Illumination in Rail

Routine inspections at rail junctions are vital for maintaining the safety, reliability and operational performance of the network. However, conducting these inspections at night presents a host of challenges that traditional lighting solutions often fail to address:

- **Limited visibility across complex track layouts:** Poor lighting can obscure a clear view of the track, making it difficult to spot defects or hazards
- **Increased risk of slips, trips and falls:** Uneven ground, cables and other obstacles are much harder to see in low light, significantly increasing the risk of accidents
- **Reduced accuracy during inspections:** The quality of maintenance work can be compromised when technicians cannot see clearly, leading to missed defects and potential future failures
- **Additional strain on frontline workers:** Working in poorly lit environments can cause eye strain and fatigue, impacting the well-being and performance of staff

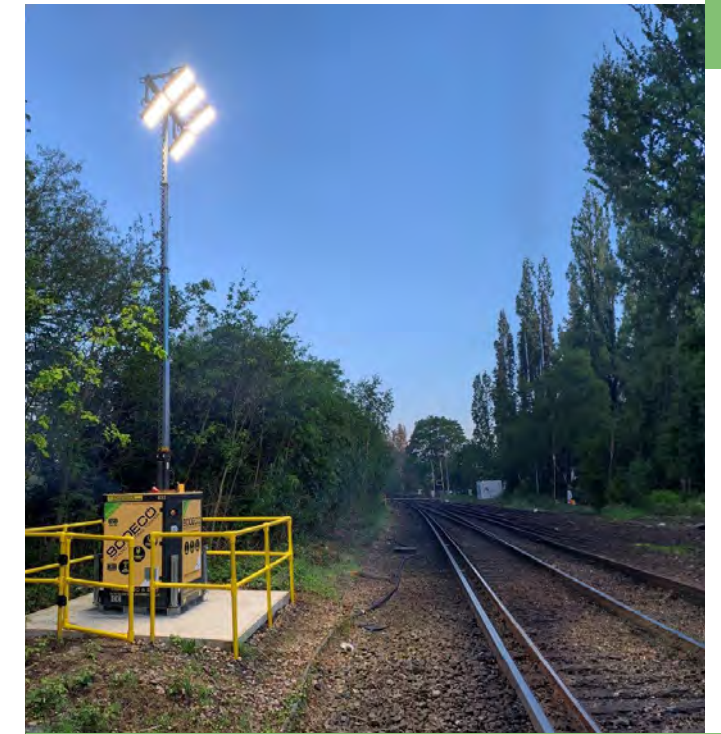
As Rail Account Manager Mark Boddy notes, “Inadequate lighting on track can compromise critical safety measures, including the prevention of slips, trips and falls. It can also negatively impact the reliability and quality of essential maintenance activities.”

Legacy lighting solutions often fall short, lacking sufficient brightness, taking too long to deploy, or failing to provide the consistent, wide-area illumination that is essential for safe and effective trackside work.

The UK's leading LED Lighting Towers

900 Communications has engineered a new generation of lighting towers designed to overcome these challenges. Its mobile and static lighting towers aren't just an incremental improvement; they represent a step-change in trackside illumination. The company is proud to

offer what it believes to be the brightest LED lighting towers in the UK, a claim supported by extensive customer feedback and compelling performance data.



When comparing lumen output, 900's units significantly outperform the competition. While typical competitor lighting towers provide approximately 80,000–90,000 lumens, its units deliver a powerful 240,000 lumens (mobile) or 262,500 lumens (static). This exceptional brightness has a transformative effect on the trackside environment, creating a safe, daylight-simulated workspace that enhances both safety and productivity.

The practical benefits of this superior illumination are clear. As Rail Account Manager Ben Ryan explains, *“Improved lighting levels that closely resemble daylight conditions make it significantly easier to identify track defects and loose components. This was recently demonstrated at a Network Rail site, where loose components were identified during the very first shift in which the lighting tower was deployed.”*

In many cases, customers have been able to replace two or three conventional lighting towers with a single 900 Communications unit, leading to substantial cost savings and a reduced on-site footprint.

Rapid Deployment and Operational Efficiency

In the fast-paced rail environment, deployment speed and ease of use are critical. 900 Communications' lighting towers are designed for rapid, single-person setup, with a typical deployment time of just 5–10 minutes per unit. Subject to location and availability, it can often deliver units the next day, and in some cases, the same day, ensuring that customers have the light they need, when they need it.

For junction lighting applications, towers can be installed on a semi-permanent or permanent basis within a 'V' or the cess. While initial placement in challenging conditions may require the use of a road-rail vehicle (RRV), once installed, the units can be easily started and operated by site staff during each shift. This straightforward operation minimises disruption and ensures that your teams can focus on the task at hand.

Transforming Night-Time Operations at Glasgow Central Station

The effectiveness of 900 Communications' lighting solutions has been proven in some of the UK's most demanding rail environments. At Glasgow Central Station, one of the busiest transport hubs in the country, maintaining safe and effective night-time operations is essential. The deployment of its 900 Eco Mobile Lighting Tower transformed low-light conditions into a safe, daylight-simulated working environment, demonstrating the real-world impact of the technology.

The Glasgow trial has been highly successful. Although the initial deployment required isolations and RRVs due to the complexity of working within a major city station, the unit has remained on site long-term and additional funding has been sought to procure further units. This success story is a testament to the reliability, performance and value of these lighting solutions.

A Commitment to Sustainability

900 Communications is dedicated to minimising the environmental impact of its operations, and in 2020 launched its 'Eco-Friendly' division to support a product range that helps customers reduce their carbon footprints.

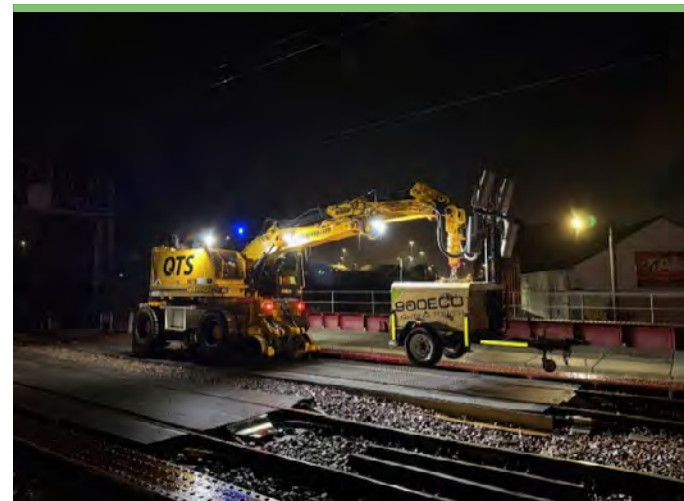
While its lighting towers are diesel-powered to achieve their exceptionally high light output, they are fully compatible with HVO fuel, a more sustainable alternative to conventional diesel. Furthermore, because a single 900 Communications lighting tower can replace two to three conventional units, overall fuel consumption and on-site space requirements are significantly reduced.

By choosing 900 Communications lighting solutions, you're not only improving safety and efficiency, but also making a positive contribution to your sustainability goals.

Prepare for the Darker Nights Ahead

As the rail industry prepares for the darker nights of winter, the time to address inadequate lighting is now. With over 45 years of experience, 900 Communications is your trusted partner for high-performance, eco-conscious lighting solutions. Its lighting towers are engineered to provide the flexible, durables and powerful illumination you need to keep your sites safe and your operations running smoothly.

Don't let inadequate lighting compromise the safety of your workers and the quality of your maintenance activities. Contact 900 Communications today to learn more about how our industry-leading lighting solutions can transform your night-time operations via sales@ninehundred.co.uk, 0845 600 4 900, or <https://www.ninehundred.co.uk/>.



Worksite Protection

Dual Inventive

Unlocking safer, more predictive and cost-effective possessions with T3-A and ZKL 3000 RC

Background

Historically, railway engineering works have been carried out within a traditional T3 possession, using possession limit boards (PLB) and detonators for protection.

This method requires track workers to walk to the extremity of the possession to place PLB's and detonators. This imposes a risk to track workers, exposing them to unnecessary hazards, such as encroaching on or towards open lines when deploying and retrieving their protection equipment. There is also anecdotal evidence that too regularly, protection equipment is being placed on the wrong line or even outside the possession limits.

Over the years, due to better insights and reporting, concerns have grown about the safety of using PLBs and detonators and in 2015, the Rail Accident Investigation Branch (RAIB) conducted a review into the protection measures used during engineering possession works. Over a period of two years, they found a number of protection irregularities:

- 44 – protection incorrectly placed
- 39 – protection set up whilst the line is open to traffic
- 52 – working outside protected area
- 52 – trains signalling into the protected area

These figures highlighted the challenges faced by teams out on track and were a cause for major concern, ultimately paving the way for deviation to the current Rule Book. These are 'engineering controls, also known as, T3-A and T3-D. These are new processes for the protection of T3 possessions on Network Rail managed infrastructure, that use existing technology to reduce that safety risk.

Possessions with engineering controls use technologies

which are controlled remotely by a mobile app or SMS, such as a remote T-COD (ZKL 3000 RC) or a remote disconnection device (RSS – Remote Safety Switch). This has improved how possessions are taken, protected and handed back, by reducing on-track exposure to allow for a safer, smarter and more efficient way of working.

T3-A trials involved the use of a remote-control T-COD, specifically the ZKL 3000 RC, were successfully conducted at Selby Junction on the North & East Route in 2024.

The successful completion of these trials was evidenced through:

- The output report
- The after action-action review
- A series of video recordings of the possession activities
- A wash-up meeting to capture feedback and identify areas requiring further development

The positive outcome from these trials provided the TransPennine Route Upgrade (TRU) project with the opportunity to adopt the T3-A model, successfully deploying the devices on the lines between York and Leeds. Within a matter of weeks, the project team could see the real benefits in terms of cost and time efficiencies.

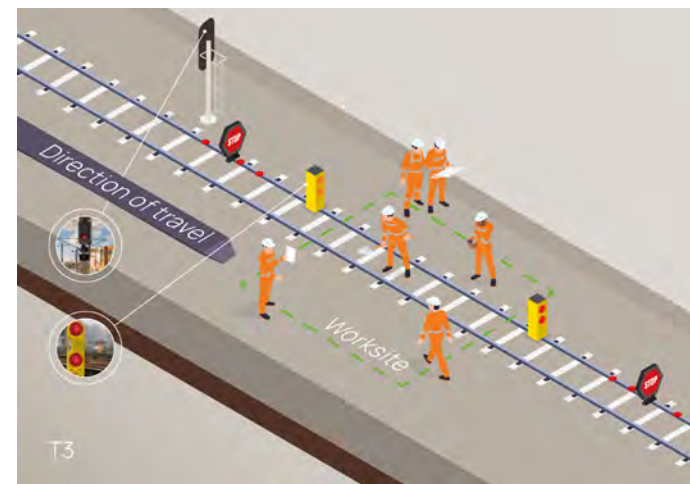
You can read more about the trial and the efficiencies gained during [the TRU project here](#).

Problem

The article *Improving Track Worker Safety*, published on 28 October 2025, highlights that around 8% of possessions are currently delivered using T3-A or T3-D protection, enabling 6% more work to be completed while carrying only two thirds of the risk. It also sets out Network

Rail's ambition for regions to achieve 80% adoption of Engineering Control T3-A and T3-D protection by 2029.

Despite this clear strategic direction, the adoption of Possessions protected by T3-A remains uneven across the network. While some areas are adopting the approach at pace and realising its benefits, traditional T3 methods continue to be widely used where T3-A is available. This variation of roll out limits the realisation of the safety, efficiency and productivity gains that T3-A is designed to deliver.



A traditional T3 (known as T3-H) possession in comparison to T3-A continues to have cost, increased risk to track workers, wasted time from the deployment/recovering of equipment and carbon emissions – due to the following:

- Additional cost of possession support staff (PSS) to place and recover protection
- Cost of equipment i.e. PLBs and detonators
- Cost and time to produce multiple Safe System of Work Packs (SSWP) that require verifying and validating
- Increased risk as multiple PSS working on or near the line
- Increased risk of deploying protection incorrectly
- Risk of misinterpretation due to high volume of safety critical communications between signallers, PICOPs and PSS
- Production time reduced through placing and recovering protection
- Increased carbon emissions due to multiple

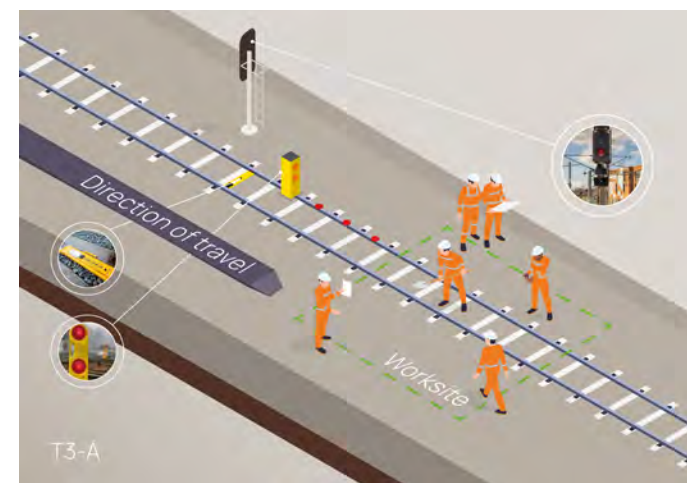
vehicles travelling to and from possession limits

In addition, recent findings show that modern train cabs provide a much better environment for the drivers, which as a consequence have significantly improved soundproofing compared with older trains. However, this reduces the effectiveness of detonators as an audible warning method. We have heard this issue is particularly evident on Pendolino trains, where the driver's cab is positioned further back. As a result, drivers may not hear or feel the effect of the detonators placed on the track and may therefore be unaware they are approaching a worksite until it is too late.

Solution

Network Rail's introduction of T3-A possessions using the ZKL 3000 RC (remote-control track circuit operating device) clearly demonstrates its recognition of the benefits of applying technology where appropriate.

Recent data supports the view that T3-A provides a more efficient, safer, faster and more reliable method of protection.



Benefits include:

- The PICOP is no longer reliant on Possession Support Staff (PSS) placing and recovering protection
- Protection can be deployed instantly through the MTinfo 3000 app, activating an unlimited number of ZKL 3000 RCs within seconds
- Reduces safety critical communications
- Less cancelled possessions by not

relying on PSS, protection can still be deployed if PSS fail to attend shifts

- Planning access for PSS no longer required
- Reduced or restricted amounts of access points are no longer an issue
- Reduces impact of walking on ballast or encroaching on third rail etc.

Efficiencies

Transitioning from T3 to T3-A possessions across several Kent routes has delivered measurable efficiency improvements over a fixed period.

Over a period of five shifts this has equated to:

Routes	Time Saving Per Possession	Time Savings Over 5 Shifts
Maidstone Lines (SBJ) Otford-Lenham	40 mins	3 hours 20 mins
Mid Kent Lines (LCH) -Ladywell Jn-Hayes	15 mins	1 hour 15 mins
Maidstone Lines (SBJ) Maidstone East-Ashford	15 mins	1 hour 15 mins
Maidstone Lines (SBJ) Maidstone East-Hothfield	19 mins	1 hour 35 mins

The cost efficiencies speak for themselves – imagine the annual savings achievable through area-wide deployment of T3-A possessions.

Driving Change

Across several routes, T3-A protection is being successfully adopted for possessions, with clear benefits already being realised. This growing experience provides a strong foundation for wider transition from traditional T3 methods where T3-A is available.

As planners consider future possession strategies, the evidence demonstrating the safety, efficiency and reliability of T3-A should play a central role in decision-making. Continued exposure to successful applications is key to building familiarity and confidence.

By expanding shared learning around T3-A – showcasing practical use cases, success stories and proven best practice – we can accelerate adoption and support a consistent, business-as-usual approach to possession delivery.

Conclusion

Using Engineering Controls, such as T3-A was identified as a necessary evolution of traditional protection methods following a history of safety incidents. What began as a concept has progressed through multiple successful trials and is now recognised as the preferred method of protection across many routes.

By continuing to highlight these improvements – alongside the clear safety benefits and efficiency gains achieved – confidence can be built across the industry.

This provides track workers with reassurance that T3-A represents the most effective form of protection, supporting the shared objective of everyone returning home safe every day.

Michael Doughty, Network Rail, Kent Route, commented:

“We successfully installed ZKL devices while still maintaining services from the bay platform at Maidstone East. The solution has proven effective, and we've now implemented our third T3-A possession — saving approximately 17 minutes during both the granting and giving-up process. A great step forward in efficiency and service continuity!”

For more information about the T3-A using the ZKL 3000 RC, get in touch at info@dualinventive.com





Worksite Protection

ZÖLLNER Signal GmbH

Evolution and Innovation in Warning Systems in France

Since the introduction of cable-based warning systems (known in France as DAAC and commonly referred to as 'Autoprowa') on major worksites in 2004, automatic warning systems have undergone significant development.

ZÖLLNER has been part of this innovation by developing the mobile radio warning system MRWS (or in French: Dispositif d'Annonce Portatif radio, short DAPR) in the early 2010s, which has since become the most widely used solution today.

The cable-based system is still used more frequently for large-scale operations or major engineering structures, whereas the MRWS, originally designed for smaller worksites, has gradually become a standard. Its versatility and high level of safety has enabled it to replace previously used methods (both human warning chains as well as technical solutions) in France and across Europe.

DAPR // AUTORISÉ ET
OBLIGATOIRE EN 2027



The ZPW126-10 is part of the newest generation of collective warning devices. The SIL4 device combines acoustic warning signal and visual reminder LEDs in one robust structure, stackable for easy handling and logistics. The ZPW126-10 can be used as part of a warning system built alongside the track or, as shown here, be easily attached to construction machinery like this excavator to accommodate noise peaks.

What's New in France?

Mandatory use of MRWS

To improve the safety of personnel working on railway infrastructure, SNCF has mandated the use of the MRWS starting in 2027 whenever warning systems are required to protect workers from hazards related to train traffic.

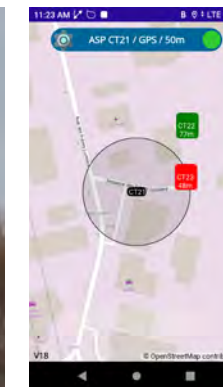
MRWS for Mobile Worksites

In France, personnel working on mobile construction sites are often additionally equipped with a two-way radio, which enables the safety supervisor to stay in contact with the lookouts positioned along the track.

Together with a partner, ZÖLLNER has developed a solution that combines two-way radio communication and positioning functionality within the MRWS.

The safety supervisor (known in France as the ASP) enters the required distance to each lookout, which is then automatically transmitted to their devices. If the specified distance is not maintained, an alarm is triggered simultaneously on both the ASP's device and the device of the respective lookout. In addition, the ASP can monitor the real-time position of every lookout on a map. This ensures that the sighting distance is never shorter than the defined minimum.

Thanks to continuous distance monitoring and automatic warning alerts, lookouts can focus entirely on observing rail traffic without having to constantly check their distance, thereby improving both safety and operational efficiency.



Distance monitoring in real-time ensures that the required distances between lookouts and the safety manager are maintained at all times, even while moving

Modular, Failsafe, the Perfect Fit – The MRWS at a Glance

The ZÖLLNER MRWS consists of modular components, including core elements such as the ZFS-10 transmitters and the ZRC-10 or ZPW-12 control units. Depending on the type of worksite, users can choose from warning devices for vegetation control, mobile worksites, fixed worksites, or worksites using onboard warning devices on vehicles.

Flexibility through Radio Transmission Technology

Since the system is based on state-of-the-art radio technology, users can quickly adjust configurations in real time according to operational needs. Audible and visual warning devices can be added or removed as required.

Stronger Together

Safety Starts with Proper Training

For more than 30 years, ZÖLLNER has been the leading provider of automatic warning systems across Europe,

committed to enhancing safety on railway worksites. With products such as the MRWS (DAPR), we create ideal conditions for protecting track workers and enabling safe operations. However, technology alone can only provide a certain level of safety. Achieving the highest possible safety standards requires well-trained personnel – both in the planning phase and in the field.

Experts Training Experts

Drawing on decades of experience, ZÖLLNER offers a comprehensive range of training programs tailored to the specific needs of railway infrastructure companies and contractors.

In France, we have been delivering training courses since 2004 in accordance with SNCF requirements. All of our trainers are highly qualified technicians with extensive hands-on field experience, ensuring that participants benefit from both technical expertise and practical knowledge.

Training certification is based on both a theoretical assessment and a practical hands-on exercise. Courses are conducted primarily at ZÖLLNER France's training facilities. To provide even greater flexibility, an e-learning module will soon be introduced, allowing participants to complete part of the training remotely before attending a practical session with the equipment.

We Stay by Your Side

We support operators in developing a thorough understanding of the system and help companies strengthen their expertise and operational capabilities. The ZÖLLNER France team remains available to provide advice and assistance, both on-site and by phone, backed by a free 24/7 support and service hotline.



ZÖLLNER
signal system technologies

Maximum safety for every worksite

The ZÖLLNER team is here to support you
every step of the way!



zoellner.de/fr/ // we design your safety solutions for rail since 1946



Worksite Protection

Zonegreen

Put Trust in Technology to Reverse Safety Trends

Right across Europe, we're failing to reduce the number of railway worker fatalities and serious injuries. In fact, the UK's RSSB figures showed a 16% increase in overall harm to employees last year.

The board's latest Annual Health and Safety Report notes 438 severe injuries were sustained by railway staff in just twelve months. Surprisingly, it's not the trains doing the most damage. The majority of injuries occur from slips, trips and falls, the use of tools, and assault or abuse.

Europe-wide, there are huge discrepancies in casualty rates. The EU Agency for Railways' Safety Overview 2025 reports a 10-fold difference between the countries with the highest and lowest accident rates.

Like the UK, the latest European data shows an increasing year-on-year pattern. In 2023, there were 1,565 significant accidents in member states – an average of more than four a day. Aside from the unquestionable human toll, it is estimated these incidents cost the industry €3.5 billion per annum.

When we have access to more technology, more data and more oversight than ever before, why is no clear progress being made in the reduction of serious injuries? Why is working on the railways more dangerous than it has been for years?

The EU Agency for Railways has called for the fast implementation of common methods for assessing safety levels and performance, along with an EU-wide incident reporting scheme. It believes these interventions are essential to assess and improve how safety is managed across the continent.

Hopefully this will lead to a more consistent approach to safeguarding measures, but until this is in place, it continues to fall to the rail operators and industry suppliers to prioritise the welfare of staff and introduce processes that make going to work something we can all do without fear of serious injury.

Modernising Maintenance

Visitors to this year's InnoTrans are likely to see a host of developments aimed at improving the rail working environment.

One company at the forefront of depot safety is Sheffield-based Zonegreen, part of the Sentric Safety Group. Members of its team will be attending the flagship event to discuss the solutions it has developed to reduce the margin for human error in maintenance facilities.

Zonegreen rail safety solutions are the result of more than a century's railway experience and expertise and use the latest technology to automate personal protection procedures and improve vehicle movement efficiency. Its suite of products is renowned for its quality, safety and reliability and they already



Get in Touch
france@zoellner.de

protect thousands of depot workers and miles of infrastructure worldwide.

The Zonegreen Depot Personnel Protection System (DPPS) is not only used widely in the UK, but also helps to ensure the safety of staff in depots across Australia and the United Arab Emirates.

DPPS safeguards workers in areas of risk by controlling vehicle movements and automating



safety procedures to remove the potential for errors associated with common manual processes.

The system is underpinned by Network Rail-approved powered derailleurs, which physically protect staff from unexpected vehicle movements. They are activated when individuals log-on to road end panels using RFID tags that record where they are working. These panels are situated in convenient locations within the maintenance building, normally next to depot doors, to give supervisors a clear line of sight when authorising access permission for trains.

Only after the derailler has been lowered will the shunt signal instruct the driver to proceed. Audible and visual warnings are then activated on the affected road, alerting staff to a moving vehicle.

Information from DPPS is fed back to the Zonegreen Depot Manager SCADA system. It records all aspects



of the depot protection, displays the location of personnel, along with the status of plant and equipment, providing full traceability.

DPPS is one of the safest depot protection systems on the market, having been independently assessed as compliant with IEC61508 and the rigour and content required by SIL2. The latest Zonegreen RFID panel is also Eurofins certified to meet the railway and radio emissions standards. It can be interlocked with third-party equipment in a rail depot and uses modern electronics, to future-proof each installation.

Innovative Interlocking

Interlocking is a crucial component in any rail depot, protecting personnel and equipment against a momentary lapse in concentration or a small error of judgement that can have dire consequences.



Zonegreen provides interlocking solutions in partnership with French sister firm, Serv Trayvoux Interverrouillage (STI), based in Montreuil, just outside Paris. It has supplied trapped key interlocking to the rail industry for more than 130 years and is ensuring safety standards are upheld in depots across France.

Trapped key interlocking (sometimes referred to as a key transfer system) uses a series of coded keys to prevent certain functions from being performed or access to high-risk areas, unless

a specified set of safety conditions are met. It provides the failsafe, sequenced control of catenary or power systems, helping to prevent accidental re-energisation and restricting access, unless dangerous equipment is isolated and earthed.

A range of third-party products can be interlocked, including:

- Overhead lines
- High-level gantries
- Bogie drops
- Boxing rings
- Lifting jacks
- Turntables
- Cranes

The Future of Interlocking

For depots looking to upgrade their interlocking processes, The Zonegreen Electronic Interlocking Solution (EIS) is an advanced safety system, not only designed to protect

personnel and equipment, but also to enhance operational efficiency.

It uses intelligent control panels and electronic sensors to authorise the operation of depot equipment and control access to hazardous areas. By enforcing a pre-set sequence of events for every procedure, operations can only proceed once all safety conditions are met. For example, it is only possible to access high level gantries when the catenary is isolated.

Modern maintenance facilities, including Joncherolles and Vaugirard in Paris, are just some of the depots benefiting from the installation of Zonegreen EIS. Its software can be reprogrammed to accommodate any safety sequences and it is easier to scale than its manual counterpart, as physical locks and keys are not required.

Like all Zonegreen products, the EIS uses failsafe principles to produce

the highest reliability rates and remote diagnostics to monitor the system and troubleshoot, reducing potential downtime. Remote visualisation also allows senior staff a full overview of the status of the equipment, whilst encrypted communication and authentication software ensures fast operational speeds and tamper-proof security.

Find Out More

Interlocking and DPPS are just two of the rail safety solutions Zonegreen is using to transform the lives of maintenance staff, both across the UK and Europe.

All Zonegreen solutions can be tailored to the specific needs of each facility and are configurable with other third-party equipment. Similarly bespoke maintenance packages are also offered to maximise longevity and operability.



Contact Us

To find out more about the whole suite of Zonegreen solutions, telephone (0114) 230 0822, visit <https://www.zonegreen.com>, or follow on LinkedIn: [Zonegreen Ltd.](#)

Its team will be happy to arrange a meeting during InnoTrans or a site visit.



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Trackside Power Solutions

Sécheron

Driving Rail Power through Heritage, Innovation and Reliability

From energy-efficient power conversion to secure digital solutions, discover Sécheron's latest technologies driving the future of rail electrification.

Sécheron is one of the world's leading suppliers of electrical and electronic safety components and traction power systems for the railway industry. With 147 years of Swiss engineering heritage and a long-standing commitment to safety, reliability and innovation, we bring extensive experience and a customer-centric approach to shaping a cleaner future powered by emission-free mobility and abundant renewable energy. The company's core values revolve around determination, enthusiasm, esteem and sustainability.

Our deep domain knowledge in rail electrification combined with continuous innovation allows us to design and deliver best-in-class solutions and services, providing protection for people and equipment, and ensuring efficient rail operations worldwide. Trusted by leading rail operators and system integrators across the globe, we power mobility and drive electrification.

Power Conversion

Railways require a significant amount of energy to power vehicles and infrastructure, and rail operators seek to improve energy efficiency, reduce the environmental impact of their networks, and optimise lifecycle costs. Power conversion is playing an increasingly important role in addressing these challenges.

Leveraging decades of expertise in power electronics, we develop a comprehensive range of power conversion solutions, including rectifiers, inverters and fully reversible converters. By converting and managing electrical energy efficiently, these technologies help maximise the long-term operational performance and sustainability of rail electrification systems.

A key application is regenerative energy recovery: instead of dissipating braking energy as heat, our converters either feed it back into the power grid, or store and reuse it to power other vehicles within the traction network. By implementing our IGBT inverter system, the Agra Metro (in India) achieved annual energy savings of approximately ₹5 million with a payback period of less than five years. This demonstrates the tangible value of our approach and sets a strong example for other metro projects across India and around the world.

We also support the reduction of diesel usage by contributing to the deployment of battery-powered trains through high-power charging converters that efficiently transform grid power



into the energy required for recharging during scheduled station stops. In Denmark, our rail charging converter architecture is already enabling battery-electric trains to operate on non-electrified lines, offering a cost-effective alternative to full network electrification while supporting the transition towards cleaner regional rail transport.

AC Electrification

Complementing our railway electrification offering, we cover all key equipment applied in AC distribution. We deliver tailor-made solutions based on modular concepts and standard products, integrating vacuum circuit breaker technology, earthing switches, measuring transformers, etc. Our equipment is engineered and produced in accordance with proven design principles and acceptance standards.

As a long-lasting leader in manufacturing AC vacuum circuit breakers for rolling stock applications, we also offer products for the electrification of AC systems – from outdoor railway solutions with our ORS vacuum circuit breaker and our SKID-mounted switchgear, supported by extensive factory testing and ensuring high reliability and performance – to our indoor and environmentally friendly (SF6-free) air-insulated metal-clad switchgear MCS, intended to feed the overhead line and usually placed trackside, in a substation or in a container.

After-Sales Services & Digital Solutions

We are not only an equipment manufacturer, but also a flexible and reliable partner for all after-sales-related questions. We support your business and ensure project continuity through a comprehensive range of services, including spare parts and obsolescence management, repairs and calibrations, modernisation and retrofitting, maintenance contracts, technical support, training, as well as digital services.

Our latest digital solution, the IOMS (Intelligent Operation & Maintenance System), is a smart and efficient software for optimising maintenance costs, predicting equipment wear and enhancing operational performance; it enables rapid response during emergencies and contributes to reduced operational expenditure (OPEX). By delivering precise operational insights, it improves equipment maintainability and reliability throughout the entire



lifecycle, maximising uptime and streamlining energy management in demanding rail environments.

Cybersecurity

All our AC and DC traction power systems are developed in accordance with cybersecurity best practices. This commitment is deeply embedded in Sécheron's corporate culture.

From design to delivery, cybersecurity lives in every step we take. Our company is ISO/IEC 27001 certified. Our key products – particularly our renowned control & protection relays SEPCOS – are cyber-certified and compliant with the IEC 62443 standard. This guarantees seamless security and the highest level of protection for our customers and their installations.

Sécheron at InnoTrans 2026

Visit us at InnoTrans from 22 to 25 September 2026 in Berlin, Germany, and meet our experts at **Booth 240, Hall 9**, to discover how our solutions can support safer, smarter and more sustainable rail networks!

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Electrification

Premium PSU

The Complete Auxiliary Power Matrix for Rolling Stock – Premium PSU at InnoTrans 2026

From 40W battery DC/DC converters to 10kW variable frequency drives, galvanically isolated and non-isolated AC/AC converters and catenary-fed auxiliaries: Premium PSU designs and manufactures the full range of auxiliary and services power conversion for railway rolling stock, all engineered to EN 50155 and built in Barcelona. InnoTrans 2026, Hall 17, Stand 425 – here is what is on the stand.

One Supplier, the Full Conversion Matrix

Premium PSU designs and manufactures the complete railway power supply matrix used on board a modern train – AC/DC power supplies, DC/DC converters, DC/AC inverters, AC/AC variable frequency drives and DC-UPS – from 40W to 40kW. Every railway product is engineered to EN 50155, with fire-and-smoke behaviour to EN 45545-2, shock and vibration to EN 61373 and the EMC performance the onboard environment demands. Sourcing the whole matrix from one qualified supplier removes multi-vendor qualification overhead and the grey areas of responsibility that appear when converters from different makers share the same bus. The complete range will be on show at InnoTrans 2026, Hall 17, Stand 425.

Spotlight – VDX Series

Premium PSU's VDX series are railway variable frequency drives (VFDs) for speed control of rotating loads – HVAC compressors, condenser fans and similar motors – where no galvanic isolation between input and output is required. Both models take a 400VAC three-phase supply and deliver a fully controllable sinusoidal output: any voltage between 60 and 400VAC and any frequency between 5 and 100Hz, with programmable V/F ramp, soft start and phase reversal. RS-232 is available on both models; CAN Bus is available on the VDX-10K.

The VDX-6K is the compact IP54 version – 6.4kW nominal, 11.6kW peak for 500ms – designed for exposed installation environments such as rooftop HVAC units. Its hardware



inputs select from four preset V/F operating points, though any voltage and frequency within the operating range can be set via RS-232. The VDX-10K is the standard IP20 version at 10kW nominal, and adds CAN Bus alongside RS-232 for integration into vehicle networks using the CANOpen protocol, with node address selectable by dip switch. Both models comply with EN 50155, EN 45545-2 and EN 61373 Category 1 Class B.

Railway OVX

High-Density DC/AC Inverters
for Railway Catenary Applications

OVX-6400 6400VA
3 phase sine wave
DC/AC inverter
HV 750V input



Catenary-Fed Power – The Spark Series

The Spark Series is Premium PSU's catenary power supply product line – converters designed to take power directly from the 600/750 VDC DC traction supply, eliminating the need for an intermediate AC/DC stage on vehicles where the catenary is the primary source. The OVX-6400 is a 6.4 kVA DC/AC inverter that converts catenary voltage directly to a stable 400 VAC three-phase output – 6 kW nominal, 8 kW peak for 5 seconds – with galvanic isolation rated at 5,200 Vrms and frequency selectable from 50/60 Hz by DIP-switch or freely configurable via RS-232 and CAN Bus. The CVS-280 complements it at the auxiliary DC level: a 280 W DC/DC converter drawing from the same catenary input and delivering regulated 24, 48, 72 or 110 VDC with 7,000 Vac isolation – the highest in the portfolio – and an integrated ORing diode for battery paralleling and redundancy. For higher-power applications, Premium PSU has delivered catenary-fed systems up to 35 kVA + 5 kVA combining two independent three-phase outputs from a single 750 VDC input – an example of the custom development capability available from the same engineering team. Both standard products comply with EN 50155, EN 45545-2 and EN 61373 Category 1 Class B.

Isolated DC/DC – The CRS, CTS and CLS Families

Premium PSU offers two complementary railway DC/DC converter platforms for different system architectures.

The CRS family covers higher-power DC/DC conversion from 180W to 2kW, with galvanic isolation and input voltage options spanning all standard railway battery nominals – 24, 36, 48, 72 and 110VDC. Unlike the CLS, which fixes the output at regulated 24VDC, the CRS/CTS matrix covers both input and output flexibility: output voltages from 5V to 110V are available depending on the model, making it the right

Model	Power nom. / peak	Input range [VDC]	Output [VDC]	Efficiency typ.
CLS-40	40W / 60W	16.8–137.5 (11:1)	24	92%
CLS-75	75W / 90W	16.8–137.5 (11:1)	24 / 12	91–92.5%
CLS-150	150W / 165W	16.8–137.5 (11:1)	24 / 15 / ±15	94%
CLS-300	300W / 330W	16.8–137.5 (12:1)	24 / 110	94%
CLS-500	500W / 550W	50.4–137.5 (4:1)	24	95%

Table 1 – CLS family overview. All models: EN 50155, EN 45545-2 HL1–HL3, EN 61373 Cat. 1B, OT4 + ST1/ST2, conformal coating PC2, 20-year design lifetime.

platform when the conversion involves application-specific bus architectures – traction control supplies, hotel-load distribution, or redundant auxiliary buses. All models support parallel operation with passive current sharing, optional ORing FET, and optional 10ms hold-up. The CRS-1000 adds four cooling options including conduction cooling for sealed enclosures; the CTS-240

is available in Eurocard 3U format for rack-integrated architectures.

The CLS family covers railway battery applications from 40W to 500W with regulated 24 VDC output as standard, plus 12, 15 and 110V variants. Models from 40W to 150W use an ultra-wide 11:1 input range (16.8–137.5V), covering all nominal battery voltages – 24, 36, 48, 72 and

110 V DC – in a single reference; the CLS-300 extends this to a 12:1 range with the same continuous operating window. The CLS-500 targets 72/110V systems with a 4:1 extra-wide range (50.4–137.5V), achieving 95% typical efficiency and an MTBF of 1,800,000 hours at 25°C. Across the family, this reduces the number of variants needed for qualification, stock and spares management in mixed fleets.

Railway CLS Series

Railway DC/DC Converters
Wide Input Range
Baseplate and robust
thermal design



In short, CRS is the higher-power platform for application-specific input/output voltage combinations; CLS is the wide-input platform for regulated 24VDC or 110VDC auxiliary outputs.

Auxiliary AC – TDS and TDX Series

Railway TDS

3.3kW AC/AC Voltage & Frequency Changer

TDS-3300
400 VAC · Three-phase
Isolated



Where galvanic isolation between the train supply and the load circuit is required, the TDS/TDX AC Master series provides it. Both models deliver 3.3kW / 3.3kVA from a 400–480VAC three-phase input – or optionally from a 600VDC input, making them suitable for both AC-fed and DC-fed vehicle architectures. The TDS-3300 provides a regulated 230VAC single-phase output; the TDX-3300 provides a regulated 400 VAC three-phase output with neutral. Both operate at 50Hz by default with frequency freely configurable from 5 to 75Hz via RS-232 or CAN Bus, and comply with EN 50155, EN 45545-2 and EN 61373 Category 1 Class B.

Battery Backup – ECS Series

The ECS series are DC uninterruptible power supplies for on-board critical loads – control electronics, signalling interfaces and monitoring systems – that must remain powered through mains interruptions or vehicle supply



José Bailón (DACH Export Area Manager) and Christian León (Product Manager) presenting the VDX-6K IP54 and CLS railway DC/DC series ahead of InnoTrans 2026.

transitions. The ECS-100 delivers 100W and the ECS-200 delivers 200 W, both with outputs of 12, 24 or 48VDC and AC inputs covering the standard auxiliary supply range. Both manage battery charging and load supply simultaneously, with automatic switchover to battery on mains failure, four selectable charging current levels, deep-discharge protection, and independent supply-fail and battery-low alarms via relay contacts. The ECS-200 additionally supports parallel operation on 24 and 48V models and is qualified to EN 45545-2.

Designed, Built and Tested in Barcelona – By a Team of Experts

What ties the portfolio together is process. Premium PSU's engineering, test laboratory and production are co-located in Barcelona, so the loop between specification, qualification and manufacturing never crosses time zones or supply chains. A dedicated team of power-electronics experts works from a quantified mission profile through a Design-for-Reliability flow, delivering custom prototypes in as little as

14 weeks – about half the typical industry cycle – and backing every unit with 100% final test. With more than 900 custom designs since 1981, the team's know-how keeps NRE costs and schedules low while meeting the most demanding rolling-stock requirements.

Meet Our Experts at InnoTrans 2026

Premium PSU will present this full portfolio at **InnoTrans 2026, Hall 17, Stand 425**. Our engineering team will be on the stand to discuss specific operating profiles, qualification requirements and custom developments. The most useful conversation does not start with a datasheet – it starts with your application, your operating profile and your timeline. To arrange a meeting at the stand in advance, contact us at marketing@premiumpsu.com or visit www.premiumpsu.com.



Premium
Powering Your Challenge



Electrification

Mosdorfer Rail



Sheffield Supertram installation of the Tensorex C+ 3D

Mosdorfer Rail is positioning itself as the go-to partner for new and the renewal of existing railway electrification, combining deep engineering heritage with some genuinely disruptive innovations in overhead catenary systems. For InnoTrans visitors, they are offering a mix of proven system reliability, lower life-cycle cost and smarter solutions tailored to the next generation of high-speed, commuter and urban networks.

Who Is Mosdorfer Rail?

Mosdorfer Rail develops, produces and supplies high-quality components and complete solutions for railway electrification, focused on overhead line catenary systems for mainline, high-speed and light rail. As part of the Austrian Knill Gruppe – a long-established specialist in energy transmission – they combine rail-specific expertise with group-wide experience in high-voltage fittings and energy infrastructure.

From their locations in the UK, Italy, Spain and India, Mosdorfer Rail serves infrastructure owners and

turnkey contractors across all continents. The mission is explicit: to be the trusted partner for railway electrification worldwide, providing the “best solutions for energy systems operators” through robust products, fast delivery and close technical collaboration.

What Mosdorfer Rail Does for Railway Networks

At the core of the portfolio are complete railway catenary systems, from individual fittings to full overhead line solutions for new build and upgrade

projects. This includes the patented range of Tensorex C+ and 3D, Tensorex Sense monitoring system, cantilever assemblies, clamps and connectors, droppers, composite insulators, power supply components, safety equipment, and tools for installation and maintenance.

Every element is engineered around reliability and long-term cost efficiency. High-strength cantilevers and droppers are designed to maintain precise contact wire geometry under dynamic load, while a broad range of clamps and rail connectors ensures secure, low-resistance connections in demanding environments. For infrastructure managers facing rising traffic volumes and tighter possession windows, the emphasis on maintenance-free or low-maintenance components translates directly into higher availability and fewer disruptions.

Light Rail and Urban Mobility Focus

Mosdorfer Rail is equally active in tramway, metro and light rail applications, where urban design constraints and tight curves place different demands on catenary systems. They provide full system supply for light rail, offering tailored assemblies and fittings that accommodate reduced structure heights, complex alignments and challenging streetscapes without compromising electrical performance.

This move is strategic: the company highlights light rail as a key growth area and ‘the future’ of its portfolio, aligning with global investment in sustainable, city-scale electric transport. For operators, that means the same engineering depth that underpins high-speed mainline projects is now being applied to compact, aesthetically sensitive, urban systems that still demand high availability.



Mosdorfer Rail cantilever system in Tanzania

Flagship Innovation: Tensorex C+ and Tensorex C+ 3D as well as the Tensorex Sense Monitoring Device

One of Mosdorfer Rail’s signature technologies is the Tensorex C+ automatic spring tensioning system for overhead catenary. Designed to maintain constant mechanical tension in the contact wire, Tensorex C+ replaces traditional counterweight arrangements with a compact, enclosed, spring-based solution that is easier to install and largely maintenance-free over its service life.

More recently, the company has introduced Tensorex C+ 3D, developed for longer tension lengths and more complex line geometries. This evolution allows designers to span longer sections, reduce the number of tensioning devices and simplify mast layouts, which in turn can lower installation costs and minimise visual impact – useful both on open-route railways and in constrained urban corridors.

These systems have been deployed on major international projects, including new bridges and high-profile corridors, demonstrating their ability to deliver stable contact wire tension in harsh climates and high-load conditions. For InnoTrans attendees, Tensorex C+ and its 3D variant will be central talking points for anyone looking to modernise legacy catenary or design leaner, future-proof electrification schemes.

Smart monitoring just got smarter with the Tensorex Sense, an intelligent monitoring solution that transforms existing Tensorex C+ tensioning devices into connected, digitally enabled assets.

Designed as a retrofit solution, Tensorex Sense allows operators to upgrade existing infrastructure without replacing installed equipment. By integrating rotary transducers, temperature sensors, GSM communications and cloud-based analytics, the system continuously monitors the operating condition of each tensioning device in real time.

Maintenance teams can access live performance data via smartphone, tablet or PC, including device location, operating position relative to ambient temperature, battery status and overall system condition. When predefined operating limits are approached, automatic alerts are sent by email or text message, allowing maintenance teams to plan inspections before faults develop into service-affecting failures.



Mosdorfer Rails
Tensorex C+

where Mosdorfer Rail contributed infrastructure and expertise to support rehabilitation through rail industry training. For network owners and Tier 1 contractors, this signals a partner that is engaged with the wider ecosystem as well as with technical delivery

A Brand Evolving with the Market

Following the acquisition of Pfisterer's rail division, Mosdorfer Rail has deliberately repositioned its brand to underline its role as an independent, innovative key supplier in the global catenary market. A refreshed visual identity, new website and unified messaging around 'Railway Catenary Systems & Solutions for Overhead Contact Lines' now provide a clearer window into the full capabilities of the business.

The group's footprint includes manufacturing and engineering centres in Sheffield, Barcelona and Mumbai, coordinated under the Knill Gruppe umbrella but clearly differentiated as a rail-focused, customer-facing entity. This gives Mosdorfer Rail the scale and resilience to support large, multi-year framework contracts, alongside the agility to deliver tailored solutions for specific corridors, climates or operational concepts.

Why InnoTrans Visitors Should Pay Attention

For InnoTrans delegates, Mosdorfer Rail offers three compelling angles: proven system reliability, meaningful innovation and a global yet accessible support structure. Infrastructure managers can explore how technologies like Tensorex C+ 3D and next-generation cantilever designs can increase availability, extend maintenance intervals and simplify future upgrades. Urban and light rail stakeholders will find a vendor ready to deliver complete, compact OCL solutions that work in visually sensitive and operationally complex city environments.

Equally important, project engineers and planners can tap into a partner with the experience to balance performance, safety, cost and sustainability from concept to commissioning. In a market where electrification programmes are accelerating and expectations on resilience and carbon performance are rising, Mosdorfer Rail is positioning itself not just as a component supplier, but as an innovation-driven collaborator for the next generation of rail and light rail infrastructure.

By shifting maintenance from reactive to predictive, Tensorex Sense helps improve network reliability, reduce unnecessary site visits and enhance safety through targeted intervention.

Beyond Hardware: Sustainability, Training and Service

Mosdorfer Rail's proposition extends beyond product catalogues to engineering support, training and long-term partnerships. They offer expert consultancy throughout the project lifecycle, from system design and component selection to on-site support, guided by extensive references worldwide in high-speed, conventional and urban rail.

Sustainability is a recurring theme in their communication, with a focus on durable products, responsible manufacturing and solutions that reduce energy losses and maintenance interventions across the asset life. The company has also invested in skills development, exemplified by its involvement in a 'Rail School of Excellence' training facility at HMP Highpoint,

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Maintenance & Equipment

Gradall TrackStar

The Shrinking Maintenance Window: Why Every Second Counts on the Modern Network

In the global railway industry, time is the ultimate currency. As passenger networks compress headways and heavy freight corridors push for maximum track density, the traditional maintenance window has fundamentally changed. What used to be a predictable, multi-hour block has shrunk into tight, high-pressure intervals.

For railway maintenance managers, this reality shifts the primary logistical challenge. The success of a sleeper replacement, ditching, or vegetation control project is no longer judged solely by the quality of the engineering, but by the speed of the execution. When track availability is severely restricted, an extra 30 minutes spent getting machinery into position is not just an inconvenience – it is a massive financial drain that delays revenue-generating traffic and ripples across an entire network.

The High Cost of Track Setup

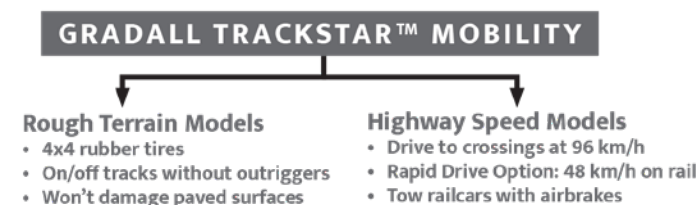
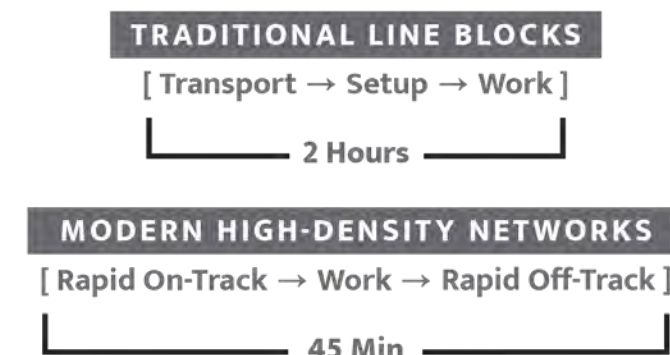
Historically, deploying heavy equipment meant specialised transport, dedicated logistics and a lengthy process to safely transition machinery onto the rails. If a crew cannot get onto the track quickly, the productive work window vanishes.

Conversely, if a machine cannot vacate the tracks immediately when a train approaches, the resulting delays trigger steep operational and financial penalties. This bottleneck has forced network operators to reconsider their approach to railway maintenance. To maximise track availability, infrastructure teams do not just need more powerful tools; they require a single-machine solution designed to conquer the clock.

One Person, One Machine: Redefining Mobility with Gradall TrackStar™

To solve the crunch of the modern maintenance window, Gradall engineered the TrackStar™ series – the industry's only single-machine, multi-tasking railway maintenance solution that maximises actual working time by eliminating deployment friction.

By designing excavators that adapt instantly to both the lineside topography and the rails themselves, Gradall allows networks to reclaim their lost setup time.



Rough Terrain Dominance: On and Off Fast

At the heart of this agility are the Rough Terrain TrackStar models (including the XL 3330V, XL 4330V, and XL 5330V). Featuring a rugged 4x4 undercarriage equipped with industrial foam-filled rubber tires, these machines drive straight onto the tracks from virtually any crossing or right-of-way access point without damaging paved surfaces.



Gradall TrackStar XL 4330 V Rough Terrain Model

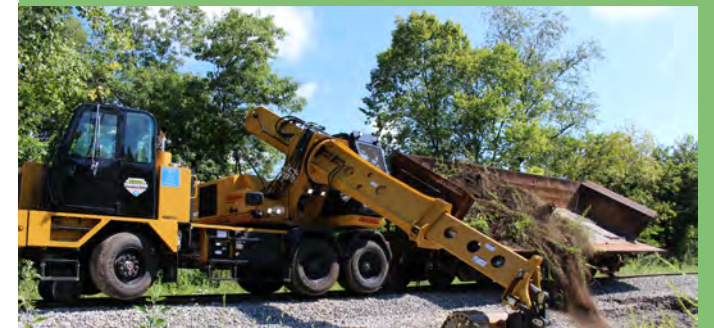
Once positioned, the integrated guide wheel rail gear system engages smoothly, propelled directly by the machine's primary drive system. Because the TrackStar utilises a strong box plate frame construction and oscillation lock cylinders, it provides a completely stable digging platform.

The Outrigger Advantage: Operators can work at the front, rear or side of the chassis without ever stopping to lower stabilisers or outriggers. When a train is cleared to pass, the TrackStar simply lifts its guide wheels and drives off the tracks immediately, keeping track downtime to an absolute minimum.

Highway Agility and Rapid Drive

For networks requiring rapid deployment across vast distances, Gradall's Highway Speed TrackStar models (XL 4130V and XL 5130V) can be driven over-the-road at speeds up to 60mph (96km/h), bypassing the need for specialised trailers.

Once on the rails, these models utilise Gradall's innovative Rapid Drive option. This advanced system allows the excavator to travel on the tracks at speeds up to 30mph (48km/h) in both forward and reverse.



Gradall TrackStar XL 4130 V Highway Speed Model with Rapid Drive Option

Complete with an integrated coupler and train airbrakes, a single operator can use Rapid Drive to tow a railcar loaded with sleepers or rip-rap directly to the jobsite.

Unmatched Versatility on the Permanent Way

Once on scene, the iconic low-profile, telescoping boom tilts 220 degrees, maintaining full power throughout the dig cycle. Whether changing sleepers, undercutting ballast or trimming trees in tunnels and under bridges, one operator can swap attachments and handle dozens of permanent way tasks.

By pairing this multi-tool versatility with unmatched track access speed, the Gradall TrackStar ensures that when you get track time, you spend it working—not waiting.

Learn more about [Gradall TrackStar](https://www.gradallrail.com) models at [GradallRail.com](https://www.gradallrail.com)

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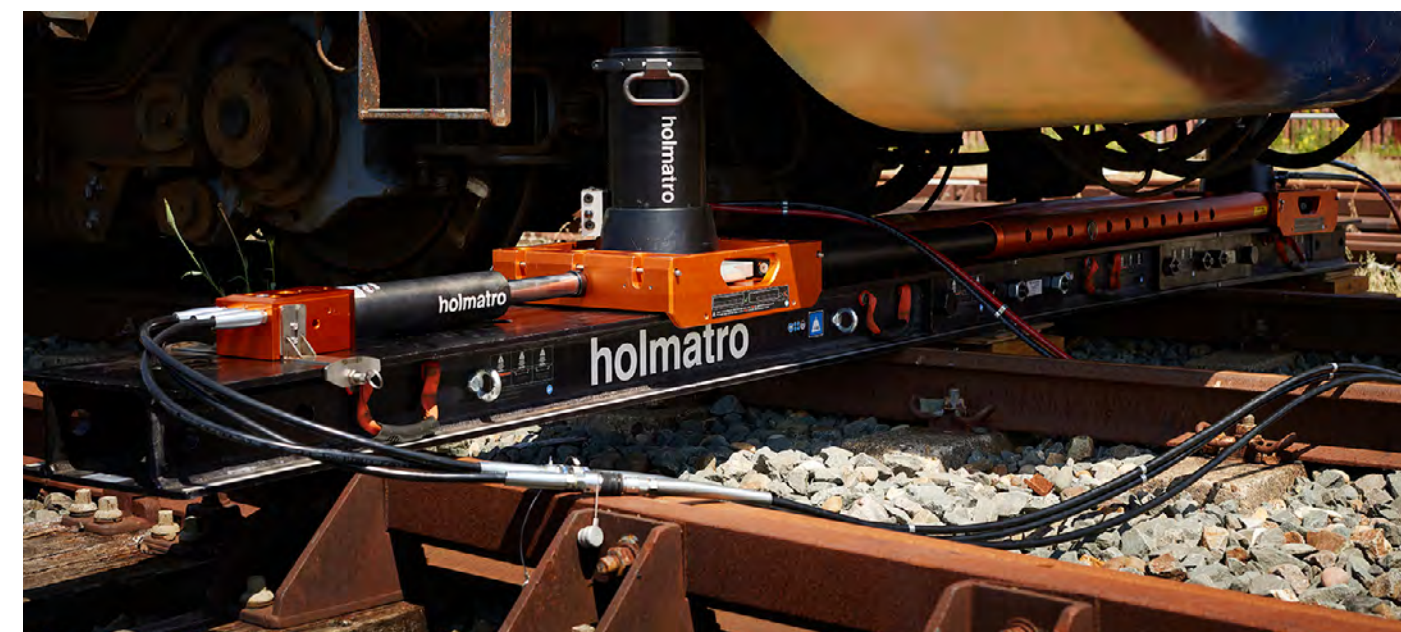


Maintenance & Equipment

Holmatro Hydraulic Solutions

Powering Innovation for Rerailing, on Every Track

Powering Innovation for Hydraulic Solutions is our DNA.



Almost 60 years of developing, engineering and producing for both high-pressure industrial and rescue applications drew us to the world of rerailing a decade ago.

Our main goal was clear: to develop a lighter, faster system for high-stakes safety and downtime situations, without compromising durability or operator safety. So, how did we achieve this?

We teamed up with experts in the field to combine our knowledge with field experience and needs, leading to the launch of the Holmatro Rerailing System at InnoTrans 2016.

Only ten years later, we are proud to have a proven track record of delivering our rerailing solutions for trains,

metros and trams. And we've supplied them to countries ranging from the Netherlands to Australia, the United States, Spain, China, Thailand, and many others in between.

And the journey has just begun!

As we continue to develop the next generation of rerailing solutions, we remain committed to delivering safer, faster and smarter solutions for railway operators worldwide.

Powering Innovation, on every track.

Johan Knuivers, ProRail: *“The result of our close collaboration was astounding. We have three sets of Holmatro rerailing systems in use, and together they are deployed 50–60 times per year. Due to the lower weight, safety features and ergonomics of the components, the system enables us to work faster and safer. This has resulted in the fact that we could do our job in two hours less per deployment. This time reduction and more ergonomic and safer deployment has also led to less absenteeism of our employees.”*

Discover Holmatro’s Rerailing Systems

SAFE

When working in demanding circumstances and time is of the essence, you want to ensure a safe work environment above all.

- To increase stability and safety, we use **stacking rings** when the cylinders are extracted:
 - Easy to safely place around the plunger of the lifting cylinder
 - Mechanically locks the load in position for a longer time
 - Enabling you to work safely near and under the load
- Easy replaceable **slide bearings** both under and in the traverse sled; a safer operation with less stress on the railway vehicle and the equipment. No steel wheel rollers needed, decreasing maintenance & weight
- An **indicator** on the traverse sleds will alert the operator to the traverse limits, preventing instability

- of the railway vehicle and the equipment
- Coloured hoses** & matching colours on the outlets of the pump unit and/or control table; reduces the possibility of incorrect assembly and thus faulty operations
- Load lowering valves** on each cylinder, ensuring lowering is possible in a controlled manner without the load having of influence on lowering
- Integrated **hose rupture security feature** in the lowering valves on each lifting cylinder; ensured safety, because of the load holding function, even in the event of a hose rupture

CONTROLLED

Working with high-pressure hydraulics requires great responsibility. Holmatro high-pressure hydraulic systems are designed to offer you controlled power.

- We offer a wireless, remote-controlled pump unit; no need to carry out a heavy, noisy pump unit into the field
- Our traverse cylinder carries an **equal capacity for both pushing and pulling**, enabling you to both push and pull the vehicle into position, usable in any position and either direction
- Inside the **traverse sleds**, you will find an additional internal sled, compensating for the radius the train makes, working with less or even without repositioning of the system during operation
- An **indicator** on the traverse sleds will alert the operator to the traverse limits; this prevents the instability of the railway vehicle and the equipment

- Sled fill plates** are used to place the cylinder closer to the lifted object and not lose stroke of the plunger to reach it
- Adapter plates** are used to position the cylinder directly at the center of the traverse sled or filing plate
- Finally, we added a **locking device**; Should you work in a sloped position, this device prevents the system from shifting downwards and therefore prevents the creation of an unsafe situation

FAST

A system with maximum performance, at a minimum weight.

- Holmatro rerailing cylinders are fully made of aluminum; this makes them sufficiently lighter and way easier to carry (by one or two people)
- Fully aluminum beams, which are lightweight and easy to carry; With the connecting set, you can connect different lengths of beams without the use of special or additional tools
- Our traverse sleds contain sliding bearings made of low-friction Teflon-like material (UHMWPE), and do not have steel wheel rollers, so you will experience:
 - Less friction**
 - A huge weight reduction**
 - Less chance of damaging the beams**
 - Less maintenance**
- Our traverse struts are fully made of aluminum, and thus lightweight distance bars are used to keep the sleds in position; For stability reasons, Holmatro uses two bars
- Since the traverse sleds have sliding bearings, decreasing friction, **you can work with a lower capacity traverse cylinder, resulting in a lighter cylinder**; With the Holmatro system, only a 12-ton traverse cylinder is required
- All system components have optimally placed grips; easy to carry, by just one or two people, and easy to assemble and disassemble without the use of any extra equipment

Holmatro Compact Rerailing Unit

The lightest solution for rerailing lightweight railway vehicles, with the highest precision.

- Weight ready for use: **only 54kg**
- Easy transportation to the accident
- Easy to install due to its compact dimensions
- Equal, split flow pump unit.
- Core hose technology; press & return 1, single hose enabling you to switch between control

- valves, while the pump is running
- Remote-controlled valves** give you an excellent overview of the situation

From System to Turnkey Solutions

Depending on the customer's requirements, we can deliver various turnkey solutions, from track-ready storage containers with backup power generation to high-specification rail vehicles with integrated staff facilities, including a pantry and seating area.

After Sales & Service Solutions

In addition to quality, we focus on unburdening our customers. Our in-house specialists and global partner network offer direct support, maintenance, spare parts, training, and on-site training & consultancy. Our long-standing experience and the local market knowledge of our partners ensure safe applications, maximum reliability and a longer lifespan.

Our trained rerailing and hydraulic experts travel worldwide to provide comprehensive on-site training following the delivery of your equipment, ensuring your team is fully prepared for safe and efficient operations.

Holmatro Premium Service Programme

In addition to quality, we focus on unburdening our customers. Our in-house specialists and global partner network offer direct support, maintenance, spare parts, training, and on-site training & consultancy. Our long-standing experience and the local market knowledge of our partners ensure safe applications, maximum reliability and a longer lifespan.

Curious to learn more?

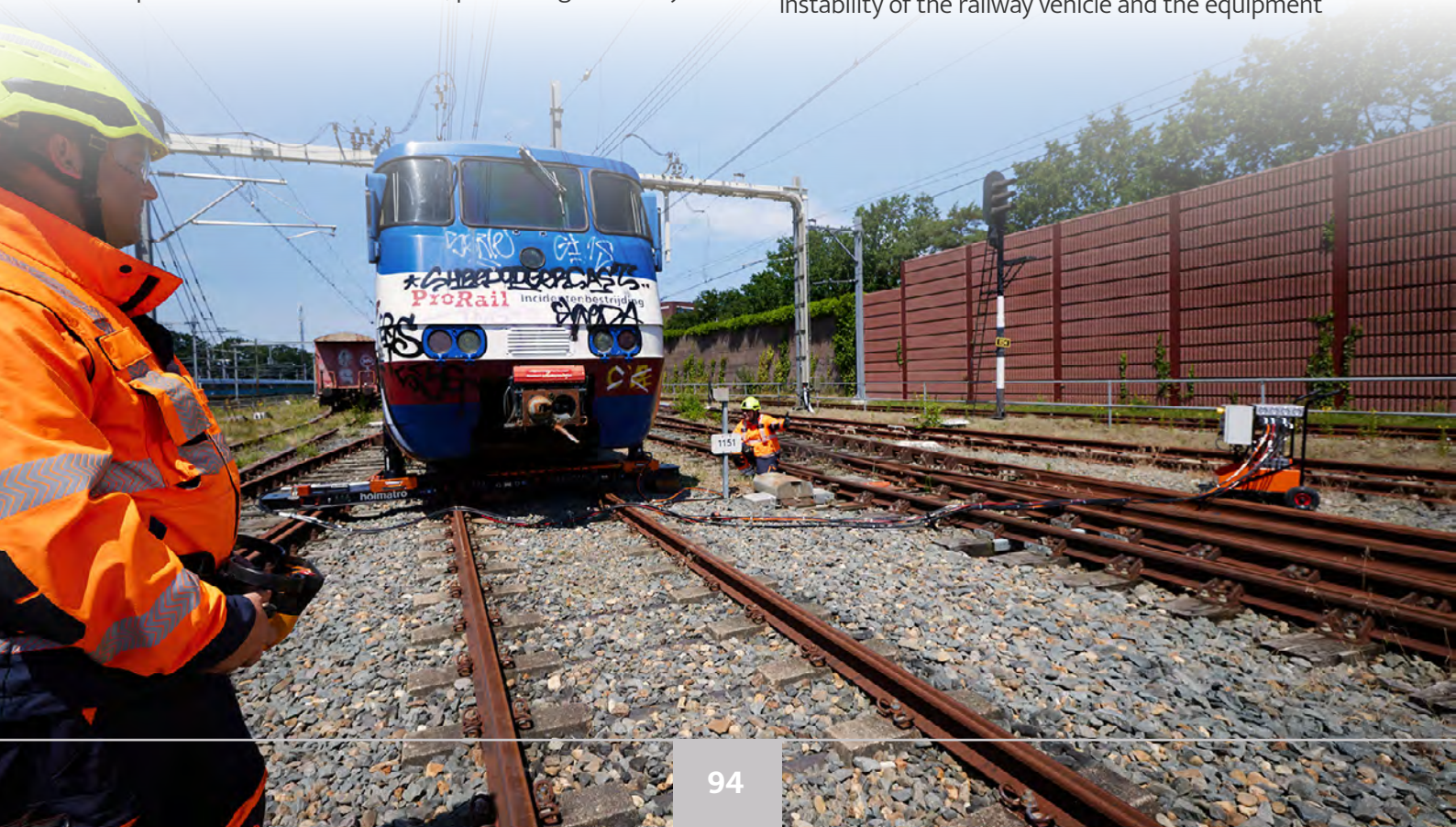
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Noise, Vibration & Emissions

TRAILA

Quiet, End to End

Noise deadlines are landing on operators' desks across Europe. Traila, the Swiss wheel-rail interface company, has built the only full-stack answer: sensing, intelligence, chemistry and application, delivered as one service. Here are the questions operators have been asking:



Q: Why has rail noise become a compliance problem, not just a complaints problem?

Because regulators and courts have started putting dates on it. In Ghent this year, the tram operator De Lijn was required through a conciliation hearing to propose measures to cut tram noise on the Bernard Spaelaan by 21 January 2026. The cause was not a crash or a safety scandal. It was curve squeal, the high-pitched noise a wheel makes as it rubs against the rail in a tight bend.

On that one avenue, almost 700 rail vehicles pass on weekdays, and residents have recorded peaks of up to 100 decibels. London's own Assembly has documented residents along the Night Tube lines reporting constant headaches, tinnitus and broken sleep. The direction across Europe is one way: the duty to measure noise is becoming a duty to act. Quiet is now a number operators are accountable for, with a date attached.

Q: Operators already buy lubricators, barriers and grinding programmes. What's missing?

Ownership of the outcome. The wheel-rail interface is one physical system, but the industry sells it in pieces. One vendor supplies the friction modifier. Another supplies the dispenser. A third supplies the monitoring. A consultant reads the data. The operator glues it all together, and carries the risk when the squeal comes back. In Ghent, one trial fix – manganese strips set into the rails – cost over 100,000 euros for roughly 150m.

That's the price of not treating noise at the source. And the source is a moving target. Noise depends on many variables at once: wheel profile, vehicle type, speed, load, weather and the exact geometry of each curve. A fix that works on one curve can fail on the next. Beating that takes sensing, decision-making, chemistry and precise application working as one loop, not four purchase orders working as strangers.

Q: Traila is best known for its leading work on active steering for trams. How did this shift come about, and where does active steering stand?

We never left the root cause; we added a second front. Traila's foundation is active steering: instead of letting a wheelset fight the rail through a curve, you steer it. We have just finished a test campaign in Zurich with the TX4, a decommissioned T2000 tram we retrofitted with our active steering bogie and a full suite of measurement equipment. It showed that active steering can work in two different ways: by actuators steering the wheelset directly, or by steering torques applied to the independent wheels. That

work now continues in our next-generation vehicle programme, where we are working with academic and industry partners on making it commercially viable.

The friction work grew out of that research. Igralub came to us because they wanted our curve-detection algorithms and our simulation and analysis toolchain. We soon realised what the combination could do: intelligent friction management treats the symptoms that generate noise today, on the fleets operators already run, while active steering solves the root cause in the vehicles of tomorrow. One company, working both ends of the same problem.

Q: What does the full stack actually look like?

It is Traila's system, and we are accountable for it. We call the approach Interface Intelligence. Traila runs the intelligence layer: onboard monitoring that turns measurements from vehicles in service into a network-wide map of where noise and wear are actually created. The precision onboard monitoring hardware is available today, and the next generation of onboard monitoring and control is in development.

One specialist partner builds with us. Igralub, the rail conditioning standard since 1992, brings the chemistry and the application systems: brake silencers, flange lubricants and top-of-rail conditioners that hold the running surface inside the narrow friction range where squeal stops. The result is what the market has not had before: Traila as the only provider offering the full stack as a single service. One point of contact. One system. One party accountable for the quiet.

Q: The lubrication is described as active, or smart. What does that mean on the track?

It means the conditioning responds to the network instead of running on a fixed schedule. Conventional top-of-rail and flange lubrication applies the same dose everywhere, at set intervals, and hopes for the best. We turn that around, in four steps:

Measure the interface across the fleet. Map the hotspots that matter. Optimise the conditioning against exactly those spots. Monitor continuously, so the system keeps improving instead of drifting back. Because the monitoring never stops, the dose adapts to route, weather and traffic, curve by curve.

The operator stops spraying everywhere and hoping, and starts conditioning where the evidence points. Every intervention is documented.

Key Facts

- Traila: Swiss wheel-rail interface specialists, Regensdorf, Zurich. IRIS-certified, ISO 9001, seven active patent families across active steering, friction, monitoring and localisation. Active steering proven on the TX4, a retrofitted T2000 tram, in Zurich.
- The offer: Interface Intelligence, the only full-stack service at the wheel-rail interface: sensing, intelligence, chemistry and application from one provider.
- Partner: Igralub (rail conditioning since 1992, 30+ years on the ground, 200+ rail customers, EU Ecolabel biodegradable chemistry).
- Documented impact (BAV source): up to minus 98% curve squeal, up to minus 12% wear, up to minus 60% conditioning-agent consumption. Hotspots are individual; effect requires monitoring.

Gotthard Bahn places its conditioning dose using RFID triggers by GPS on specific hotspots on its network.

Traila's own systems are in live projects with operators in three countries. And adoption is not a rip-and-replace job. The conditioning hardware works with third-party systems already installed on the fleet, so the unit of upgrade is the controller, not the fleet.

The chemistry is biodegradable across the range, with a growing range of EU Ecolabel products. Behind the system sit Traila's credentials: IRIS certification, an ISO 9001 quality system, and seven active patent families across active steering, friction, monitoring and localisation.

Q: What should an operator facing a noise deadline do first?

Find out where your network actually hurts. Most operators have never seen a detailed curve-by-curve map of their own wear and wheel-rail interaction noise and wear, and without one, every fix is a guess. That map is where we start, and it's where the conversation with a regulator changes: from promises to evidence.

The operators getting ahead of the noise issue will be the ones who stop buying fixes piecemeal. The wheel-rail interface has always made noise. Now there is one stack, and one provider, that can make it go quiet on command. Bring us your noisiest curve.

Traila is exhibiting with its partner Igralub at InnoTrans 2026, in the SwissRail Pavilion, Hall 2.2, Stand 250, where the full Interface Intelligence system will be shown for the first time. [Book a briefing at the stand, or via Traila.ch.](#)

When a regulator or a resident asks what was done, the answer is a log, not a shrug.

Q: What results has this produced, in numbers?

In programmes assessed by the Swiss Federal Office of Transport, the microphone-based approach has cut curve squeal by over 90%, wear by over 10%, and conditioning-agent use by more than half.

The right lubrication, at the right time, in the right place, in the right quantity - achieved through a full systems assessment of vehicle and infrastructure interaction - is what consistently unlocks those results.

Q: Where is the proof in service, and what does it cost an existing fleet to adopt?

It's already running on networks you can ride today. Igralub has spent more than 30 years in this field and serves over 200 rail customers; its reference networks show what precise conditioning delivers. At the Mariazellerbahn in Austria, 38 hotspots are fully covered. TPG in Geneva runs onboard wheel-rail conditioning across its fleet. The legendary Matterhorn

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Depot Equipment

Roediger Vacuum

Roediger at the New Dortmund-Hafen Depot: Vacuum Power for Germany's High-Speed Fleet



Germany's ICE network continues to grow in scope and importance, and so does the need for modern, high-capacity maintenance facilities. One of the latest additions is the new ICE-Werk Dortmund-Hafen, a state-of-the-art depot designed to keep Deutsche Bahn's high-speed trains reliably in service. The facility combines advanced building and rail infrastructure with specialised systems for water supply, wastewater removal and interior cleaning – a critical but often overlooked aspect of modern train maintenance.

A glimpse into the future: this is what the new plant is set to look like © Henn GmbH

At the heart of these servicing systems is the vacuum technology supplied by Roediger Vacuum GmbH. The new depot will be equipped with two central vacuum stations and a total of four compact stations of the Roediger Type 360. Together, they provide sufficient capacity to supply and discharge the entire hall and the exterior servicing areas. This means that fresh water and wastewater can be handled safely, quickly and hygienically, supporting efficient turnaround times for the ICE fleet.

The depot's main hall is around 480 metres long and houses four servicing tracks. Along these tracks, approximately 120 underground service pits enable trains to be supplied with fresh water and to have wastewater toilet systems emptied. The configuration allows flexible servicing of different trainsets and multiple trains simultaneously, a key requirement in a busy high-speed network. Here, Roediger's systems benefit directly from years of operational experience at the ICE depot Köln-Nippes, where similar installations have been in service since the facility opened in 2017. That long-term operational track record has informed the design and optimisation of the Dortmund-Hafen installation, helping to reduce maintenance requirements and increase system reliability.

Beyond the main hall, the ICE-Werk Dortmund-Hafen includes two exterior servicing areas with four additional tracks. These outdoor positions are equipped with more than 100 of Roediger's T-Systems. The T-Systems are designed for efficient train-side connection, allowing quick

Roediger Project Manager Mathias Pietsch in front of the new service hall 'K1'



and safe servicing even in varying weather conditions. This high number of units enables the rapid, track-side removal of various types of train and contributes to a smooth flow of vehicles through the depot.

Across the outdoor tracks 16 media cabinets distribute the necessary utilities for the interior cleaning – hot and cold water supply as well as various cleaning agents and other resources. These cabinets play a crucial role in ensuring reliable and quick interior cleaning of the trains.

By integrating Roediger's supply and disposal technology, the depot can deliver consistent service quality while meeting stringent environmental and hygiene standards.

With the ICE-Werk Dortmund-Hafen, Deutsche Bahn gains a modern facility that supports the efficient and sustainable operation of its high-speed fleet. Roediger Vacuum GmbH's contribution underscores the importance of robust, proven servicing technology in keeping Europe's long-distance rail services running smoothly.



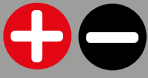
Roediger compact vacuum station type 360



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Whether you require batteries repaired, overhauled or replaced, Capitol is trusted and relied upon by a wide range of UK companies. We deliver on our promises to provide exacting standards of product, service, ongoing technical support and commitment in all aspects of our business.

We are an independent manufacturer with enough strength and flexibility to be able to support mainline customer requirements through stock availability and technical experience. Capitol is very proud to offer a variety of solutions for the battery industry and applications we service.

RAILWAY/

TRANSPORTATION

MATERIALS HANDLING

EMERGENCY POWER

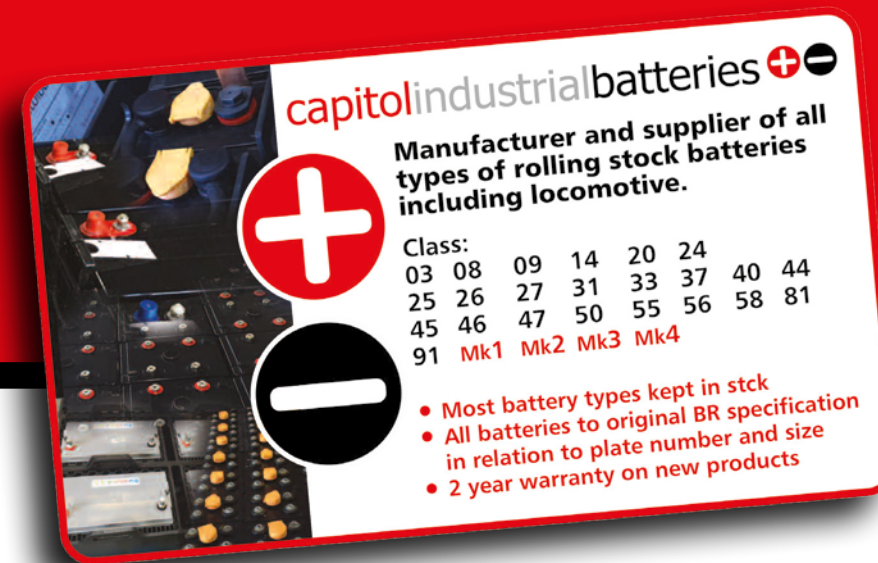
GOLF INDUSTRY

RENEWABLE ENERGY

MARINE INDUSTRY

AVIATION

**WHO WE
SUPPLY**



**OUR
BATTERIES**

STATIONARY | MOBILITY | DIN

AUTOMOTIVE | TRACTION (BS & their construction)

MONOBLOC TRACTION



capitolindustrialbatteries



Any train - not just any battery!

Denis McLeod, Capitol Batteries

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Train Interiors

Kiel Americas



Kiel Brings Global Seating Expertise to InnoTrans 2026

This InnoTrans Kiel will be presenting its established Lihok platform, the next generation of its Match model and previewing Streamline – its newest modular seating concept.

With representatives from eight countries on one stand, Kiel is using InnoTrans 2026 to showcase seating solutions that combine passenger comfort with operator and lifecycle requirements.

Kiel heads to InnoTrans 2026 with a line-up spanning established long-distance and regional platforms to newer, modular concepts still in development.

Kiel brings its full international operation together at InnoTrans 2026, showcasing seating solutions that combine passenger comfort with operator and lifecycle requirements.

Kiel is excited to be exhibiting at InnoTrans this year, where the group will be coming together to show off our latest designs. On our stand we're excited to have representatives from eight countries: Germany, where our headquarters are based, Poland, North America, Macedonia, the Netherlands, Italy, Austria and Spain.

Bringing these locations together on one stand reflects how we operate as a group: shared expertise across development, production, sales and customer service. Customers working with us draw on our international experience, technical depth, regional proximity and a consistent approach to quality, regardless of which part of the group they engage with.

Industry Trends in Rail Seating

Demand for rail seating is being shaped by several ongoing industry trends: continued investment in sustainable mobility, the modernisation of existing fleets, rising passenger expectations around comfort,

and a preference for interiors that are durable, low-maintenance and cost-effective to run.

For us, this demand is concentrated in regional, intercity and long-distance rail service, along with modernisation projects. In these areas, seating has a direct effect on passenger comfort, operating cost, weight, maintenance requirements and the overall appearance of the vehicle interior. We see operators increasingly evaluating seating not only on upfront cost, but on how it performs and holds up across a vehicle's full operating life.

Product Highlights at InnoTrans

At InnoTrans, Kiel will be showcasing selected seating solutions that highlight the demands placed on modern rail interiors. Each exhibit represents a specific added value: comfort, modularity, durability, design quality or long-term usability.

The Lihok was developed specifically for long-distance rail travel and uses natural wood materials to create a distinctive, elegant appearance. The material choice is functional as well as aesthetic – the Lihok is robust, easy to maintain and modular, enabling customer-specific customisation. Available in seat widths of 450mm and 520mm, and with back and sitting angle adjustment as standard, options include foldable armrests, a back-mounted folding table with cup holder and USB charging.

Lihok deployments have taken place on railways including ÖBB Railjet in Austria, SBB Giruno, BLS and Matterhorn Gotthard Bahn in Switzerland and Transitio in Sweden.

The Next Generation

Match G3 is the next generation of Kiel's regional seating platform, building on the established Match G2.

This model was built as a modular system for regional and long-distance trains, with seat and back cushion widths designed to fulfil TSI-PRM standards, a range of headrest options, and compliance with UIC 564, EN 45545 and GOST standards.

Match G3 is built on that existing platform rather than replacing it outright, and offers improvements to comfort, configurable privacy and an even more cost-effective design.

It's roughly 10% lighter than its predecessor, significant because lower vehicle weight can save energy over the course of a vehicle's lifecycle. Space efficiency also plays a role, because seating systems must make optimal use of the available interior space. However, the key is always balance: being efficient as possible without compromising comfort and safety.

Visitors to our stand will also be the first to see the concept model for Kiel's latest product, the Streamline. The full specification details for this model will be shared at a later date.

The Changing Role of the Seat

The demands on rail transport are changing, and with them the role of the seat. In the past it was often viewed primarily as a piece of equipment, but today it's part of a larger system, where comfort, identity, sustainability, efficiency and the passenger experience all go hand-in-hand.

Kiel aims to help make rail travel more attractive, with seating that's robust enough for daily operation while still giving passengers a high-quality experience. For us, a good seat is more than just a component – it's central to how a journey feels, and that's exactly where we want to make a noticeable difference.

At the Stand

Our stand at **InnoTrans 2026 will be located in Hall 1.1, Booth #270**, where visitors will be able to view our Lihok, Match G3 and Streamline models. Together they highlight the direction our seating development is taking, from established long-distance and regional platforms to the newer modular concepts still in development.



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EXPO: OCTOBER 5-7, 2026

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Train Interiors

Polarteknik



For over 30 years, Polarteknik has worked with the world's leading train manufacturers, delivering reliable, sustainable and efficiently produced interior door systems for demanding rolling stock projects.

Headquartered in Huittinen, Finland, Polarteknik solutions are built on long-term commitment: to customers, to projects, to product performance and to a more ecological future for rail transport.

"We work together with our customers towards a green future for transport," says the Polarteknik team.

"Our goal is to help make rail travel the most safe, comfortable and sustainable way to move from one place to another."

Polarteknik's strength is not only in what we deliver, but in how deeply we understand the railway industry. Every project requires careful analysis of technical requirements, safety frameworks, passenger comfort, fleet availability and lifecycle value. This is where our

experience becomes a practical advantage. We combine proven product platforms, specialist engineering and accumulated return on experience to help customers manage complexity with confidence.

Our portfolio covers automatic and manual interior door systems, partition walls, fire barrier solutions, gangway solutions and tailored products for new rolling stock. OEM new-build projects remain at the core of our business, and we continue to support leading manufacturers with solutions designed for safety, reliability, availability and fire integrity.

But a train's value does not end at delivery. As fleets remain in service for decades, maintenance and after-sales support become essential to performance, sustainability and total cost of ownership. Polarteknik supports



Your partner for
Smart Gangway
Solutions

Find out
more about



WWW.POLARTEKNIK.FI



customers through installation and commissioning, inspections, maintenance, modernisation, spare parts, technical support, refurbishments and fleet upgrades.

Polarteknik takes your fleet further.

Our wide-ranging expertise reaches beyond individual roles. Every Polarteknik employee contributes to a broader understanding of the customer, the product, the passenger and the operating environment. This breadth helps us consider comfort from every angle: ease, speed, relaxation, safety, reliability and ecological performance.

Polarteknik has built a specialised ecosystem around its customers and partners. We are in control of design, manufacturing, testing and validation, and we support our products throughout their lifetime. With long experience, broad competence and in-depth industry understanding, Polarteknik is a trusted partner for sustainable rail interiors – from first delivery to future upgrades.

“Keeping rolling stock in good condition is key to safe, comfortable and efficient operations. Our role is to help customers extend fleet lifetime, improve availability and bring proven new technology into both new trains and existing fleets.”

About Polarteknik

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

Polarteknik, a part of Dacke Industri group, is a specialist company for passenger door system manufacture, service, maintenance, refurbishment and beyond.

www.polarteknik.fi



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Solutions



Find out
more about



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Vehicle Systems & Subsystems

Paragon Products LLC

From Constant Flow to Intelligent Control: A New Era for Locomotive Fuel System Reliability

Developed in direct response to customer feedback, Paragon's next-generation smart fuel pump is securing widespread OEM adoption by transforming a historically silent component into an active, self-regulating diagnostic tool.

In the demanding world of freight rail operations every minute of uptime is critical. A locomotive out of service is a significant drain on resources costing operators not just in repair time but also lost revenue and logistical disruption. For years a frustratingly common issue has plagued maintenance depots: the unnecessary replacement of fuel pumps.

Often blamed for any fuel system issue, these vital components have been removed and returned to the manufacturer only to be designated 'no trouble found' (NTF). This cycle of misdiagnosis results in wasted labour, repeat failures and staggering costs. Now a new generation of smart fuel pump technology from Paragon Products is set to end this costly problem for good.

A Truly Dynamic Component

The issue stems from the traditional simplicity of locomotive fuel systems. The pump is the only truly dynamic



component so when a failure occurs it's the first and easiest part to blame. Technicians frequently report issues like a 'noisy' pump – a symptom that's almost always indicative of an external problem such as air in the suction line rather than a defect in the pump itself. This leads to a costly loop of trial and error.

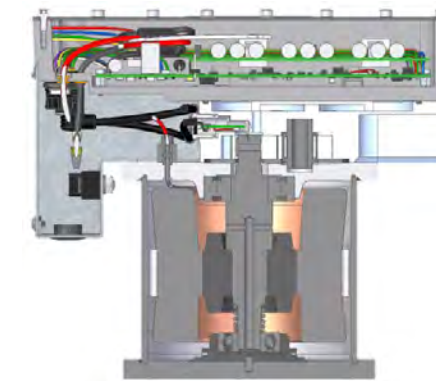
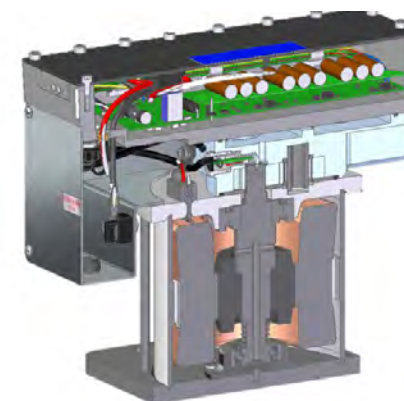
For one major US Class 1 operator the NTF rate for pumps on a specific locomotive fleet was as high as 70%. Each unnecessary pump change represents a significant financial hit. A typical road failure can cost an operator around US\$15,000 in operational losses and a locomotive can be out of service for a full day as it's moved to a shop.

Add to this the labour for the change out shipping costs and the fee for testing a perfectly good pump, and the expenses quickly multiply. Worst of all the original problem remains unsolved meaning the locomotive is destined for another failure and another trip to the depot.

Responding to Customer Feedback

It was direct feedback from customers facing this exact challenge that spurred Paragon to act. Recognising that the pump itself could be the key to solving the diagnostic puzzle, the company developed the first-generation smart fuel pump. The goal was to give the pump a voice, allowing it to tell technicians what was really happening within the fuel system.

Engineers at Paragon equipped the pump with the ability to monitor its own current voltage and pressure. By first collecting vast amounts of real-world data from locomotives in 'dumb mode', they established a baseline for normal operation. They then compared this data with the distinct electronic 'signatures' created by common failure modes such as a clogged fuel filter, suction-side air leak or an out-of-range voltage supply, which were replicated in bench testing.



Intelligent Firmware

With this intelligence embedded in its firmware, the pump can now actively diagnose the system in real time. Rather than being a silent victim of external factors it becomes the first line of defence in troubleshooting. It communicates its findings through a simple yet effective system of green and yellow LED lights on the unit itself. A solid green light means the pump is running correctly.

A blinking yellow light might indicate a dry run condition prompting a check of the fuel tank level. A combination of blinking lights can point to a locked rotor or voltage issue. With this clear visual guidance technicians can immediately understand the health of the system and avoid changing a healthy pump.

While this diagnostic capability marked a major leap forward, Paragon continued to listen to its customers and identified another critical area for improvement. This led to the development of the second-generation smart pump – a variable-speed unit that fundamentally changes how fuel is managed.

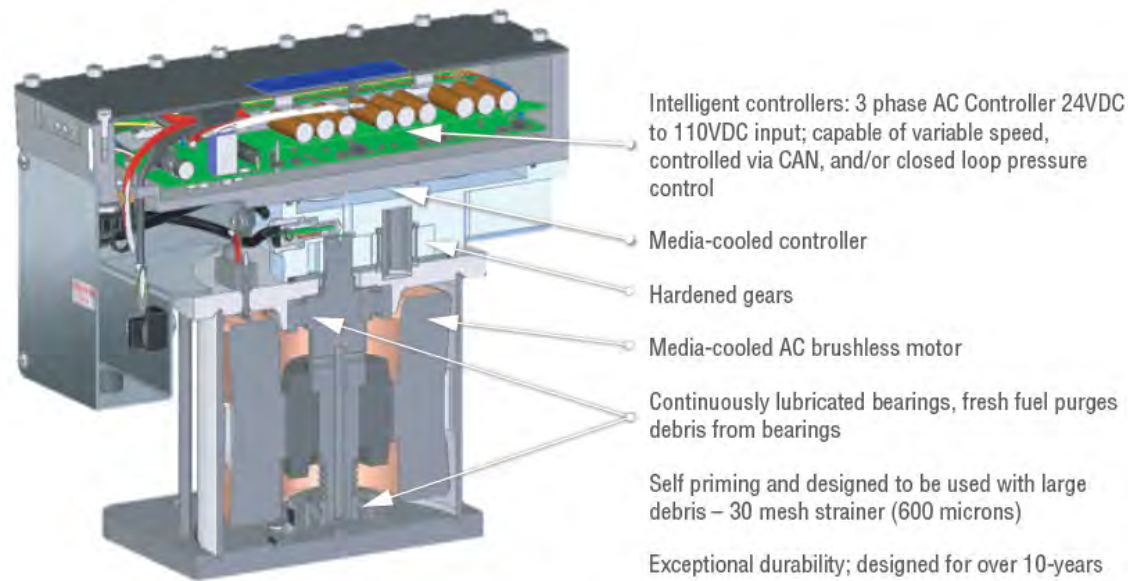
Resolving Discrepancies

Historically, locomotive fuel systems have operated on a constant flow principle. The pump delivers a fixed volume of fuel – for example seven gallons per minute – which creates a system pressure of around 120 psi. However, the engine itself may only require 90psi. To resolve this discrepancy a mechanical regulator valve is used to bleed off the excess pressure, dumping unused fuel back into the tank. While functional this design has two significant drawbacks.

Firstly, as locomotives age and fuel tanks accumulate debris, these mechanical regulator valves are prone to sticking or becoming clogged. When this happens the constant-flow pump continues to push its full volume into a blocked system. The pressure builds uncontrollably, sometimes exceeding 250psi, until it finds the weakest point to escape. This has led to catastrophic failures including ruptured fuel filter housings and massive fuel leaks that pose a serious environmental risk and a safety hazard to personnel.

Intelligent Regulation

The new Paragon smart pump eliminates this failure mode entirely. Instead of maintaining a constant flow it operates as a variable-speed unit that intelligently regulates itself to maintain a precise target pressure. The pump only delivers the fuel the engine needs, eliminating the requirement for an external mechanical regulator. If the pump's internal pressure sensor detects a



blockage it automatically throttles down. If the pressure continues to build the pump will shut itself off preventing a dangerous over-pressurisation event.

The second benefit of this variable-speed approach is extended fuel filter life. In a traditional system a significant portion of the fuel that's filtered is immediately dumped back into the tank to be contaminated again. By only pumping and filtering the fuel required at any given moment the Paragon smart pump reduces the load on the filters. Paragon is currently conducting tests to quantify the exact extension of filter life, with plans to publish a formal paper on the findings within the next year.

Designed for Harsh Environments

Designing a product to withstand the uniquely harsh railway environment was a challenge Paragon was well-equipped to meet, having cut its teeth in the rail industry. To ensure a service life of over ten years

engineers focused on critical areas of durability. They implemented a ceramic hybrid bearing and engineered out all dynamic seals – a common failure point in other pumps.

To protect the sophisticated electronics from the extreme heat of the engine cab they also developed an innovative fuel-cooling system that uses the locomotive's own fuel supply as a massive heat sink, circulating it through the inverter to keep components cool. Furthermore, a soft-start function gradually builds up power reducing the high-current draws that wear down electronic components over time.

Delivering Enhanced Reliability

This commitment to creating a robust future-proofed solution is reflected in the product's adoption. The smart pump has been approved by and is being purchased by major OEMs, including Wabtec and Progress Rail, and is already being implemented at a large scale by two US Class 1 operators.

By offering this advanced technology at a price point only marginally higher than its legacy pumps, Paragon is providing a compelling upgrade path for operators looking to enhance reliability and escape the problem of obsolete electronic components. It represents a move towards a more reliable, efficient and safer future for rail operations – one where the blame game finally comes to an end.

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Vehicle Systems & Subsystems

Grueber



Grueber – Nearly 200 Years of Engineering Expertise at the Heart of Modern Railways

Springs may be among the least visible components in a modern bogie, but they're among the most critical. For nearly 200 years, Grueber has been perfecting them, and is now bringing digital innovation to one of rail's oldest technologies.

In the complex ecosystem of modern railway engineering, where high speeds, immense loads and uncompromising safety standards converge, some of the most critical components are also the most easily overlooked. Tucked away within the undercarriage, springs are fundamental to a train's performance, safety and comfort. They are the silent workhorses that manage the interface between the vehicle and the track.

For nearly two centuries, one company, Grueber, has dedicated itself to mastering the science and art of spring technology, evolving from a historic forge into a vital engineering partner for the global rail industry.

Rail Transport Heritage

Founded almost 200 years ago, the German-based Federnwerke J.P. GRUEBER GmbH & Co. KG



The technical challenge is compounded by the fact that real-world operating conditions are often far more complex than theoretical models can predict. This makes the manufacturer's accumulated knowledge and experience absolutely critical. It's this deep-seated expertise, built over generations, which enables Grueber to design and produce components that perform reliably under immense static and dynamic loads, ensuring the integrity of the entire vehicle.

A Partner, Not Just a Supplier

In an industry where precision and reliability are paramount, Grueber distinguishes itself by fostering deep engineering partnerships rather than engaging in simple transactional relationships. The company emphasises that its collaboration with a client truly begins, rather than ends, with the delivery of a product. Its key strengths are identified as speed, reliability and, above all, technical competence.

A cornerstone of this philosophy is the principle of early involvement. Grueber advocates for working with vehicle manufacturers during the initial concept and development phases of a project. This allows its specialists to contribute their extensive know-how in the design of primary and secondary suspension springs, helping to identify potential challenges and optimise the overall system from the outset.

When springs are only considered later in the design process, many critical parameters are already fixed, potentially leading to compromises in performance or cost. Early collaboration, therefore, often yields technically superior and more economically efficient solutions.



began its journey forging steel into high-quality products. Today, its state-of-the-art facilities produce precision-engineered springs and bent parts for a host of industries, but its heritage is deeply intertwined with the evolution of rail transport.

The company's involvement in the sector dates back to around 1880, a period when the Industrial Revolution was driving the rapid expansion of railway networks across the world. As demand grew for high-performance steel products capable of withstanding the rigours of this new mode of transport, Grueber's technological capabilities positioned it as a key supplier.

This legacy of collaboration was established early. At the beginning of the 20th century, industrial pioneers like Siemens sought out Grueber for its advanced engineering expertise. This tradition of partnership continues to define the company's ethos today, serving a roster of leading international manufacturers including Alstom, Skoda, Hitachi, Siemens and Stadler, as well as major operators like Indian Railways. From Canada to China, Grueber springs are an integral part of the systems that ensure reliable ride quality and safety on a global scale.

The Unsung Hero of the Bogie

To a casual observer, a spring may seem like a simple component. In reality, it's a highly stressed, precision-engineered product operating in one of the most demanding environments imaginable.

In railway applications, springs must endure millions of load cycles, constant vibrations, significant temperature fluctuations and immense dynamic forces over a service life that can span decades. As the company explains, even minor deviations in material properties, surface treatment, or geometry can have a profound impact on performance and longevity.



Direct Customer Engagement

This collaborative spirit extends to knowledge sharing. The company regularly hosts customer days, technical forums and workshops designed to foster an open exchange of ideas between operators, engineers, developers and other industry experts. These events delve into innovative technologies, new manufacturing possibilities and emerging market demands, with recent topics including advanced surface treatments and maintenance strategies.

The goal is to create synergies and share practical experience that participants can apply to their daily project work, driving efficiency across the board. The revision of the ISO 9001 standard, which now requires a systematic approach to knowledge management, underscores the value of this practice – a discipline Grueber has been cultivating for years through a comprehensive digital knowledge database and internal engineering forums.

Innovation for the Future of Mobility

As railway technology advances, the expectations placed on component manufacturers continue to rise. The drive for higher speeds, longer maintenance intervals, and ever-tighter tolerances requires continuous innovation in both product design and manufacturing methods. Grueber has consistently met these demands by investing in advanced manufacturing processes, surface technologies, and testing capabilities, including fatigue and endurance testing, crack detection, and fully documented quality control.

Looking ahead, Grueber sees its role as being intrinsically linked to the major trends shaping the future of rail: sustainability and mobility. The industry-wide push to reduce vehicle weight, improve energy efficiency, and lower the carbon footprint of transport presents

significant opportunities. As a specialist in high-performance spring solutions, the company is actively developing innovative products to support these goals.

Digital Spring Measurement

This focus on the future will be on full display at InnoTrans 2026. Grueber plans to unveil its next-generation Steel Spring Generation 4.0 technology, alongside iSpring, a digital measurement and monitoring system for in-service railway applications. This digitised steel spring represents a leap forward in predictive maintenance and performance analysis, demonstrating that even a component as traditional as a steel spring can be a focal point for digital innovation.

Ultimately, Grueber's message to the industry is clear: while spectacular innovations often capture the headlines, the future of sustainable and safe mobility also depends on the flawless performance of reliable, long-lasting components. By combining nearly 200 years of experience with a relentless drive for innovation and a commitment to true partnership, Grueber continues to play its vital, if often unseen, role in making modern rail transport possible.

Visit Grueber At Hall 9, Stand 425

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Vehicle Systems & Subsystems

Rowe Hankins

Onwards and Upwards – Rowe Hankins Marks Four Decades in Rail

As Rowe Hankins marks its 40th anniversary, we trace the journey from distribution agency to global design partner.

This year marks the 40th anniversary of [Rowe Hankins Components](#)' incorporation: four decades in which a small electromechanical components agency has grown into a globally recognised [designer and manufacturer](#), earning a reputation for technical expertise, engineering quality and a willingness to take on the most challenging of problems.

The company began as a distribution agency for Heinemann electromechanical products, but its founding conviction that real value lies in solving problems, not stocking shelves, pointed it in a different direction.

The Early Years

Co-founders Roger Rowe and Toni Hankins, both electrical engineers, first met in the early eighties when they began working together at electromechanical components manufacturer Electromatch.

Recognising a shared vision and commercial opportunity, the pair left to establish independent sales agencies – Roger founding R C Rowe Consultants, Toni establishing T Hankins Components – both representing Heinemann electromechanical products. Working in close collaboration, the two agencies effectively operated as a single business throughout 1985, laying the foundations for what would become Rowe Hankins the following year.



Some of the company's initial stock was financed by a £12,000 personal overdraft, but almost all of that first shipment was sold within days, putting the bank account into the black, where it remained for the next 25 years. 'Onwards and upwards' became the founders' informal guiding principle during those early years, and from rented premises in Bury, they built the business through direct selling, long hours and a growth plan centred on product diversification and organic growth without borrowing.

The company exceeded £1 million turnover in its second year and has never looked back, reinvesting rather than withdrawing profits in order to expand its premises and workforce. Today Rowe Hankins operates from its own 25,000 sq. ft combined office, store and production space, and has a total of 33 staff. This is expected to grow during 2026 with the opening of a new factory in China to support the ever-growing Asian market.



From Distributor to Designer

The establishment of an in-house R&D function in 1998 marked a major turning point for Rowe Hankins, as it was then that the company began designing its own product ranges rather than representing others. It began to develop the [speed sensors](#), [current monitoring devices](#), lubrication systems and detection units that now form its core offering, with each born out of a specific customer need.

Today's CEO, David Owen, believes that one of the reasons Rowe Hankins remains a trusted partner in the sector is down to its dedication to both innovation and customer service.

"Over the years we've developed components and solutions alike, from [intelligent wheel flange lubrication \(iWFL\)](#) and [tram overspeed protection](#) through to [LiDAR detection and safety solutions](#), and our continued support of these highlights that we're not all about selling," he notes. "We often [refurbish and support our systems](#) well beyond normal end-of-life, and always provide customers with updates and upgrades."

Industry recognition backs up the company's credentials. This includes quality and environmental accreditations to ISO Standards and being awarded 2015's Modern Railway Innovations and Light Rail Best Supplier accolade, as well as major contracts including a Network Rail supply ahead of the London 2012 Olympics.

A Different Kind of Company

The company has also changed structurally over the years. Since Rodger Rowe and Toni Hankins retired, the business transitioned to an employee ownership trust. This is a shift that David describes as fundamental to how the business now operates.

"We're all invested in our future," he says. "It's a model that carries the values of the founding years – resilience, long-term thinking, doing right by the customer – into the next chapter."

Looking Ahead

As Rowe Hankins marks 40 years, the focus is firmly forward. Expansion into project-based work, new technology partnerships and emerging areas such as LiDAR-based detection systems point to a business that has no intention of standing still.

"The dedication of the team drives the business forward, continually evolving to meet the needs of customers and the industry alike," says David. "As we enter our next chapter we're looking to diversify into new solutions, markets and products that will secure the business growth and the future beyond. Whether you're an existing customer or exploring what Rowe Hankins can offer for the first time, we'd love you to be part of that journey."

Find out more about Rowe Hankins by visiting www.rowehankins.com or emailing sales@rowehankins.com

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Rowe Hankins Milestones

- **1986** – Rowe Hankins Components formerly established distributing Heinemann products
- **1988** – achieved BS 5750 accreditation
- **1990** – constructed a new factory
- **1992** – awarded the Weber franchise
- **1993** – awarded Marquardt distributorship
- **1995** – achieved BS EN ISO 9002:1994
- **1996** – awarded Schrack distributorship
- **1997** – awarded AI-TEC Instruments distributorship
- **1998** – established the company's research and development department and awarded Eaton distributorship
- **2001** – achieved BS EN ISO 9001:2000 certification and awarded Sécheron distributorship
- **2002** – established the Sécheron Service and Maintenance Centre and awarded LEM agency
- **2004** – opened a new service centre for Sécheron / Hasler equipment and appointed European specialist for traction – Eaton Heinemann
- **2005** – appointed Bombardier agent for the USA and Canada and supplied runback units to Metronet BCV
- **2008** – introduced lean manufacturing principles, completed intelligent wheel flange lubrication (iWFL) trial with Merseyrail and successfully passed the Bombardier Safety Critical Audit
- **2009** – achieved IRIS accreditation
- **2011** – awarded major Network Rail contract to supply NICs for improved asset monitoring in advance of the London 2012 Olympics
- **2014** – expanded facility to 25000 sq. ft to meet increasing production demand
- **2015** – awarded Modern Railway Innovations Award and Light Rail Best Supplier
- **2018** – expanded factory by a further 4000 sq. ft to support future growth and achieved BS EN ISO 9001:2015 and BS EN 14001:2015 accreditation
- **2021** – Rowe Hankins EOT Trustee Limited is setup, purchasing 95% of Rowe Hankins Shares
- **2023** – won the Sheffield Supertram Overspeed protection contract
- **2025** – won the Manchester Metrolink Lidar Detection contract, appointed sales and support agents for McLaren Applied (now rebranded as Motion Applied) and appointed sales, installation and maintenance support partner for ZTR Canada; David Owen joins as the company as CEO
- **2026** – celebrates 40 years of trading



EAO Group

HMI Solutions that Move People. Experience EAO's World of HMIs at InnoTrans 2026.

Where people travel every day, safety, comfort and efficiency are key. That's where EAO's HMI solutions for railway come into play: Whether for passenger access systems, driver's cabs, toilet facilities or for enhanced passenger convenience – each HMI solution from EAO is developed in close collaboration with you.

With many years of experience and broad technological expertise, we provide comprehensive advice, anticipate needs, combine components, materials and technologies into complete systems – to meet the specific requirements of your application. As your expert partner, we enable easy integration into your existing systems and designs, considering both functional and ergonomic requirements and ensuring full compliance with all relevant standards.

During InnoTrans we will showcase tailored HMI solutions and will introduce our latest innovations for the railway industry. Aside from the next generation Series 56 pushbuttons and our new Series 56 Touchless you'll get insights into these exhibition highlights:

Universal Sound Module – The Acoustic Solution for Passenger Access Systems

EAO is launching a new Universal Sound Module, from a speaker-only version up to integrated sound generation with adaptive volume behaviour and instant sound emission, to enhance barrier-free usability, reliability and passenger safety in public transportation, for quiet and noisy environments.

The sound module offers the flexibility to configure up to 15 sequences and audio files. A new configuration software enables intuitive adjustment of sound parameters. The functional and acoustic design is optimised for controlled, effective volume emission and is aligned with the Series 56 and 57 design



Tailored HMI solutions and new EAO product highlights during InnoTrans 2026

families. This ensures consistent sound emission and a harmonious integration into the design, without compromising on aesthetics or installation concepts.

The Universal Sound Module ensures full regulatory compliance with relevant standards, such as TSI PRM (EU) 2023/1694, EN 14752:2025, and EN 50155:2026, whilst meeting security requirements from the Cyber Resilience Act (CRA). Join us at InnoTrans and listen to it all for yourself!

Extension of Charging Solutions Product Range

The railway-certified charging solutions enable passengers to charge mobile phones or other portable devices during their train journey. Our charging solutions range includes both wireless charging and USB charging sockets and can be supplied complete with power supplies and cabling. EAO is extending this range by adding a new, faster 15W version of the tabletop chargers and a USB-C socket with a multi-voltage power supply to the product line. Additional features, such as the tabletop charger with magnetic locating ring or LED status indicators or our powerful PPS compatible USB-C sockets can be tested right at our InnoTrans booth. So, whenever you are running low in battery – visit us and recharge!

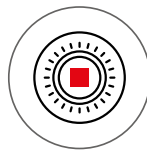
We invite you to experience our HMI fascination and to immerse yourself in the mesmerising mountain world of Switzerland – visit us at our Booth 750 in Hall 27 during this year's InnoTrans in Berlin. [Find out more on our website.](#)

Railway HMI Solutions.

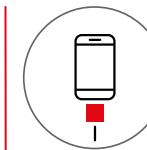
Intuitive, reliable and tailored – for every situation.



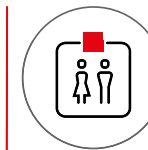
Driver's cab.
Control elements with
convincing ergonomics.



Passenger access.
Solutions for safe boarding
and alighting.



Passenger convenience.
HMIs offering maximum comfort
for a pleasant journey.



Toilet facilities.
Intuitive and user-friendly
operating systems.



EAO develops and produces high-quality HMI Solutions. Whether it's a driver's cab, passenger access system, passenger convenience or any other application, we provide a solution tailored to your individual needs. In developing your HMI, we take into account all functional and ergonomic requirements – including market- and country-specific standards. We provide comprehensive advice from concept, to prototype production, to pilot series, to series production.

Discover our latest developments for railway applications during InnoTrans 2026

- Extended product range of charging solutions – with faster wireless chargers and reliable USB-C sockets with multi-voltage power supply
- Next generation acoustic solutions for passenger access systems – the EAO Universal Sound Module
- Custom-tailored HMI Solutions for your individual railway applications – as your partner for many needs



Read more or contact us at
www.eao.com/s/innotrans-2026



Vehicle Systems & Subsystems

IEP

INPS Environmental Products Inc.



ORA-2025 "ORANGE"™ Locomotive Air Conditioner

Next-Generation Cooling for Today's Locomotive Fleets

Designed for both new locomotives and retrofit applications, the ORA-2025 delivers reliable cooling performance while simplifying installation and reducing lifecycle maintenance costs.

As railroads modernise their fleets, dependable cab climate control has never been more important. The

ORA-2025 ORANGE™ Locomotive Air Conditioner delivers powerful cooling performance, simplified installation and industry-leading reliability – all designed specifically for the demanding railroad environment.

Engineered for Railroad Service

Unlike commercial HVAC systems adapted for rail use, the ORA-2025 was engineered from the ground up specifically for locomotive applications. Designed to withstand vibration, temperature extremes and continuous operation, it delivers dependable performance wherever railroads operate.

Why Choose the ORA-2025?

Next-Generation 72V Brushless Scroll Compressor

Designed for long service life with fewer moving parts and exceptional reliability.

No Inverter Required

Simpler electrical architecture reduces complexity while improving overall system dependability.

8.5kW (29,000BTU/hr) Cooling Capacity

Powerful cooling performance even in extreme summer operating conditions.

Flexible Installation

Available as either a rooftop unit or split-system configuration to suit virtually any locomotive application.

Already Operating an Orange™ Air Conditioner?

Modernise your existing Orange™ Air Conditioner.

Protect your original investment while upgrading to today's compressor technology!

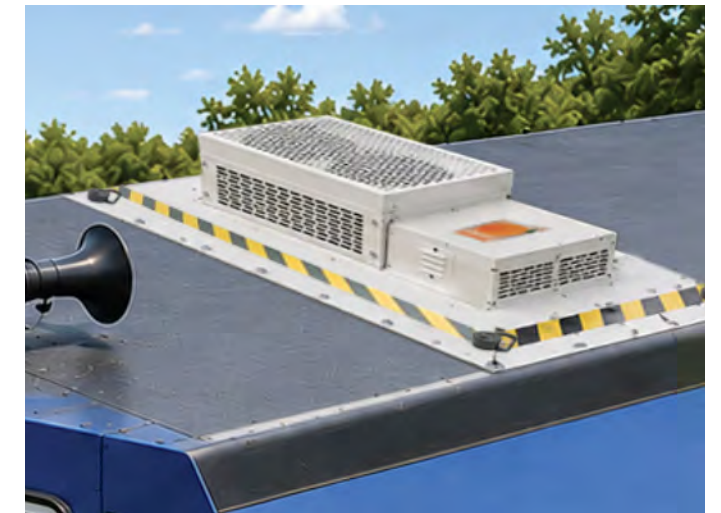
BAK-4002-1 ORANGE™ Upgrade Kit

Upgrade to next-generation ORA-2025 without replacing your complete air conditioning system.

The **BAK-4002-1 Upgrade Kit** transforms your existing ORANGE™ locomotive air conditioner into the latest ORA-2025 technology quickly, economically, and with minimal locomotive downtime.

Direct Replacement Compressor Plate Insert

Designed specifically for existing ORANGE™ systems, the upgrade compressor kit installs as a direct replacement for the original compressor assembly, utilising the existing system architecture with no major system modifications.





RAPU2174 BANANA™ Auxiliary Power Unit

Stop Idling. Start Saving.

Reduce Fuel Consumption • Lower Emissions • Extend Engine Life

Every hour a locomotive idles, unnecessarily costs fuel, increases emissions, and adds engine wear.

The **RAPU2174 BANANA™ Auxiliary Power Unit** allows locomotives to shut down while automatically maintaining the systems required for reliable restarting and crew comfort.

The result is significant fuel savings, reduced maintenance costs and lower emissions – without sacrificing operational readiness.

The BANANA™ APU Automatically Maintains

- Engine coolant temperature
- Engine oil temperature
- Battery charging
- Cab heating
- Critical locomotive support systems

The RAPU2174 operates independently of the locomotive engine. It continues protecting the locomotive while consuming only a fraction of the fuel required for engine idling.

Proven in Railroad Service

Successfully field-tested with documented performance over a two-year period on an optimal operating GP35 switching locomotive.

50,000+ gallons of fuel saved

10,000+ locomotive idle hours eliminated

More than \$187,000 in documented fuel savings

These measurable savings continue to increase throughout the life of the locomotive.

Designed for Today's Railroads

The RAPU2174 is ideal for:

- Switching locomotives
- Road locomotives
- Fleet modernisation programmes
- Idle reduction initiatives
- Emissions compliance programmes

"When paired with the ORANGE™ A/C system, the BANANA™ APU maintains cab air conditioning during shutdown, reducing fuel consumption and maximizing efficiency."

Find out more at inps-ep.com



Components & Materials

DIAB

Step Up Rail Sustainability

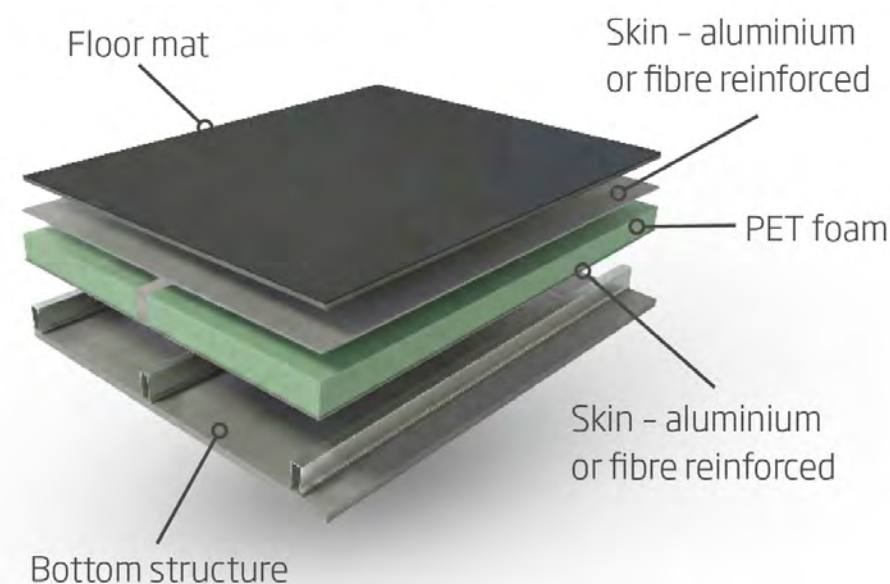


The rail industry is moving faster than ever, and efficiency is no longer just a goal; it is a mandate. To meet the demands of tomorrow, operators and manufacturers must look beyond traditional building blocks. It is time to step up your rail game with Diab's cutting-edge lightweight solutions.

The Foundation of the Next-Generation Interiors

For decades, the rail sector relied on heavy materials like plywood for interiors and flooring. While functional, these traditional materials come with heavy penalties: excess weight, susceptibility to rot and higher fuel consumption. Diab offers a definitive alternative. By switching to our advanced core materials, you can revolutionise your rail applications, from roof to floor.

LIGHTWEIGHT FLOOR DESIGN



The Definitive Solution for Flooring

The floor system is the backbone of the passenger experience, requiring immense durability and safety. Diab's Divinycell PR is a 100% recyclable PET sandwich core engineered specifically to replace heavy plywood. It provides a robust, lightweight foundation that drives down vehicle weight, directly translating to lower energy consumption and reduced CO₂ emissions.

Choose between aluminium skins or fibre-reinforced skins – the latter being our most lightweight version. Full composites are often the only way to meet the very low target weights of around 6.5kg/m² that many operators strive for.

Unlike wood-based alternatives, Divinycell PR is non-organic and rot-free, ensuring long-term durability and minimal maintenance costs even in challenging environments.

Why switch to a Diab sandwich core?

Transitioning to our thermoplastic core materials allows you to achieve significant performance gains without compromise:

- Step up sustainability: Utilise a circular solution based on post-consumer and post-industrial

- PET that is 100% recyclable.
- Step up safety: Rest assured with fully compliant materials that meet stringent EN45545-2 fire safety standards.
- Step up efficiency: Minimise weight to increase payload capacity and extend range.
- Step up comfort: Experience unparalleled thermal and acoustic insulation for a quieter, more comfortable journey.

A Partner for the Entire Journey

At Diab, we do more than supply material. We are a total solutions partner. Through Diab Engineering Services, we support you from the drawing board to the production line, whether you need assistance with fastening solutions, structural analysis, or creating ready-to-install kits that speed up your build time.

Meet Us at InnoTrans 2026

Ready to discover the next generation of lightweight rail interiors? Join us at InnoTrans 2026 to see how our solutions stack up.

September 22-25, Berlin // Hall 3.1 Stand 790

Always at the core of your solution

Diab

LIGHTWEIGHT STRUCTURES FOR RAIL INTERIORS AND EXTERIORS



Meet us at InnoTrans 2026

SEPTEMBER 22-25, BERLIN
HALL 3.1 STAND 790

Discover the next generation of rail interiors with Diab's cutting-edge PET core materials. Engineered to replace heavy traditional materials like plywood, our 100% recyclable Divinycell PR is the definitive solution for robust, lightweight structures – exterior and interior.

By switching to a Diab sandwich core, you significantly reduce vehicle weight – driving down energy consumption and CO₂ emissions while increasing payload capacity. Step up your rail game and experience unparalleled insulation, EN45545-2 certified fire resistance, and minimal maintenance costs.

diabgroup.com



ComatReleco AG

ComatReleco Expands Portfolio for Railway and Industrial Applications with New Protection, Control and Connectivity Solutions

With the launch of the MRS13R overcurrent protection relay, the CTF timer relays with forcibly guided contacts, and the enhanced Push-in socket family, ComatReleco introduces three product lines specifically designed to meet the growing demands of modern railway and industrial applications.

The focus is on increased operational safety, simplified system integration and reduced installation, testing and maintenance efforts. Together, these new solutions address key challenges in protection and control systems while helping system designers, integrators and operators build reliable, efficient and cost-effective installations.

Fast and Resettable Overcurrent Protection for Critical Applications

Electrical systems in rolling stock, railway infrastructure and industrial facilities require dependable protection against overload and short-circuit conditions. At the same time, operators were seeking higher system availability and lower maintenance requirements. With the new **MRS13R** overcurrent protection relay, ComatReleco offers a solution specifically developed for railway applications that delivers fast and accurate protection of electrical systems.

The MRS13R detects hazardous overcurrent conditions within just 3.1 to 4.5 milliseconds. Total reaction

MRS13R - Overcurrent protection relay



time from fault detection to relay operation is less than 20 milliseconds, helping to minimise potential damage to cables, equipment and connected loads.

The relay can be used in conjunction with external current transformers or connected directly to AC and DC loads. A configurable scaling factor simplifies the integration of various current transformer concepts and allows adaptation to a wide range of applications. With a measurement range of -5A to +5A, the relay covers numerous monitoring tasks commonly found in railway and industrial systems.

Whenever the measured current exceeds a predefined threshold, the MRS13R activates connected switching devices such as circuit breakers while simultaneously issuing an alarm signal to the control system. An integrated LED indicator and menu-driven display simplify commissioning, configuration and diagnostics during daily operation.

A key advantage over conventional fuses is the relay's automatic reset capability. While traditional protection concepts require the replacement of a blown fuse, the MRS13R automatically returns to its normal operating state once the fault condition has

been cleared. This significantly reduces maintenance effort and minimises system downtime.

Reliable Status Feedback Through Forcibly Guided Contacts

In safety-related applications, clear and reliable status indication is essential. For this reason, the MRS13R is equipped with forcibly guided contacts, ensuring dependable feedback of the actual switching status to PLCs and supervisory control systems. This feature supports fault diagnostics and contributes to higher system safety.

The relay also includes a dedicated diagnostic input that allows operators to verify the mechanical integrity of the relay independently of a real overcurrent event. Functional tests can therefore be performed during commissioning, maintenance activities or periodic inspections without generating an actual fault condition.

This combination of rapid fault detection, automatic reset functionality and reliable status monitoring makes the MRS13R particularly attractive for applications where both system availability and electrical protection are critical requirements.

Hardware-Based Timer Relays as an Alternative to PLC and SIL Solutions

In addition to protection functions, timing functions play a crucial role in modern control and signalling circuits. With the new CTF series, ComatReleco introduces multifunctional timer relays specifically developed for safety-related railway and industrial applications.

The devices combine proven forcibly guided contacts with hardware-based timing functions, providing a cost-effective alternative to PLC-based timing solutions or SIL-certified safety relays in applications where a full safety architecture is not required.

One of the defining characteristics of the CTF series is its fully hardware-based design. Instead of using a microprocessor, the devices use a dedicated application-specific integrated circuit (ASIC). As a result, the relays operate deterministically and remain independent of software versions, firmware updates or programming errors. At the same time, the need for software validation is eliminated.

For system integrators and operators, this translates into a high degree of predictability and reliability. In addition, potential cybersecurity risks are reduced because no programmable components are involved.

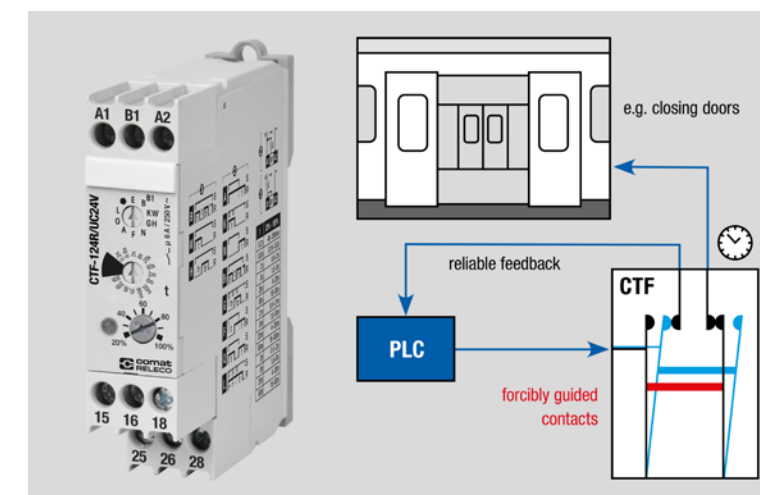
Extensive Timing Functions for Diverse Requirements

The CTF series supports a wide range of timing functions, including:

- On-delay
- Off-delay
- Combined on- and off-delay
- Pulse-on and pulse-off functions
- Pulse generation functions
- Flashing functions
- Delayed pulse (shot) output
- Step-switching functions

With timing ranges from 40 milliseconds up to 80 hours, the relays can handle both short-duration and long-term timing requirements. This makes them suitable for applications such as door control systems, release circuits, interlocking functions, monitoring systems and signalling equipment in railway and industrial environments.

The timer relays are available either with two changeover contacts (2 CO) or with one normally closed and one normally open contact (1 NC + 1 NO). The contacts are rated up to 6 A and feature gold plating to ensure reliable operation even at very low loads. This makes the devices particularly well suited for control and signalling applications.



CTF - Time relay with forcibly guided contacts

Sx-PI - Push-in relay socket family



Forcibly Guided Contacts Enhance Operational Safety

Another key feature of the CTF series is its forcibly guided contacts. Their mechanically linked design prevents both contacts from being closed at the same time, enabling reliable detection of faults such as welded contacts and preventing undefined switching states.

This characteristic is especially important in release, interlocking and monitoring circuits where reliable status feedback is required. Operators benefit from improved diagnostic capabilities and increased confidence in the integrity of the control system.

Despite their broad functionality, the timer relays remain highly compact. With an installation width of just 17.5mm, they are ideally suited for control cabinets where space is at a premium.

Compact Push-in Socket Family Simplifies Installation, Wiring and Saves Space

Complementing its relay portfolio, ComatReleco has expanded its offering with a modern Push-in socket family designed for faster installation, greater flexibility, and more compact control cabinet layouts.

The sockets enable tool-free mounting and removal, reducing installation and maintenance time. Push-in technology allows quick, secure conductor connection without screw terminals. Standardized bridging systems simplify engineering and assembly, while integrated test points and marking options support efficient commissioning and identification.

Up to 25% Less Control Cabinet Space

A key advantage of the new socket family is its compact design. Compared to similar solutions, ComatReleco reports space savings of up to 25%.

As control cabinet space becomes increasingly valuable in railway and industrial applications, compact components create room for future expansion and simplify system design.

Two Independent Conductors per Terminal

The sockets support solid and stranded conductors, with or without ferrules, from 0.34 mm² to 2.5 mm².

A notable feature is the ability to connect two independent conductors per terminal, reducing wiring effort and minimizing the need for additional terminal blocks.

A Comprehensive Approach to Modern Control Systems

Together with the MRS13R overcurrent protection relay and the CTF timer relay family, the new Push-in socket range forms a comprehensive portfolio covering protection, control, and space optimization.

These innovations reinforce ComatReleco's position as a specialist in relay, control, and connection technology while meeting growing demands for availability, safety, and efficiency in modern electrical systems.

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Components & Materials

SCHURTER TrenoLux

Design Meets Performance: How SCHURTER TrenoLux Is Shaping the Future of Railway Lighting

In today's railway industry, lighting has evolved far beyond its traditional function. It has become a defining element of vehicle design, passenger experience and brand identity. For rolling stock manufacturers, system integrators and railway operators, selecting the right lighting partner means finding a supplier capable of combining outstanding aesthetics with engineering excellence, uncompromising quality and long-term reliability.

SCHURTER TrenoLux has established itself as exactly that partner. As part of the globally renowned SCHURTER Group, the company develops and manufactures premium LED lighting solutions for railway applications, delivering innovative exterior and interior lighting systems that meet the demanding requirements of modern rail vehicles worldwide.

Where Design and Engineering Become One

The appearance of a train is increasingly defined by its lighting. Exterior headlights and signal lights are no longer simply safety components, they have become signature design features that communicate innovation, quality and the manufacturer's identity.

Based in Vienna, Austria, SCHURTER TrenoLux works closely with rolling stock manufacturers and designers to develop lighting solutions that integrate seamlessly into each vehicle's overall design language. Every optical element, housing geometry and lighting signature is engineered to enhance both functionality and aesthetics. With all engineering excellence in-house, SCHURTER TrenoLux is capable of developing customised solutions perfectly fitted to each project.

Whether the requirement is a straightforward, cost-efficient lighting solution or a sophisticated, fully integrated system for next-generation rolling stock, SCHURTER TrenoLux provides suitable solutions scalable for every project.

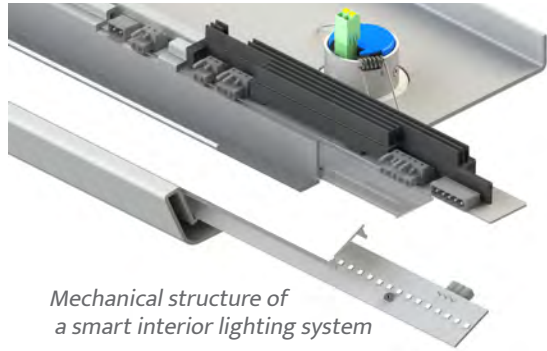
Intelligent Lighting with Maximum Flexibility

No two railway platforms are identical. Vehicle architectures, operating environments and customer expectations vary significantly from project to project.

To address this diversity, SCHURTER TrenoLux has developed a modular platform that allows highly



Customised exterior lighting



Mechanical structure of a smart interior lighting system

customised lighting solutions while maintaining efficient development and production processes. This flexible engineering approach enables manufacturers to realise unique vehicle designs while benefiting from proven technologies and shorter development cycles.

Inside the vehicle, advanced LED lighting solutions provide comfortable illumination while supporting energy efficiency and digital fleet management. Adjustable brightness, tunable white technology and programmable lighting scenarios allow operators to create impressive passenger environments while optimising energy consumption.

Integrated diagnostics also enable predictive maintenance strategies, allowing operators to monitor system performance continuously and identify potential issues before they result in unplanned downtime. Modern communication interfaces such as CANopen and Ethernet TRDP enable seamless integration into digital vehicle architectures.

To ensure maximum flexibility, two smart interior system architectures have been designed, with communication between the Light Control Unit and the luminaire available in both DALI and the TrenoLux Light Network, which is based on CANopen. Both systems allow advanced control of the complete lighting system, each with its own individual benefits.

Shaping the Next Generation of Rolling Stock

SCHURTER TrenoLux supports customers throughout the entire project lifecycle – from concept development and optical design to validation, certification support and serial production. This collaborative approach enables manufacturers to bring innovative vehicles to market while reducing technical complexity and development risk.

By combining sophisticated industrial design, intelligent electronics and premium manufacturing quality, SCHURTER TrenoLux delivers lighting systems that create value throughout the entire lifecycle of a railway vehicle.

For railway OEMs and operators alike, modern lighting has become a strategic investment that enhances safety, strengthens vehicle identity and improves operational efficiency. SCHURTER TrenoLux demonstrates how thoughtful engineering and exceptional design can work together to illuminate the future of rail transportation.

About SCHURTER TrenoLux

SCHURTER TrenoLux is a specialist in advanced LED lighting systems for the global railway industry and part of the internationally recognised SCHURTER Group. The company develops and produces customised interior and exterior lighting solutions for all vehicles operating on rail. With its base in Vienna, SCHURTER TrenoLux supports customers from concept and design through validation and serial production. The Location is equipped with state-of-the-art technology and an in-house lighting laboratory that supports the development of innovative solutions, helping manufacturers and operators improve safety, vehicle design, passenger comfort and long-term operational efficiency.

SCHURTER TrenoLux

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 **SCHURTER** TrenoLux



SCHURTER
TrenoLux
smart Light
Control Unit

 **SCHURTER** TrenoLux
ELECTRONIC COMPONENTS

InnoTrans 2026 THE FUTURE OF MOBILITY

22 – 25 SEPTEMBER • BERLIN

We warmly invite you to visit the SCHURTER TrenoLux booth at InnoTrans 2026 in Berlin. At our largest exhibition stand to date, we will present our latest innovations in railway lighting and showcase how modern solutions can contribute to safer, smarter, and more comfortable rail transportation.



Hall 1.1 | Booth 220

Let's meet in Berlin!



Discover our newest developments for interior and exterior lighting. Learn more about our customized solutions for international rail projects and meet our team in person to discuss future opportunities.

Your SCHURTER TrenoLux Team



Components & Materials

Güde GmbH

Siemens Is Building Egypt's New High-Speed Rail Network

Güde Is Supplying Safety-Critical Connection Technology

Egypt is partnering with **Siemens Mobility** to realise **one of the world's most ambitious rail infrastructure programmes**: the construction of a new high-speed network spanning **approximately 2,000km**. Once completed, this network will connect more than 60 cities across the country and provide **around 90%** of the population with access to modern, fast and sustainable mobility. The project represents a fundamental transformation of Egypt's transportation landscape and sets new standards for efficiency, safety, and environmental performance in the region.

The network consists of three major corridors that will link Egypt from north to south and from east to west. Siemens Mobility is supplying a comprehensive portfolio of technologies and systems for this undertaking, including Velaro high-speed trains, Desiro regional trains, Vectron freight locomotives, state-of-the-art signalling technology, full electrification and turnkey infrastructure solutions. This integrated approach ensures that all components – from rolling stock to control systems – are perfectly aligned to deliver maximum reliability and long-term operational stability.

We are proud that **Güde** safety-critical components, such as our **sperrkant spring washers BN 208 012**, are already being used in the first completed sections of the line. In a project of this scale, every fastening element must meet exceptionally high requirements for vibration resistance, long-term durability and operational safety. Our products are designed precisely for such demanding environments. They help ensure that mechanical connections remain secure under dynamic loads, extreme



temperatures, and continuous high-speed operation – conditions that are typical in modern railway systems.

For Güde, participation in the **Siemens Egypt** project is more than a business milestone; it is a confirmation of our long-standing expertise in railway fastening technology. As a company with decades of experience in supplying safety-relevant components for international rail programmes, we are honored to contribute to a project that will shape mobility for millions of people.



We move trains!



InnoTrans Berlin
22.-25.09.2026
Hall 25 Booth 170



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Germany

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sales@guede.net

www.guede.net

Güde – Retaining Elements for the Railway Industry Worldwide

For decades, Güde GmbH has been synonymous with precision, reliability and deep technical expertise in the production of retaining elements for rail vehicles and railway infrastructure. Our components are used across the globe – from Berlin and London to Shanghai and beyond. Wherever safety, quality and long-term durability are essential, Güde is a trusted partner for manufacturers, operators and infrastructure providers.

A significant part of our portfolio is based on standardised spring washers manufactured according to Deutsche Bahn specifications, including **DB log 30.7000**, **BN 208 012**, and **BN 208 010**. These components are essential in ensuring secure, vibration-resistant connections in both rolling stock and track infrastructure. In addition to these established standards, we offer a wide range of customised solutions tailored to specific technical requirements. Whether larger diameters, reduced installation heights, single, double or triple-wound geometries, or special materials – our production processes allow us to meet customer specifications with maximum precision and efficiency. Where technically feasible, we manufacture exactly according to customer drawings, from unique prototypes to large-scale series production.

Our state-of-the-art manufacturing technology, combined with extensive material expertise and rigorous quality assurance, enables us to supply international railway projects that must comply with the highest safety and performance standards. Güde retaining elements are used in high-speed rail networks, metro systems, freight corridors and critical infrastructure projects worldwide. Their reliability under dynamic loads, extreme environmental conditions and long service lifetimes makes them an essential part of modern rail engineering.

As the railway industry continues to evolve – driven by digitalisation, sustainability goals and global infrastructure expansion – Güde remains committed to delivering fastening technology that meets the demands of tomorrow. Our products help ensure that rail systems around the world operate safely, efficiently and sustainably.

Güde – fastening technology that builds trust worldwide.

Güde GmbH – Approved Supplier of Deutsche Bahn AG

Tradition, Precision and Partnership – Since 1948

For more than **seven decades**, our family-owned company stood for uncompromising quality, reliability and continuity in the field of fastening solutions. Since our founding in **1948**, Güde has earned international recognition as a trusted

manufacturer of spring washers and a broad range of precision-engineered connecting elements.

Looking ahead, we are pleased to once again participate as an exhibitor at **InnoTrans 2026 in Berlin (Hall 25, Booth #170)**. Our first appearance two years ago was a significant milestone for our company. Presenting Güde alongside the major players of the industry at the world's leading trade fair for railway technology was both impressive in scale and a moment of pride for our team. With decades of expertise in the railway sector, we are well prepared to showcase our capabilities and continue strengthening our position within this highly specialised market.

Since 2010, Güde GmbH has been an **approved supplier of Deutsche Bahn AG** for **sperrkant spring washers (BN 208 012)** and **sperrkant washers (BN 208 010)** – a milestone that marked the beginning of our long-term success in the railway sector. Over the past 16 years, we have continuously expanded our expertise, strengthened our partnerships, and proven our reliability in countless national and international rail projects. In 2025, we achieved another important qualification milestone: Güde received the **HPQ approval of Deutsche Bahn for railway superstructure spring washers (e.g. FE6 log 30.7000, FE 7 lotkv 4a, FE15 lotkv 14, FE19 lotk 114)**, further underscoring our technical competence and our commitment to meeting the highest safety and documentation standards in railway infrastructure.

Our customers have trusted us for decades, and we continue to support them with a strong portfolio of railway-specific fastening solutions – all manufactured with precision, consistency and deep material expertise. This combination of technical know-how and long-standing industry experience positions us as a reliable partner for both vehicle and infrastructure applications.

Even as global challenges intensify – including evolving regulatory frameworks such as CBAM – we remain confident in our ability to adapt and continue delivering excellence. Our long-standing commitment to **quality, flexibility, rapidity** and **reliability** forms the foundation of our success. These principles are the reason we are able to supply more than **2.7 billion components per year worldwide**, and they continue to guide our actions as we navigate an increasingly complex and dynamic market environment.

Trust in Güde, many others do.



The **POWER** of
Mattei's Rotary
Vane Compressor
TECHNOLOGY
IN RAIL





Components & Materials

Mattei Group



Why Rotary Vane Compressors Outperform Screw Technology – On the Ground and on the Rails

When comparing air compressor technologies, the debate between rotary vane and rotary screw has long been dominated by market familiarity rather than engineering merit. A closer technical look, however, reveals a consistent story: rotary vane compressors are fundamentally superior in long-term efficiency, reliability and suitability for demanding environments like rail and transportation.

How They Work: Two Very Different Philosophies

At their core, the two technologies take opposite approaches to sealing and compression. A rotary screw compressor relies on two precision-machined helical rotors that mesh inside a stator, maintaining micrometric clearances to prevent internal leakage. Nothing physically holds those gaps in place – they depend entirely on bearing precision. A rotary vane compressor, by

contrast, uses a single offset rotor fitted with free-sliding vanes that ride against the stator wall on a continuous hydrodynamic film of lubricant. The seal renews itself with every revolution.

This distinction in sealing architecture is not a minor engineering detail – it defines the entire performance trajectory of each machine over its working life.

The Screw's Silent Decline

In screw compressors, bearing wear begins from the very first hour of operation. As bearings degrade, rotors shift, clearances open and the so-called 'blow-hole' – the default leakage path between meshing rotors – grows wider. High-pressure air slips back towards the inlet, and the machine delivers progressively less air for the same energy input. Independent field studies have measured efficiency losses in double digits over a screw compressor's lifetime.

The problem is compounded by the screw's need for regular bearing overhauls. In standard industrial settings, bearings must typically be replaced every 20,000 to 30,000 hours. The degradation occurs silently – no audible or visible warning – and a full air-end overhaul is generally recommended every four to six years, which restores geometry temporarily before the cycle of decline begins again.

The Vane's Improving Curve

Rotary vane compressors behave in the opposite direction. In the first hours of operation, the vane flanks

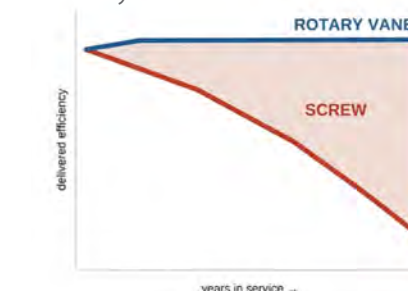
polish smooth as they slide in and out of their rotor slots, cutting internal friction and actually reducing power draw. After this initial bedding-in period, performance stabilises and holds. There is no clearance to widen, no thrust bearing whose wear opens a leakage path, no blow-hole that grows. Verified independently by Intertek, rotary vane compressors improve efficiency within the first 500 operating hours and then maintain that level while comparable screw compressors decline.

Why Rail & Transportation Changes Everything

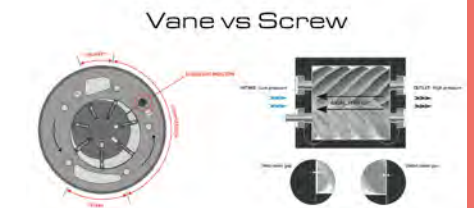
In a controlled factory environment, screw compressors can at least operate within predictable degradation parameters. Onboard a train, those parameters collapse entirely.

Rail applications subject compressors to continuous vibration, extreme temperature swings (from -40°C to +60°C), high humidity, and contamination – conditions that dramatically accelerate bearing wear. Screw compressor bearing life, which might reach 20,000–30,000 hours in a clean stationary environment, is cut to just 10,000–12,000 hours under typical rail operating conditions. Missing an overhaul in this context is not just a performance risk: rotors can make physical contact,

Rotary vane technology maintains efficiency over time



Railway-vane-vs-screw: Rotary vane: fewer losses, higher efficiency



causing catastrophic failure of the entire compression block.

Rotary vane compressors, being self-adjusting and self-balancing machines floating on two continuously lubricated bush bearings, are inherently unaffected by vibration and environmental stress. Bush bearings have been proven beyond 200,000 hours in industrial use, and rail-deployed rotary vane units have been recorded running past 35,000 hours on their original factory-fitted vanes and bearings – with no performance degradation.

The application range is broad: rotary vane compressors for rail serve clients across Europe, Scandinavia, North and South America, China and Southeast Asia, covering everything from light rail and metros to high-speed trains and freight locomotives. Package specifications cover flows from 160 to 6,000 l/min, pressures from 6 to 13 bar, voltage compatibility from 120V to 3,000V, and sound pressure levels of 60–80dBA.

The Bottom Line

For rail operators, where uptime, safety, and total cost of ownership are non-negotiable, the choice of compression technology carries real operational weight. Rotary vane technology doesn't just start better – it stays better.



Components & Materials

Southco

Locking Out the Threat: Access Hardware Behind Rail Security

Rail security today means defending against vandalism, tampering, maintenance lapses and cyber threats simultaneously. Access hardware sits at the heart of that challenge. James Stroud, Director of Product Management at Southco, explains how a tiered approach to physical and digital threats is shaping the company's rail security product portfolio.

While vandalism, anti-social behaviour and accidental maintenance breaches have always been a risk to passenger safety and the security of high-value assets on rail carriages, the overall threat landscape has changed as trains have become increasingly connected digitally.

Rail security today involves protecting vehicles from both physical and digital threats.

Access hardware remains at the intersection of these two challenges: latching and locking solutions secure panels, control access to and prevent the unauthorised opening of containers and cabinets. They therefore reduce the risks of panels left open, tampering and theft and support broader efforts to protect against cyber threats.

[Southco](#), the leading global designer and manufacturer of engineered access hardware, offers some distinct categories of products that provide solutions to accommodate varying security requirements for rail applications.

The Versatility of Southco Compression Latch Security

Within a single rail carriage, there are a multitude of individual application points that require a panel latching solution that is robust, reliable and adaptable to varying levels of access restrictions. Southco's E3 VISE ACTION® Compression Latches do exactly that: ensuring tight, robust vibration-resistant door closure, helping reduce or eliminate noise and rattles caused by vibration and coming in a broad range of access configurations.

Southco offers many different head styles as standard, that require special tools or keys for operating the latch. Depending on the requirements of each application and the environment the latch is operated in, Southco's E3 VISE ACTION® Compression Latches ensure that they enhance application security at the required level, ranging from access via square and triangular keys of varying dimensions and

offered with or without recess to a much more secure tubular key option, which Southco can provide with customer-bespoke keycode variations.

In addition to these off-the-shelf solutions, Southco has been working with OEMs in the rail industry and other industrial markets for decades to develop custom head styles that suit their customers' latching needs. Southco's portfolio of compression latch security-enhancing head styles count into the hundreds.

Securing against Human Error

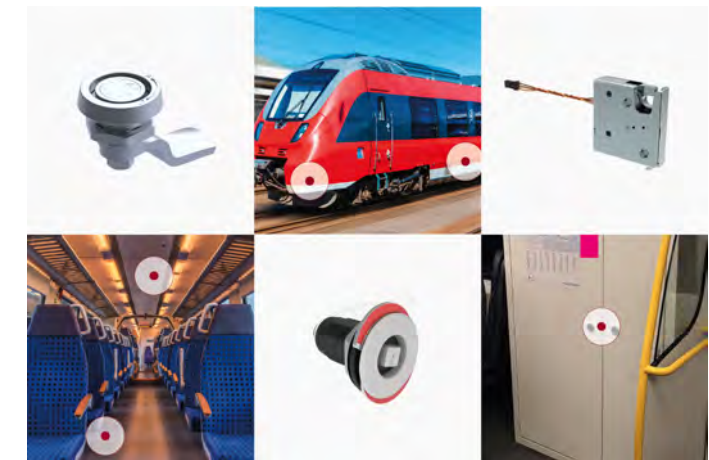
The most used head style is an 8.5mm square, commonly referred to as railway standard within the industry. It is used on maintenance panels inside the carriage as well as on the train's exterior, and is therefore a latch frequently accessed by staff. In these applications, the main security concern is risk of human error: maintenance staff accidentally not closing latches properly and panels being left open.

This is a major security concern for exterior applications where a panel left unsecured might fall off.

To avoid any such maintenance errors and ensure panels are securely latched, Make Safety Visible by Southco™ products provide visual indication of latch status and therefore show whether a latch is open or secured. The solutions that are best suited for the railway industry are again based on Southco's E3 VISE ACTION® Compression Latches. They have been enhanced through the addition of either reflective wings which deploy when the latch is opened and only retract when the latch is fully secure or a bi-stable cover that will stay open and cannot be closed as long as the product is unlatched. For rail carriage interior panel solutions which are less safety-critical, Southco also offers a range of latches with colour-coded markings etched into the latch face, making maintenance procedures easier and less prone to errors.

The Next Generation of Protection through Compression Latch Security

Southco is developing a further evolution of their E3 VISE ACTION® Compression Latch platform: a key-lockable variant engineered to offer a near-indefinite number of keycode combinations. This solution, which will be firstly showcased at this year's InnoTrans, specifically targets data-carrying enclosures and cabinets which demand a very high level of access security. The industry continues to favour mechanical over electromechanical latching solutions as a mechanical solution carries no risk of a digital attack.



Controlling Access Electronically

Electronic access control or Connected Access represents Southco's most technologically advanced approach to security. Electronic access control adds a layer of monitoring and management, allowing operators to track, restrict and audit access in real time.

[Southco's Connected Access range](#) targets applications where the consequences of unauthorised entry are most severe: doors to individual compartments on sleeper services or the driver's cab. As with a commercial aircraft cockpit, the vulnerability of a train driver to unwanted intrusion carries significant safety implications. Electronic access control manages that risk with a level of precision that mechanical solutions alone cannot match.

In practice, this can mean mobile app-based access management: Southco's recently launched plug-and-play solution, the Keypanion® app combined with a Southco lock and Bluetooth® controller allows door access to be controlled and monitored via a smartphone, offering flexibility without compromising security.

While electronic access in the rail industry remains a developing

area, Southco continues to invest in solutions for this space, anticipating that growing connectivity and autonomy across the industry will bring demand in line with the technology's potential.

Security Across Every Level

[Southco](#) offers a tiered approach to rail security, one that gives operators and OEMs the flexibility to match the level of protection to the specific demands of each application.

Rail security requires solutions that can address physical and digital threats. When OEMs are seeking their highest levels of protection, the industry continues looking to mechanical solutions because they carry no digital attack surface. However, there is clear potential to integrate electronic solutions and Southco is well-placed to introduce Connected Access solutions onboard.

Southco will showcase its full range of security-supporting access hardware at **InnoTrans in Hall 3.1, Stand 300** including new developments in high-security mechanical latching making their public debut at the show.

[Book an exclusive unveil of Southco's brand-new solutions for rail security at InnoTrans here.](#)

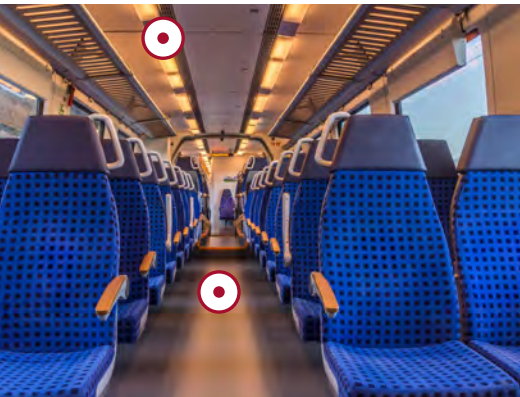
Rail Security starts with the Latch

Hall 3.1 | 300

Book an exclusive unveil of
Southco's brand-new solutions
for Rail Security at InnoTrans!



Book Your Meeting!



Visual Indication for Secure Panel Closure



EN 45545 Compliance for Fire Safety



Connected Access for Controlled Monitoring



Hidden Access for Vandalism Protection



Restricted Access for High Security Protection



Visit us at InnoTrans: Hall 3.1 | 300

KYDEX®
THERMOPLASTICS

Materials
that move
rail interiors
forward

MEETS ASTM E
162 & 662

DURABLE &
SUSTAINABLE

CUSTOMIZABLE
COLOR & PATTERN

 **InnoTrans**
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SEKISUI KYDEX, LLC

Rethinking Rail Interiors Through Harmonised Material Design

Designing rail interiors has always required a balance of safety, performance and passenger experience. That balance is becoming more nuanced. Designers are being asked to create environments that feel considered and cohesive, while engineering teams must continue to meet the demands of high-traffic, regulated spaces.

As a result, material selection is no longer viewed only through the lens of part performance. Surface quality, colour consistency, tactile character, manufacturability, lifecycle impact and long-term durability all contribute to the experience of a rail cabin. Increasingly, the opportunity lies in treating materials as part of an integrated design system rather than as separate component decisions.

Thermoplastics are playing an important role in this shift. Their lightweight construction, durability, cleanability and ability to meet flame, smoke and toxicity requirements make them well-suited for passenger-facing applications. Compatible thermoplastic materials can be used across forming processes, enabling a consistent visual language to extend throughout the interior.

Achieving Visual Consistency

One of the most visible challenges in rail interior design is maintaining harmony across components produced through different manufacturing methods. A single cabin may include injection-molded parts, thermoformed panels and extruded profiles.

When materials or finishes vary between processes, even subtle differences in colour, gloss or texture can become noticeable. Those transitions matter to rail designers working to create a calm, intentional passenger environment.

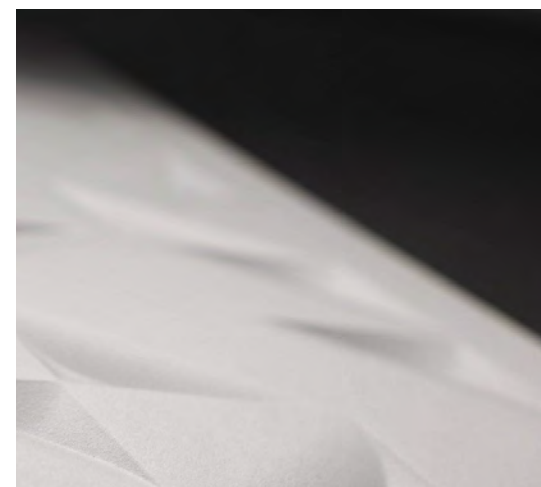
In areas such as window casings, seat shells and sidewalls, designers are placing greater emphasis on material systems that can be translated across manufacturing methods

without sacrificing reliability. When a single material is used, it becomes easier to align visual characteristics and reduces reliance on secondary processes such as painting or coating.

Extending Material Consistency

Maintaining continuity depends on how well materials can move between processes. Historically, this has led to compromises, with material selection based on process constraints. As interiors become more integrated, that fragmented approach becomes harder to sustain.

Materials such as KYDEX® P2200 offer a more aligned path by enabling extruded profiles that can match KYDEX® 2200 IM (injection-molded) resins and KYDEX® 2200LT



thermoformed parts. This allows trims, edge details and structural elements to align visually. For designers and engineers, this reduces the need to manage materials across adjacent parts.

Pressure Forming and the Role of Precision

As material consistency becomes more important, manufacturing processes play a central role. Pressure forming enables the thermoplastic sheet to conform more closely to mold surfaces, improving surface definition and consistency. This becomes especially valuable when pressure-formed parts are alongside injection-molded components within the same visual field.

The pressure forming technique supports:

- Sharp lines, intricate detailing, gloss control and uniform appearance
- Functional undercuts for mechanical interlock
- In-mold textures for tactile variation and brand differentiation
- Tighter tolerances compared to standard vacuum forming
- An injection-molded look and feel with a more flexible tooling investment

When compatible materials are used across these processes, transitions become less noticeable, and the cabin reads as a more complete environment. The result is not only improved part integration but a stronger sense of harmony.

Integrating Surface Design Without Secondary Layers

Surface design is another important part of a harmonised material strategy. As passenger expectations continue to rise, designers are looking for ways to introduce pattern, wayfinding, branding and visual depth without adding layers that may age, wear or perform differently over time.

One solution gaining traction is Infused Imaging™ technology. Rather than relying on secondary processes like applied films or coatings, the visual element becomes part of the material itself. For high-contact environments, this can help maintain durability while giving designers greater freedom to develop bespoke finishes.

Infused Imaging™ allows for rich, high-resolution patterns to be embedded directly into KYDEX® Thermoplastics without compromising recyclability or performance. This enables visual depth, material cohesion and complete customisation across applications.

Supporting Sustainability Through Material Strategy

For rail interiors, sustainability is increasingly tied to material strategy. KYDEX® Thermoplastics offer a future-forward solution for sustainable CMF design. Fully recyclable, KYDEX® materials

are manufactured without plasticisers and are designed to meet the demands of modern transit interiors.

Thermoplastics can provide a lighter alternative to legacy materials while preserving design freedom and long-term performance. Their durability helps reduce the need for frequent replacement, while resistance to chipping, discoloration and cracking supports longevity in high-touch, passenger-facing environments.

By reducing the number of materials used across rail interiors, design and engineering teams can streamline sourcing, reduce variability and more effectively support environmental responsibility.

A More Integrated Approach to Rail Interior Design

As rail interiors continue to evolve towards more cohesive, personalised and sustainable solutions, material strategy plays a pivotal role. Harmonised thermoplastics, produced through compatible processes, give designers a way to connect creative intent with operational requirements.

For the next generation of rail interiors, material harmonisation is more than a visual preference. It is a design principle that can help create intentionally composed passenger spaces.

KYDEX®
thermoplastics
and injection
molding resins





Components & Materials

Argus Fluidhandling

From British Rubber to Global Hydraulic Power



The Evolution of Oil Feed Engineering, Argus Fluidhandling and the Alfagomma Group

The story of Oil Feed Engineering sits at the heart of Europe's hydraulic engineering evolution – stretching from early British tyre manufacturing to today's global fluid power systems. What started as a domestic rubber industry network under the British Tyre and Rubber Company (BTR) grew into one of Europe's most influential engineering groups. Its specialist hydraulic businesses – Oil Feed Engineering and Argus Fluidhandling – became essential components in a broader international consolidation. By 1958, Oil Feed Engineering joined BTR Industries, specialising in flexible rubber and steel-braided hydraulic hoses. Around the same time, Argus Fluidhandling emerged as a leading supplier of hydraulic hoses and fittings, eventually integrated into BTR's Hiflex network. The late 1990s brought restructuring. BTR's hydraulic and rubber operations were consolidated under UniPoly S.A., streamlining decades of European engineering expertise. In 2005, Italian manufacturer Alfagomma acquired UniPoly assets, including Oil Feed Engineering and Argus. This acquisition united decades of British and

European hydraulic know-how under one global platform. Founded in 1956, Alfagomma had grown from a domestic Italian hose producer into a worldwide hydraulic systems leader. Today, the company operates 8 manufacturing plants, 79 subsidiaries across five continents, and serves OEM and industrial customers globally.

“From British rubber roots to a global hydraulic systems platform, this is a story of industrial transformation on an international scale.”

Argus Fluidhandling Ltd specialises in the manufacture of hose assemblies, rigid tube assemblies and fabricated structures for OEM markets worldwide. Specifically developed for the rail sector, the RailSAFE AF45 hose range has been designed to meet the demanding requirements of railway applications. RailSAFE AF45 hose is approved to EN45545-2:2013 and has also been developed to satisfy the requirements associated with NF F 16-101 and BS6853 standards, drawing upon many years of experience supporting the rail industry.

- Part code: RailSAFE AF45 Hose Range
– EN45545-2:2013 Approved
- Manufacturer: Argus Fluidhandling / Alfagomma

To further validate long-term performance, the RailSAFE AF45 hose range is undergoing extended one-million-cycle impulse testing. Designed specifically for railway applications, the AF45 range is frequently used as an alternative to standard EN854 R3 hose in railway air brake systems.

Group capabilities include:

- Hose development and validation
- Small- and large-volume hose assembly manufacture
- Fitting design and manufacture
- Tube bending
- Laser profiling
- Robotic welding
- CNC machining

Certified to ISO 9001, IATF 16949 and ISO 14001.

Alfagomma Railway Hose Solutions

Railway Hose Solutions Built for Safety, Performance and Reliability

Engineered for demanding rail applications and compliant with the latest EN 45545-2 railway fire safety standards.

// 2SC RAILWAY



// 2TE RAILWAY PLUS **NEW**



When reliability matters, operators and OEMs trust Alfagomma railway hose solutions to deliver performance under pressure. Designed specifically for rolling stock, rail maintenance equipment, hydraulic systems and auxiliary rail applications, Alfagomma railway hoses are engineered to provide: exceptional flexibility and durability; high-pressure hydraulic performance; resistance to vibration and harsh operating environments; reduced maintenance downtime; long service life in demanding rail conditions.

Alfagomma 2SC and 2TE railway hoses comply with EN 45545-2, the European standard covering fire behaviour, smoke density and toxicity requirements for railway materials and components. Tested to meet the stringent safety requirements of modern railway systems, Alfagomma hose solutions help support: passenger rolling stock; metro and tram systems; locomotives; maintenance vehicles; hydraulic and pneumatic rail systems.

With proven global manufacturing capability and technical expertise, Alfagomma delivers hose assemblies designed for maximum operational reliability and safety.

Why Choose Alfagomma Railway Hose?

- EN 45545-2-compliant
- Designed for railway fire safety standards
- High-performance hydraulic hose technology
- Excellent flexibility and bend radius
- Reliable performance in harsh environments
- Global technical support and supply network

ISO 11237 - EN 857 2SC - EN 45545-2 R22 (HL1-HL2) - R23 (HL1-HL2-HL3)

Tube: oil resistant synthetic rubber.

Reinforcement: two high tensile steel braids.

Cover: abrasion, ozone and hydrocarbon resistant synthetic rubber.

Application: high pressure hydraulic lines, fuel oil, antifreeze solutions, air and water. Specially designed for railway applications.

Constant operation: -40 °C +100 °C (-40 °F +212 °F)
air max T = +70 °C (+160 °F)

Length: random

Exceeds EN 854 2TE - EN 45545-2 R22 (HL1-HL2) - R23 (HL1-HL2-HL3)

Tube: oil resistant synthetic rubber.

Reinforcement: one high tensile textile braid.

Cover: abrasion, ozone and hydrocarbon resistant synthetic rubber.

Application: medium pressure hydraulic lines, fuel oil, antifreeze solutions, air and water. Specially designed for railway applications.

Constant operation: -40 °C +100 °C (-40 °F +212 °F)
air max T = +70 °C (+160 °F)

Length: random

Argus Fluidhandling – A Specialist Engineering Legacy within the Alfagomma Group

Argus Fluidhandling traces its origins back to the early development of hydraulic hose and fluid transfer technology in the 1930s and 1940s, when it was known as the 'oil feed company' and subsequently was brought into the BTR fold in the 1990s. The Argus name first emerged in Europe as a specialist manufacturer of hydraulic hoses and fittings. Over time, the business evolved through several structural changes within the wider British and European rubber and hydraulic engineering sector.

By the late 20th century, Argus had become part of a broader consolidation movement in the industry. In the 1990s, it was integrated into the BTR Fluidhandling and Hiflex network, aligning it with one of the UK's most influential industrial groups in rubber, tyre, and hydraulic systems. This period saw Argus develop into a recognised engineering brand within BTR's expanding fluid power division, supplying hydraulic hose assemblies, fittings, and engineered fluid transfer solutions for demanding industrial applications.

Following the restructuring of BTR's rubber and engineering interests in the late 1990s, Argus was absorbed into the UniPoly and Hiflex group structure, continuing its specialisation in hydraulic components while benefiting from a wider European manufacturing and distribution footprint. This stage strengthened its technical capability and positioned the business within a growing pan-European hydraulic systems network.

In 2005, a major transition occurred when Alfagomma acquired the Dunlop Hiflex Group, bringing Argus Fluidhandling into the Alfagomma portfolio. This acquisition significantly expanded Alfagomma's presence across Northern Europe, including the UK, Germany, the Netherlands, Scandinavia and other key industrial markets. Argus was subsequently integrated more closely into Alfagomma's global hydraulic systems strategy.

By 2016, Argus Fluidhandling had been fully consolidated within the Alfagomma Group, operating as part of its international hydraulic and industrial fluid handling division. Today, Argus supports Alfagomma's global OEM and industrial customer base, specialising in the design, assembly, and testing of hydraulic hose systems and fluid transfer solutions.

Integrated Acquisition Timeline

- **1958** – Oil Feed Engineering joins BTR Industries Group
- **1990s** – Argus becomes part of BTR Fluidhandling / Hiflex Group
- **Late 1990s–2004** – Transition through UniPoly and Hiflex restructuring
- **2005** – Alfagomma acquires Dunlop Hiflex Group
- **2005–2016** – Progressive integration into Alfagomma's global structure
- **2016** – Full integration of Argus Fluidhandling into the Alfagomma Group

Alfagomma Founding History

Alfagomma was founded in 1956 in Italy by Felice Gennasio. Alfagomma originated in Monza, Italy, in 1956, established by Italian entrepreneur Felice Gennasio as a general trading company. Initially, the company focused on industrial trading, and in 1972, it built its first plant for industrial hose manufacturing in Teramo, Italy, through a joint venture with BTR Dunlop UK, and in 1977, a second plant in Cosenza, Italy, was established to produce steel wire braid reinforced hoses.

The company's internationalisation accelerated in 1989 when Felice Gennasio's sons, Enrico and Guido Gennasio, took over management. Alfagomma then expanded globally, opening manufacturing plants in Malaysia and later in China for hydraulic fittings and adapters. Over the years, Alfagomma acquired Dunlop Hiflex Group in 2005, strengthening its presence in northern Europe and establishing a network of branches across Germany, Holland, Sweden, Norway, Denmark and Finland.

With over six decades of innovation, Alfagomma has become a global leader in hydraulic and industrial fluid handling systems, operating 22 manufacturing plants and 87 branches across five continents, employing around 3,600 people. The company has been recognised as a Historical Italian Brand by the Italian Ministry of Economic Development, highlighting its long-standing contribution to Italian industry.



Running Gear

BONATRANS GROUP

© Hardik Joshi | Unsplash



Another BONATRANS Success in High-Speed Rail

India has long been one of the key non-European markets for BONATRANS GROUP a.s., Europe's largest manufacturer of railway wheelsets. Over many years, the Czech company based in Bohumin has contributed to numerous rail projects across the country, supplying wheels, axles and complete wheelsets for a wide range of rolling stock.

Every day, millions of passengers travel on metro systems in cities such as Delhi, Mumbai, Kolkata, Bengaluru, Hyderabad, Lucknow, Kochi, and others aboard trains running on wheelsets developed and manufactured by BONATRANS.

The WAG-12, the most powerful freight locomotive in the Indian Railways fleet, runs on BONATRANS wheels and axles, as do numerous other railway vehicles operating on one of the world's largest and most rapidly modernising rail networks.

As India continues to invest heavily in modern transport infrastructure, its railway sector is undergoing a remarkable transformation. Among the most ambitious projects is the B28 high-speed trainset, the first train of its kind to be designed and manufactured in India.

Developed by the BEML–Medha consortium for the Mumbai–Ahmedabad High-Speed Rail corridor, the B28 has a maximum design speed of 280km/h and represents a major milestone in the development of India's domestic high-speed rail industry.

Drawing on decades of experience in the design and manufacture of wheelsets for high-speed applications, BONATRANS has developed a modern wheelset solution for the B28 programme.

Designed with a strong focus on life-cycle cost, weight optimisation and operational reliability, the wheelsets incorporate a number of advanced technical features:

- All wheelsets have been designed and manufactured in accordance with European EN standards, in line with established practice for high-speed rolling stock.
- The wheels are produced from the enhanced steel grade BONASTAR®. Its higher-yield strength improves resistance to tread deformation, helping to extend wheel life and reduce life-cycle costs.
- The axles are protected by the highly durable BONACOAT®C2 coating system, providing enhanced corrosion resistance and long-term protection.
- Both powered and non-powered axles are manufactured from EA4T category 1 steel, a material widely recognised for demanding high-speed railway applications.
- To minimise unsprung mass, both powered and non-powered axles are designed with a longitudinal hollow bore. Besides reducing weight, the hollow design enables ultrasonic inspection without the need to dismount the wheels or remove the protective coating. Furthermore, the bore is cold rolled over its full length. This additional manufacturing process significantly improves fatigue strength and contributes to the long service life of the axle.
- Wheel and axle markings are applied using precision milling with a round cutter. Compared with conventional stamping methods, this modern approach eliminates the risk of creating stress concentrators, thereby supporting safe and reliable operation.

As India enters a new era of high-speed rail transport, BONATRANS is proud to contribute to a flagship programme that will help shape the future of mobility across the country.



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Running Gear

HANNING & KAHL

Family Owned, Rail Focused

HANNING & KAHL specialises in hydraulic brake systems and infrastructure solutions for urban rail networks. The company has built its reputation on a simple promise: developing systems where failure is simply not an option, while providing ongoing support long after a product is handed over.

Today, that commitment spans 47 countries across six continents, backed by a workforce of around 500 and an international service network. However, what makes HANNING & KAHL's offering genuinely distinctive is its roots. Founded in Germany in 1898, the company leverages a 127-year history as an owner-managed family business, now in its fourth generation of leadership.

In an industry shaped by consolidation and acquisitions, that continuity carries real weight. Investment decisions are made with the long view in mind, because the family name is on the door, and the next generation will inherit what this one builds. And it is precisely that mindset that has driven a fundamental shift in how HANNING & KAHL defines its value to customers.

As Berthold Fingerhut, Head of Sales and Project Management, Rolling Stock Division, explains:

"We've increasingly shifted from a strongly product-focused approach toward a system and service-oriented value proposition. Today, we're at our customers' side over the entire life cycle, from development and commissioning through to maintenance and on-site servicing, underpinned by our international presence."

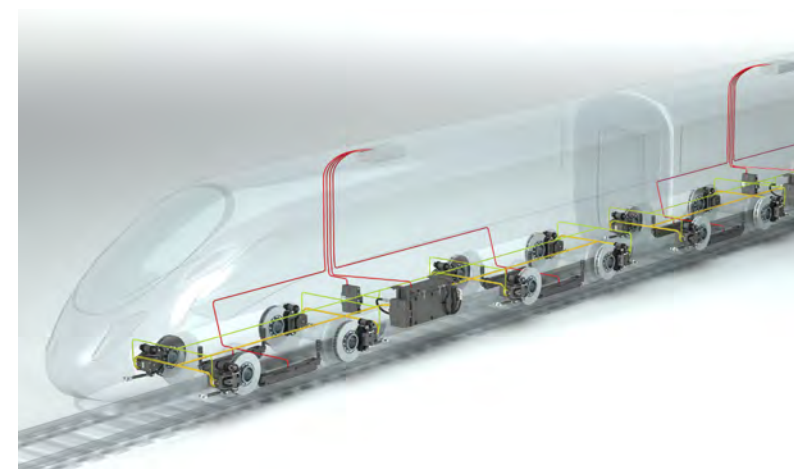
A Complete Rail Portfolio

HANNING & KAHL structures its product range into two operating divisions: Rolling Stock and Infrastructure. Within Rolling Stock is the development and production of hydraulic braking

systems, track brakes (BrakeMaster), levelling (LevelMaster™) and sanding (GripMaster™) systems.

"We're currently experiencing the strongest growth in the area of urban mobility, particularly in hydraulic brake systems for modern light rail and subway vehicles. These systems play a crucial role, as many cities worldwide are expanding and upgrading their local transport systems," says Fingerhut.

The Infrastructure division supplements this product range with solutions such as point-setting systems, control technology, signalling installations and digital depot management systems for urban and industrial rail applications. "Our strength lies in this combination: we don't just understand the vehicles, but also the environment



in which they operate. This allows us to optimise interfaces, better align system behaviour and offer our customers comprehensive solutions.”

This product portfolio is rounded off by an extensive range of services provided by its global partner network, most recently including the launch of its US service subsidiary.

A New North American Chapter

The company has been seeing particularly dynamic growth in North America, where there's a strong and increasing demand for reliable service and systems solutions that are easy to maintain and available on short lead times. There's also a positive trend in several South American markets, where multiple projects are underway to expand urban rail networks.

With this in mind, HANNING & KAHL felt the time was right to expand its existing US subsidiary into a dedicated service subsidiary in Philadelphia, USA, to support these markets. This provides the full range of services offered by its rolling stock division, from repairs and maintenance through to technical support and on-site customer training.

“We'd been seeing significant growth there for years, combined with rising demand for fast, local service support. Technical excellence is no longer enough – our customers increasingly expect us to have a local presence and the ability to respond quickly. By establishing our service subsidiary, we've directly



addressed this requirement,” says Fingerhut. “With this, we're bridging the gap between the high technical complexity of our systems and the need for rapid support in day-to-day operations.”

Laying the Foundations State-Side

The biggest challenges in setting up a fully operational service base in the US were establishing a new service setup capable of meeting both the company's high-quality standards and the expectations of the North American market.

“Greater distances, different maintenance logic and, in some cases, even varying customer processes play an important role,” says Fingerhut.

“Therefore, our systems and service concepts are designed to be flexible. At the same time, we've had to ensure that our service organisation can respond more quickly and directly than in some European markets. Indeed, this was one of the main reasons behind our decision to establish a local subsidiary – it puts us

in a better position to meet these specific requirements.”

This involved building a skilled team on the ground, implementing standardized processes and integrating its existing ISO 22163 (IRIS) management system. Philadelphia was ideally located from a strategic perspective, as it enabled the company to reach many relevant transport regions efficiently, as well as benefit from access to skilled workers and an established industrial infrastructure.

Close cooperation between the US and Germany was also important, because while a great deal of knowledge was shared from Germany, the processes had to be adapted locally and proven in day-to-day operations. With this combined approach of central direction and local responsibility, HANNING & KAHL was able to establish its subsidiary on a stable and sustainable footing.

“In this way, we've combined global technological capabilities with local proximity and responsiveness,” Fingerhut explains.

Quality without Compromise

HANNING & KAHL is one of only 14 companies in the US to meet the international quality standard ISO 22163 (IRIS) and is already successfully participating in a number of major North American projects as a supplier of hydraulic braking systems. These include the [Innovia Metro 300 Vancouver Skytrains](#) and the Siemens S200 vehicles for Cleveland.

The Cleveland braking system will be exhibited at the APTA Expo 2026 on October 4-7th, where HANNING & KAHL will be at booth 3861.

Looking ahead, it plans to continue strengthening its local presence

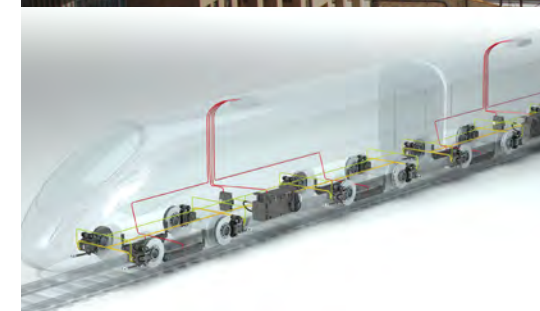
in the Americas, at the same time as driving continuous process and product improvements in Europe.

Committed to maintaining high quality standards and creating measurable value for its customers around the world, **HANNING & KAHL invites current and potential customers to come and see for themselves at InnoTrans 2026. The company can be found in Hall 27, Stand 610**, where it will be debuting its new BrakeMaster braking system, featuring the hydraulic unit, spring accumulator and control unit subcomponents. Additionally, the company will be showcasing its newly developed filter flushing system, which plays a key role in ensuring the long-term functionality and reliability of hydraulic braking systems.



On the infrastructure side, the company will be showcasing its comprehensive range of services in addition to its new point machine for mainline rail technology, and providing insights into innovative solutions for modern rail transport.

Key sales executives and technical experts will be available to answer any questions at both shows, but for those unable to attend in person, you can reach HANNING & KAHL via [berthold.fingerhut@hanning-kahl.com](#).



Brakes with a System

The modular product range offers safe braking concepts from development and project planning to the production of complete braking systems.



www.hanning-kahl.com



Running Gear

ZF Group

Together on Track

Rail has always been a driver of progress, connecting people, regions and economies. Since entering the railway technology business in 1924, ZF has been at the forefront of this evolution, continuously shaping mobility with innovation, engineering excellence and a deep understanding of industry needs. What began with the adaptation of a transmission for railcars has grown into a global success story: today, ZF Rail is one of the world's leading technology partners for the rail industry.

A Strong Foundation: Technology Across Systems

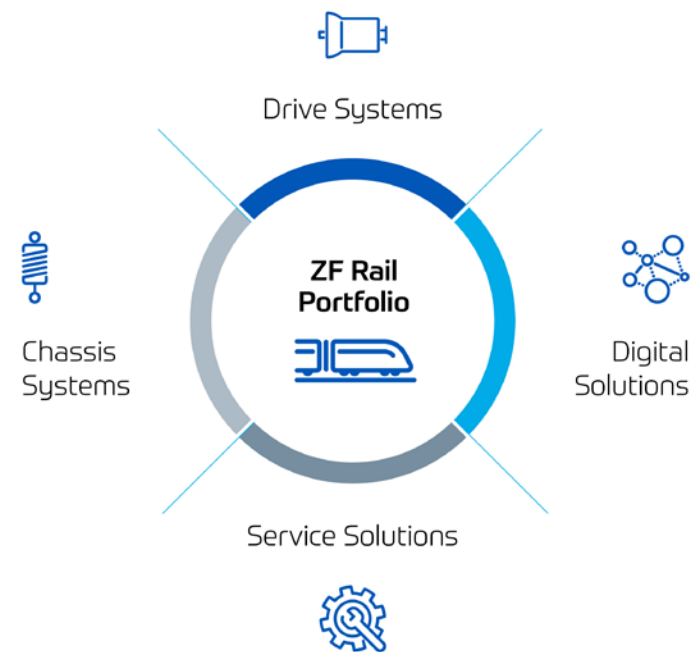
At the heart of ZF's success lies a unique strength: the ability to transfer technology across industries. Drawing on expertise from automotive, commercial vehicles and industrial applications, ZF develops solutions tailored to the specific demands of rail transport.

This cross-sector approach enables scalable, proven technologies while maintaining the flexibility to address a wide range of rail applications and customer requirements. The result is a comprehensive and future-ready portfolio covering key domains of rail vehicles from driveline to chassis, from digitalisation to aftersales services.

Comprehensive Portfolio for Modern Rail

Drive Systems – Powering Performance

ZF driveline technologies form the backbone of efficient rail operations. The portfolio includes solutions for all types of rail vehicles like electric multiple units, metros, trams, highspeed trains, diesel multiple units, locomotives and special vehicles.



ZF's portfolio for rail covers driveline and chassis solutions as well as smart condition monitoring systems and a broad service network, ensuring availability, efficiency and long-term reliability worldwide

With modular gearbox concepts, lightweight designs and noise-optimised systems, ZF ensures reliable power transmission, reduced energy consumption and lower lifecycle costs – across all applications, from urban mobility to long-distance highspeed travel.

Chassis Systems – Stability and Safety

Complementing driveline technologies, ZF's chassis systems contribute significantly to ride comfort, safety and vehicle stability. Advanced damping solutions and suspension components are engineered to withstand demanding operating conditions while ensuring smooth and reliable operation.

These technologies enhance passenger comfort, reduce wear and support consistent performance throughout the vehicle's lifecycle.

Digital Solutions – Intelligence on Track

As rail systems become increasingly connected, digitalisation plays a central role in improving efficiency and reliability. With its connect@rail platform, ZF enables comprehensive condition monitoring of vehicles, fleets and infrastructure.

By combining sensor technology, connectivity, cloud computing, data analytics and AI, connect@rail allows operators to shift from reactive to predictive maintenance strategies. The result: reduced downtime, optimised maintenance planning and improved operational safety.

ZF Aftermarket – Maximising Lifecycle Value

Beyond product development, ZF supports rail operators throughout the entire lifecycle of their assets. With a global service network, spare parts supply and tailored maintenance solutions, ZF ensures maximum availability and long-term performance.

This holistic approach helps operators minimise costs, extend service life and maintain reliable operations in an increasingly demanding environment.

Shaping the Future of Rail Mobility

Urbanisation, growing transport demand and increasing sustainability requirements are reshaping the rail industry. Operators and manufacturers must deliver solutions that combine efficiency, reliability, comfort and environmental performance.

ZF is a strong partner in this transformation. By combining mechanical expertise with digital intelligence and comprehensive service concepts, the company delivers integrated solutions that address the full spectrum of modern rail requirements.

Whether enabling quieter urban transport, supporting highspeed travel or optimising maintenance through data-driven insights – ZF technologies are designed with one clear goal: to keep rail systems moving efficiently, reliably and sustainably.

Under the motto 'Together on Track', ZF will showcase the latest innovations in its portfolio – Including a world premiere – at this year's InnoTrans: Hall 20, Booth 580.



Together on Track: With global reach and a customer-first mindset, ZF acts as a long-term partner – reliable, responsive and future-ready

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Together on Track



Combining proven technology, global expertise and trusted partnership, ZF keeps your fleet performing at its best.

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Hall 20

ZF Rail reflects our commitment to reliable technology, uncompromising quality and long-term partnership in passenger and freight mobility worldwide. Built on a century of experience and as one of the world's leading technology suppliers for rail systems, the portfolio spans driveline technologies, chassis components, smart condition monitoring systems and a service network that safeguard availability, reduce downtime and optimize lifecycle costs. With global reach and a customer-first mindset, we act as a long-term partner – reliable, responsive and future-ready.

[Learn more about us and visit ZF.com/innoTrans](https://www.zf.com/innoTrans)



Running Gear

Texelis Transport

SILK, Texelis Transport's Innovation that Gives a New Future to Regional Train Lines

Regional lines have always been a critical part of the French railway system, a vital link between urban and rural areas. However, over time, these lines became a symbol of an ageing, under-maintained and fragmented network. TELLi (French project for an Innovative Light Train) and its essential transmission element SILK is meant to bring revolutionary concepts to address this issue.



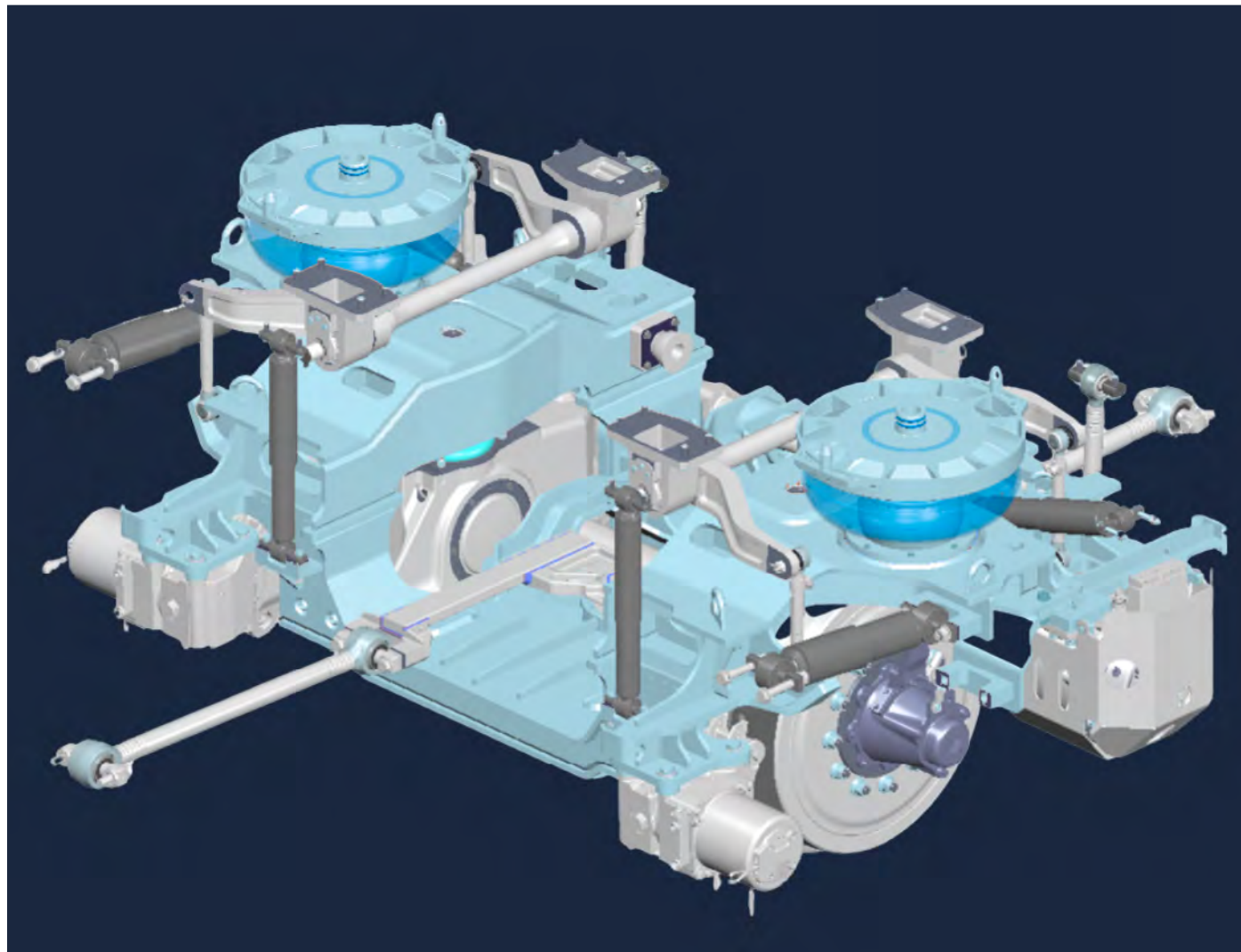
TELLi: Regional Trains, Renewed Focus of the Rail Industry

With its 7,500km of local rail lines, France has a unique rail network in Europe. But these lines, which are essential for rural areas, have often become synonymous with high costs and declining ridership. The TELLi project is a consortium of 11 partners (Hitachi, Texelis Transport, CAF, Railenium, Wabtec, ALSTOM, FerroCampus, Capgemini, Cerema, Ektacom) driven by SNCF (French

mobility group) to reverse this trend. The ambition is to offer a lighter, economical, modular, energy-efficient, carbon-neutral regional rolling stock.

TELLi's challenge: significantly lowering operating and maintenance costs while reaching a range of 200km and a top speed of 120km/h.

The train-to-ground connection, a fundamental element of the train, had to be fully redesigned by Texelis Transport to reach this ambitious target.



TEXELIS

TRANSPORT

SILK: The Innovation that Changes Everything

Texelis Transport is working in its Limoges premises on a simple but disruptive idea: switching to an independent motorised and single-axle wheel architecture. This concept led to SILK (which stands for Sustainable Innovative Low wear Kinetics), a lighter, smarter and easier to maintain solution compared to conventional bogies.

SILK represents a technological breakthrough, that offers the following significant benefits:

- Reduced wheel-rail wear, a major challenge for ageing regional lines
- Real-time adjustment of the axle position on the tracks through control of wheel differential speed, to minimise wear and wheel slip
- 30% reduction of weight, with positive impact on track load and thus on maintenance requirements
- Challenged maintenance, notably with bolted wheels and electrical motors that are easier to remove without dismantling other components

This means lower operating costs, increased availability and greater network resilience for regional rail operators.

A Train More Accessible to Everyone

Thanks to SILK, the TELLi will be able to offer a globally flat floor. The train also automatically adjusts to the height of the platform before entering a station, ensuring compatibility with 95% of existing docks. This leads to improved accessibility for passengers with specific needs (wheelchairs, people of reduced mobility, strollers, bicycles, luggage). TELLi also allows infrastructure cost savings, as it doesn't require costly docks retrofit for implementation.

The main driver for SILK design was to reduce ownership costs (operating and maintenance costs) by 30% over the entire lifecycle, through onboard sensors, predictive maintenance, modular architecture... everything has been designed to make life easier for operators.

Real-Life Trials to Validate the Revolution

Texelis Transport has launched heavy testing on a full-scale demonstrator, representing half a TELLi, to prove expected benefits and to confirm that SILK meets consortium and future regional operators' expectations.

A Key Role in the Revival of Regional Railways

With SILK, Texelis Transport is doing more than just introducing a technical innovation. The company is proposing a new way of thinking about regional rail, with the aim to be lighter, more affordable and more adaptable to passenger needs. This is Texelis Transport's vision to contribute to the necessary revival of regional rail lines, as a driver of regional development, ecological transition, and sustainable mobility.

The target is to have the first trains on tracks by 2032.

InnoTrans 2026

September 22-25 - BERLIN

Texelis Transport will be in **HALL 20, booth 570** and will exhibit a 1/2-scale model of SILK.

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TEXELIS
TRANSPORT



Testing & Measuring Equipment

HEXAGON



Hexagon and Track Forward Put Wheel Predictive Maintenance on the Right Track

By integrating precise CALIPRI measurement data with AI-powered analytics, Hexagon and Track Forward are helping rail operators move from reactive inspections to forward-looking maintenance strategies.

Hexagon, developer of the optical measurement solution CALIPRI, and Track Forward, provider of AI-powered analytics platform WheelSense, are joining forces to deliver an end-to-end solution that takes rail operators from precise wheel measurement to predictive maintenance decisions.

At the core of this partnership is the combination of precise measurement data from the CALIPRI system with Track Forward's intelligent analytics platform WheelSense. By bringing these technologies together, an end-to-end solution has been created that provides highly accurate data capture through to automated evaluation and maintenance recommendations.



Turning Profiles into Predictions

Here's how it works. CALIPRI enables non-contact and rapid measurement of wheelsets directly in operation. The data obtained is then processed in WheelSense and analysed using advanced algorithms. Individual measurements are no longer merely documented, but placed within a temporal and operational context. Operators can see how wheel profiles develop, which vehicles or operating conditions are showing anomalies, and where targeted measures will have the greatest impact.

This enables early detection of wear development, forward-looking maintenance planning and optimal utilisation of component lifecycles.

"The combination of precise measurement technology and intelligent data analytics opens up entirely new possibilities for maintenance," says Peter Lehofer, Head of Product Management at Hexagon. "Our customers benefit from well-founded decisions based on valid data, making predictive maintenance a reality at last."

Track Forward also sees strong potential in the partnership:

"With CALIPRI we receive high-quality input data that takes our analytics to a new level," says Marc Schmerbach, Founder of Track Forward. "The key added value arises when precise measurement data isn't considered in isolation, but in the context of vehicle history, wear progression

and maintenance strategy. This is exactly where WheelSense, together with CALIPRI, comes in."

Addressing Key Challenges

The joint solution addresses key challenges in the industry: increasing cost pressure, higher availability requirements and the need for sustainable operational strategies. The result is maximum transparency regarding the condition of wheelsets and components, more accurate predictions and significantly more efficient maintenance processes.

Rail operators benefit from reduced downtime, optimised maintenance intervals and a sustainably extended service life of critical components.

With this collaboration, Hexagon and Track Forward are sending a clear signal for the future of the rail industry: data-driven decision-making, transparent wear patterns and proactively planned measures are becoming the new standard in maintenance.

See for Yourself at InnoTrans

Hexagon and Track Forward will be exhibiting together at **InnoTrans this September. Visitors can see the CALIPRI measurement systems and WheelSense analytics platform in action at Hall 23, Stand 530.** Come and meet the teams behind the joint solution that's making predictive wheelset maintenance a practical reality for rail operators.

calpri.net | trackforward.com



Astronics

Reducing Downtime, Increasing Reliability: The Business Case for Automated HVAC Testing

Astronics brings advanced diagnostics, data logging and predictive analytics to HVAC systems, helping rail operators improve efficiency and reduce repair times, writes Astronics Test Systems' Director, Mass Transit, Bagali Siddaram, and Systems Engineering Manager, Kyle D'Arcangelis.



ATS-500 HVAC Test System

Heating, ventilation and air conditioning (HVAC) systems are essential to passenger and staff comfort when travelling on trains. Whether it's the height of summer or the depths of winter, they keep everyone comfortable by maintaining that perfect on-board temperature balance.

As a key subsystem on a train, HVACs are regularly checked and overhauled as part of an operator's maintenance schedule. This is traditionally done manually, using portable test equipment, which is limited to giving a pass/fail result. If a fault is found, the system must then be moved to the repair shop for in-depth diagnosis.

This can take time because HVAC systems combine various engineering disciplines. Unlike a purely electronic system, you're dealing with motors, compressors, pressure transducers, and more. It's complex because each component interacts. For example, if you get a low-pressure reading, is it genuinely low pressure, or is the sensor defective? That integration makes testing more demanding.

Precision Testing Made Simple

In response to this, Astronics Test Systems has developed a dedicated HVAC bench test equipment (BTE) solution, ATS-500 HVAC Testing, which is part of the ATS-5000 Series. This automates HVAC testing, reducing downtime and maintenance costs. A single BTE can test different types of air conditioning systems used across various train fleets, regardless of the HVAC supplier or model, or whether units have integrated control circuits or are roof-based, and separate from the controller.

The ATS-500 provides a fully automated, universal solution for diagnosing faults across complete HVAC

assemblies and sub-assemblies including evaporator blowers, heaters, condensers and compressors. Rather than offering simple pass/fail results, it pinpoints which component or sub-assembly is faulty, enabling quick replacement and retesting.

With Ethernet and LAN connectivity, it can also diagnose circuit breakers, contactors and sensors, perform system-level software updates, and carry out self-diagnostics down to module level, ensuring precise, end-to-end validation and long-term maintainability of HVAC systems.

Proactive and Reactive Testing

From a maintenance perspective, the BTE supports both reactive and proactive testing. By monitoring data such as compressor current or valve performance, the system can detect early signs of failure, enabling predictive maintenance and avoiding costly breakdowns.

Every test is automatically logged with component serial numbers, allowing operators to review historical data, identify recurring faults and in turn refine their maintenance strategy. With up to ten years of stored results, users can easily analyse trends and build long-term reliability insights.

The BTE's modular, future-proof architecture also ensures longevity. Software and hardware can be independently upgraded, allowing new functions or instruments to be added without redesigning the entire system. This adaptability makes it suitable for evolving HVAC technologies and future fleet requirements.

Finally, the solution's easy-to-use operator interface is a core strength. It simplifies setup and execution, meaning that technicians don't need advanced programming or diagnostic expertise to use the system effectively. Together, all these features make Astronics' HVAC BTE a cost-efficient, scalable and future-ready testing platform.

Proven Success in New York

The ATS-500 is already proving its value in the field, with successful deployments at transit authorities

including New York City Transit (NYCT), and further installations in the works at authorities including the Massachusetts Bay Transportation Authority (MBTA).

The system was installed in NYCT's maintenance depot to test multiple HVAC configurations across different fleets of rolling stock. The operator has reported faster fault isolation, improved consistency in test results and ease of use, noting that the interface was intuitive and did not require deep technical training.

The ability to test multiple HVAC systems with a single platform has also been particularly well received, delivering measurable improvements in depot efficiency and equipment reliability.

Find Out More

In addition to manufacturing the equipment itself, Astronics Test Systems excels at delivering complete logistics support, with installation, training and support engineers deployed to your location. We're here to ensure the long-term success of your BTE, helping you maximise uptime and return on investment.

To find out more about the ATS-500 or the other ways Astronics Test Systems can support your organisation's testing needs, please [visit our website](#) or contact ATSsales@astronics.com.

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ASTRONICS
TEST SYSTEMS



Testing & Measuring Equipment

LA-CO Industries Europe

Solving the Two Biggest Challenges in Fastener Inspection

Fast curing times, fluorescent visibility and no harmful solvents: LA-CO Industries' latest innovation sets a new standard for fastener inspection across rolling stock manufacturing and maintenance, writes Géraldine Salesse, Marketing Manager, LA-CO Industries.

In the world of railway engineering every component matters. The operational integrity of a train relies on the performance of countless individual parts working in harmony. Among the most critical yet easily overlooked of these are the nuts, bolts and fasteners that hold vital assemblies together.

Subjected to constant vibration, mechanical stress and thermal cycling, these fasteners can loosen over time posing a significant safety risk. For decades maintenance and manufacturing teams have sought a simple reliable way to monitor these crucial connections. The answer lies in a highly effective visual inspection method using tamper-evident paint.



Industrial Marking Solutions

LA-CO Industries, a global leader in industrial marking solutions, has long provided the railway industry with its MARKAL Security Check Paint Markers. These markers apply a thick paint seal across a fastener and its adjacent surface creating a clear visual indicator.

If the fastener moves or is tampered with the brittle seal breaks providing an immediate, unmistakable sign that attention is required. This simple yet powerful tool transforms the complex task of torque verification into a straightforward visual check.



Now building on this legacy of safety, and listening closely to the needs of both OEMs and maintenance operators, LA-CO Industries is proud to announce the launch of its new and innovative SECURITY CHECK+ Fast Dry range, which will be officially presented at InnoTrans 2026 in Berlin. This next-generation product line's engineered to solve two of the biggest challenges in the industry: production downtime and inspection visibility.

The OEM Challenge

For OEMs and their suppliers, efficiency is paramount. On a busy production line where rolling stock components are assembled, waiting for a paint marker to dry isn't an option.

OEMs and their partners must comply with stringent safety standards set by rail operators. These often mandate the marking of all safety-critical bolted assemblies. However, a slow-drying paint can create a serious bottleneck, as you cannot handle a component or move to the next production stage if the markings are still wet.

The standard MARKAL Security Check Original formulation, while highly effective, can take up to a week to fully cure. In a high-throughput assembly environment factory floor workers reported this

could cause delays, and this feedback was the primary driver behind the development of the SECURITY CHECK+ Fast Dry formulation.

By re-engineering the paint's chemical composition, LA-CO Industries has drastically reduced the full curing time to approximately 48 hours. This allows OEMs to maintain production velocity without compromising on the quality and reliability of the tamper-evident mark. The result is faster return-to-service of equipment, reduced delays and improved productivity.

A Need for Visibility

Once a train enters service, the operational environment changes dramatically. Fleet maintenance teams face a different set of challenges. A train returning for a major service interval after hundreds of thousands of kilometres is covered in dust, grease and brake residue. Maintenance crews need to inspect an incredible number of marked fasteners, often in poorly lit conditions under the train or on the roof. Visibility is everything.

The SECURITY CHECK+ Fast Dry markers currently come in a range of vivid, high-contrast options including orange, pink, green, blue and yellow. However, visibility can be hampered underneath a train. To address this, LA-CO Industries developed new fluorescent colours for the range. When illuminated with a black UV torch, the fluorescent marks glow brightly cutting through the grime, making it incredibly easy for inspectors to spot a broken seal from a distance.

This is a game-changer for maintenance efficiency. Instead of painstakingly inspecting each bolt up close, a technician can quickly scan an entire bogie or roof assembly. It saves valuable time and reduces the risk of a loosened fastener being missed, which is fundamental for ensuring operational safety.

Innovation that Sets a New Standard

The development of the SECURITY CHECK+ Fast Dry range focused on meeting user needs without compromise. While other fast-drying markers exist on the market, they often come with trade-offs. Some achieve speed by using aggressive solvents which are

hazardous to user health and the environment, and are restricted in Europe. Others have a thin liquid consistency that fails to provide the thick brittle seal required by railway standards for a reliable check.

The new MARKAL formulation is unique. It delivers both fast curing times and enhanced fluorescent visibility while remaining free from harmful solvents and maintaining the essential thickness for a robust tamper-evident mark. This combination of features makes it the only solution on the market that effectively meets the distinct needs of both OEM production lines and frontline maintenance crews.

Partnership and Innovation

The launch of the SECURITY CHECK+ Fast Dry markers at InnoTrans 2026 represents more than just a new product. It's a testament to LA-CO Industries' commitment to partnership and innovation. We're not just selling a marker; we're providing a solution. We listen to our partners in the railway industry – from the engineers at Hyundai Rotem and Alstom, through to the maintenance teams at SNCF and Deutsche Bahn – and develop products that make their jobs safer and more efficient. This new range is a direct result of that collaboration and we're excited to share it with the industry.

As the rail sector continues to advance the fundamentals of safety and reliability remain the bedrock of progress. With the new MARKAL Security Check+ range, a simple line of paint continues to make a world of difference. Visit LA-CO at **InnoTrans at Hall 8.1, Booth 135.**

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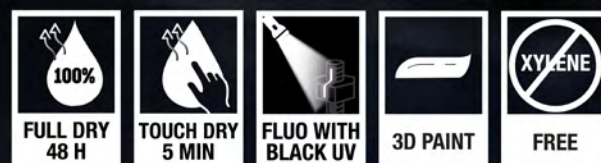
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Weighwell Engineering Ltd.

Why Weight Distribution Matters in Modern Rolling Stock Maintenance

Rolling stock maintenance is often associated with the visible work: wheelsets, brakes, bogies and onboard systems. These are all essential to keeping trains safe, reliable and available for service.

But one important factor is less visible: how the rail vehicle's weight is distributed.

A rail vehicle may look complete, compliant and ready to return to service, but if its weight is not correctly balanced, the vehicle may not behave exactly as intended. An uneven weight distribution can influence ride quality, suspension behaviour, braking performance and component wear.

That is why train weighing should not be seen as a final formality. In modern rolling stock manufacture, maintenance and overhaul, it is a practical engineering check that helps confirm whether a vehicle is balanced, correctly configured and ready for operation.

More Than a Gross Weight

When people think about weighing a rail vehicle, they often think only of total vehicle weight. That figure is useful, but it does not tell the whole story.

For rolling stock engineers, the key question is often not simply "how heavy is the vehicle?" but "where is that weight sitting?"

A vehicle's total weight could be within the expected range, while one axle, bogie or side of the vehicle

carries more load than intended. This matters because rail vehicles rely on a balanced load distribution to interact correctly with the track and suspension.

Weight distribution can influence how the vehicle rides, how suspension components respond, how braking forces are applied and how the wheel-rail interface behaves. Even small variations can become important when vehicles are operating at speed, carrying passengers or returning to service after significant maintenance work.

In this context, rail vehicle weighing is not simply about confirming mass. It is about understanding balance.

A Useful Check After Overhaul

Modern rolling stock rarely remains unchanged throughout its life. Vehicles are built, commissioned, refurbished and repaired. Each stage can affect weight distribution.

A vehicle may return from overhaul with renewed components, bogie work, suspension adjustment or with the installation of new equipment. Individually, these changes may appear manageable. Collectively, they can alter how weight is distributed across the vehicle.

That is why post-modification weighing is so valuable.

It provides engineers with evidence that the vehicle remains within expected weight ranges and that the load is distributed correctly across, bogie, axle and wheel positions. It also helps engineers confirm that the work completed in the train maintenance facility has not introduced or left an imbalance that could affect performance in service.

Supporting Better Maintenance Decisions

Across the rail industry, maintenance is becoming more data-led. Depots and fleet teams are increasingly focused on condition monitoring, digital records, asset availability and whole-life performance.

Weight data should be part of that picture.

A weighing result provides a clear snapshot of the vehicle's physical condition. If the vehicle is correctly balanced, the result gives reassurance and a useful record. If an imbalance is detected, engineers have the opportunity to investigate and take corrective action before the vehicle returns to service.

The important point is that the issue is identified early, when it can still be managed proactively.

This is where rail vehicle adds real value. It supports evidence-based maintenance rather than assumption-based decision-making.

Portable Train Weighing for Busy Rail Environments

The challenge for many depots, manufacturers and overhaul facilities is not whether weighing is useful. It is how to obtain accurate weight data without creating unnecessary disruption.

Traditional fixed weighing infrastructure can be effective, but it is not always practical for every site or project. Some facilities may not have permission for permanent weighing equipment. Others may need a temporary solution for a specific fleet, modification programme or acceptance process.

Weighwell's Portable Train Weigher (PTW) was developed to provide accurate static weighing without permanent track modifications. The patented rail scale

can be installed within existing infrastructure and used to measure each axle, bogie, railcar or multiple railcars, depending on the configuration required.

Because it is portable, it can support short-term projects, pre- and post-modification weighings and maintenance investigations. It can also be deployed across different sites, giving teams access to reliable weighing data where and when it is needed.

For busy rail environments, that flexibility matters. It allows weighing to support maintenance and assurance programs without becoming a bottleneck.



Measured Confidence

Rolling stock reliability depends on many factors. No single measurement can tell the whole story of a vehicle's condition. But weight distribution is fundamental to how a rail vehicle behaves.

When a train is built, modified, overhauled or prepared for service, engineers need confidence that it is not only complete, but correctly balanced.

Accurate rail vehicle provides that confidence.

It helps confirm that the vehicle's weight is where it should be. It supports maintenance quality, ride performance and safety assurance. It gives operators, manufacturers and overhaul providers a practical way to verify work before a train returns to the rail network.

In a rail industry increasingly focused on reliability, availability and better use of data, weighing has an important role to play.

Because sometimes the most important maintenance insight is not what can be seen.

It is what can be measured.

For more information visit www.weighwell.com.

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- ▶ Ideal for railcar maintenance
- ▶ Weighing systems supplied globally
- ▶ Established in 1988

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Cleaning & Decontamination

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Cleaning & Decontamination



THE FUTURE OF
TRAIN & TRAM WASH SYSTEMS

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Keeping rolling stock clean is about more than appearance. For train operators, metro systems, depots and maintenance providers, effective cleaning supports passenger experience, staff safety, asset protection and long-term operational efficiency.

From traffic film and brake dust to graffiti, interior stains and daily passenger-area cleaning, rail vehicles are exposed to demanding conditions every

day. Surfaces must be cleaned quickly, safely and effectively, often within tight maintenance windows and with minimal disruption to operations.

Blue & Green AB develops and produces cleaning, washing, graffiti removal and surface protection products for the railway and wider public transport sector. With a strong Nordic environmental profile and many years of practical experience in chemical product development, the company supports operators and maintenance teams with solutions for both exterior and interior rolling stock applications.

Blue & Green's rail offering covers train exterior washing, exterior & interior graffiti removal, graffiti shadow removal, surface protection, floor care, textile

cleaning, glass cleaning and passenger-facing interior surfaces. The aim is simple: to help rail customers achieve cleaner vehicles, better-protected surfaces and more sustainable maintenance routines.

From Cleaning to Protection

Modern rail cleaning is no longer only about removing dirt. The best results are achieved when cleaning, decontamination and protection are considered as part of the same process.

Train exteriors are exposed to traffic film, brake dust, iron particles, insects, oil, grease and general grime. These contaminants can be difficult to remove, especially when vehicles operate in harsh weather conditions or on busy urban and regional routes. Blue & Green offers products designed to clean these surfaces efficiently while also supporting a clean, uniform and well-maintained finish.

Tackling Graffiti Quickly and Effectively

Graffiti remains one of the most visible and costly cleaning challenges in public transport. It can cover large exterior surfaces or appear as smaller tags on interior floors, walls, seats, panels and windows. If left untreated, graffiti can damage the passenger environment, affect brand perception and increase the time required for maintenance teams to return vehicles to service.

Blue & Green provides a dedicated range of graffiti removal products for rolling stock, including solutions for exterior graffiti, interior tags and graffiti shadows. The company's range includes both thin-flowing and thixotropic products, allowing customers to select the right solution depending on surface,



working method and type of contamination.

The process does not stop once graffiti has been removed. Shadows, residues and surface sensitivity are often just as important. Blue & Green's method is designed to remove graffiti and shadows while helping preserve the surface.

A Proven 4-Step Method

Blue & Green's approach to train and metro interiors is built around a proven 4-step method:

- 1. Clean** – Remove daily dirt, stains and general contamination from passenger-facing surfaces.
- 2. Remove graffiti** – Use effective products adapted to the surface and type of graffiti.
- 3. Remove shadows** – Treat remaining residues and shadow to restore the surface as far as possible.
- 4. Protect** – Apply suitable interior protection where relevant to make future cleaning easier and improve surface resistance.

This method is designed for practical use by cleaning and maintenance personnel. It supports a structured process for surfaces such as floors, walls, windows, textiles and other interior areas where cleanliness is directly linked to passenger comfort. For staff, the right product choice is also a work environment issue. Incorrect dosing or unsuitable chemicals can create unnecessary risk, damage surfaces or produce poor results. Blue & Green therefore places strong emphasis on advice, guidance and training, helping customers choose the right product, correct dosing and appropriate working technique.

Sustainability as a Practical Requirement

For rail operators and maintenance providers, sustainability is no longer a separate ambition. It is increasingly part of procurement, compliance,

brand responsibility and day-to-day operations.

Blue & Green has built sustainability into its product development, production, supply chain and customer guidance. The company is certified according to ISO 14001 for environmental management and ISO 9001 for quality management. It also offers eco-labelled and environmentally assessed products, including Nordic Eco-labelled products and products assessed through recognised environmental systems.

The company develops and improves products in its own laboratory in Landskrona, located in the same building as its production facility. This close connection between development and production enables Blue & Green to work directly with product performance, environmental adaptation and customer-specific requirements.

Supporting Depots with Knowledge, Not Just Products

A product is only effective when it is used correctly. In rail cleaning, that means understanding the surface, the contamination, the available equipment, the cleaning window and the environmental requirements.

Blue & Green supports customers with product knowledge, guidance and training. This includes advice on dosing, working methods, surface compatibility and process design. The aim is to help operators and maintenance teams achieve consistent results while avoiding unnecessary product use, surface damage or inefficient routines.

For depots and maintenance teams, this combination of products and expertise is central. The right process can reduce repeated cleaning, improve working conditions, support more predictable maintenance and extend the value of protective treatments.

Cleaner Trains, Better Protected Surfaces

As the rail sector continues to focus on sustainability, operational efficiency and passenger satisfaction, cleaning and washing solutions must deliver on more than appearance. They must support safe working methods, protect vehicle surfaces, meet environmental expectations and perform reliably in real-world depot conditions.

Blue & Green's position in the railway sector is built on that combination: practical cleaning performance, graffiti expertise, Nordic environmental standards and in-house product knowledge.



“Graffiti removal is most effective when removal, shadow treatment and future protection are planned together.”





Rolling Stock Manufacturing & Maintenance

Virtek Vision

Driving Digital Precision in Railway Manufacturing

How laser-guided assembly, CAD-driven projection and AI-enabled process monitoring help railway manufacturers improve fit-up accuracy, reduce rework, strengthen traceability and support more consistent production across complex welded assemblies.

The Pressure to Build Better

In railway manufacturing, precision is never optional. Whether teams are building welded sub-assemblies, locating brackets or verifying fit-up across large, fabricated structures, manufacturers operate in an environment where quality, repeatability and traceability are essential.

Assemblies often involve multiple components, tight tolerances, and production steps that must align closely with engineering design.

At the same time, the industry is under increasing pressure to improve throughput, quality and maintain consistent standards while managing skilled labour shortages and rising production complexity.

These realities are pushing rail manufacturers to reconsider traditional assembly methods and adopt more automation, digital-driven, process-controlled approaches that bring clearer guidance to the shop floor.



From Manual Methods to Digital Assembly

One of the most important changes happening on the shop floor is the move away from manual measurement, physical templates and paper-based instructions toward laser-guided virtual assembly. In complex railway applications, traditional methods can introduce variability, consume setup time and increase the risk of downstream errors. A manually marked reference point, a misplaced template, or a small interpretation of a mistake can lead to disruption in the process and added expenses. By projecting digital information directly onto the workpiece, operators can create a more intuitive workflow that delivers

clear visual guidance exactly where it is needed. This helps eliminate much of the manual measuring, marking and fitting that slows production, while also reducing reliance on hard templates and the storage, maintenance and rework they often create. It also makes it easier to respond to engineering updates, because design changes can be reflected directly from CAD data in-process rather than reworked through manual setup methods.

How 3D Laser Projection Supports Railway Manufacturing

Virtek Vision's solutions bring this digital approach to assembly by

projecting CAD-based laser templates directly onto components. Operators are guided step by step through the build process without relying on manually transferred measurements or printed references. This helps improve placement accuracy, reduce setup time and support more repeatable results across complex rail assemblies. Because the system works directly from CAD data, it helps keep production aligned with engineering intent and reduces the risk of discrepancies between what was designed and what is built. Integrated 3D vision capabilities allow the system to locate parts in space and align them to CAD data, making the technology practical for real manufacturing environments where part variation, weld distortion or inconsistent positioning can affect setup. Instead of forcing operators to adapt the process around manual reference methods, the system helps bring digital intent directly to the workpiece.

Features such as FlashAlign™ help simplify setup by allowing the laser projector to align quickly to the part without time-consuming teaching steps. The platform also supports a range of applications beyond standard projection. These include 'pick & project' for faster workpiece selection and projection, 'visualization' for previewing final assemblies before production begins, 'digitising' for recreating CAD data from legacy or missing designs, and 'verification' for identifying incorrect part placement in real time. In practical terms, these capabilities help manufacturers work more efficiently across both new and existing programs while adapting more quickly to design revisions. They also help connect engineering intent with shop-floor execution by giving operators clearer guidance and reducing the manual interpretation

that can lead to fit-up issues, rework, or unnecessary production delays.

Adding Visibility with AI-Enabled Process Monitoring

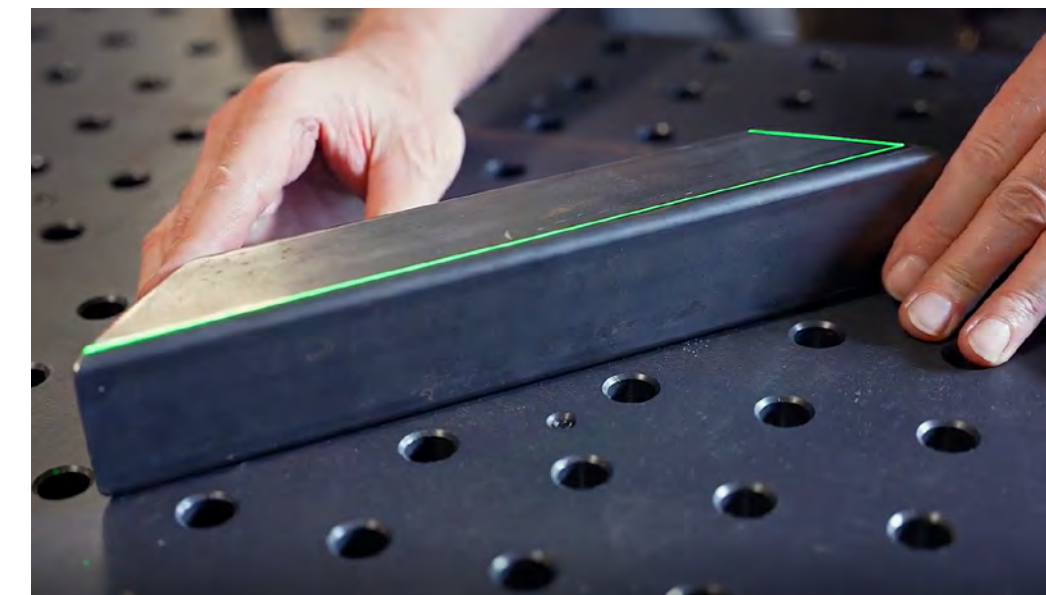
Assembly guidance is only part of the picture. Railway manufacturers also need stronger visibility into the process itself, especially in environments where quality documentation, compliance and customer assurance matter. Virtek's AI-enabled process monitoring camera adds that layer of oversight by capturing high-definition images throughout each stage of the build process. The result is a continuous digital record that supports quality reporting, confirms process completion and helps manufacturers document what happened during production. With predefined capture points built into the workflow, image collection can be automated rather than left to manual intervention, helping create more consistent and reliable records across every assembly.

This level of monitoring offers benefits that go beyond

recordkeeping. By tracking progress in real time, teams can identify issues earlier, before they become costly defects or downstream delays. Digital verification of component placement and weld stages helps strengthen traceability and reduce the likelihood of preventable errors. Unique serial numbers can be linked to captured images and process records, giving manufacturers a more complete production history for each part or assembly. Time-stamped action logging and detailed reporting add further visibility, making it easier to review process performance, support audits, and demonstrate adherence to quality standards. Over time, the digital data captured through process monitoring can also support continuous improvement by helping manufacturers identify bottlenecks, compare results across builds, and make more informed decisions about production efficiency and quality control.

Why This Matters Now

For the railway sector, these technologies are not simply about replacing old tools with new ones. They are about creating a manufacturing environment where





instructions are clearer, workflows are more repeatable, and quality is built into the process from the first step to the final verification. That is especially important at a time when manufacturers are expected to increase throughput while maintaining strict standards for reliability and compliance.

Digital visual guidance can also help manufacturers respond to workforce challenges by making assembly steps easier to follow and reducing dependence on highly manual knowledge transfer. When best practices are projected directly onto the workpiece and paired with digital monitoring, teams

can standardise processes more effectively across shifts, facilities, or experience levels. In an industry where consistency, accountability, and efficiency are increasingly linked, that combination of precision and visibility offers a practical path forward for rail manufacturers looking to modernise operations without compromising quality.

A Smarter Path Forward

As railway manufacturing continues to evolve, the ability to combine precision, efficiency and traceability will become even more important.

Laser-guided assembly and AI-based process monitoring offer manufacturers a way to reduce rework, improve operator guidance and build greater confidence into every stage of production.

For organisations working to modernise assembly operations while maintaining the highest standards of quality, digital manufacturing tools are no longer just an advantage. They are becoming an essential part of the future of rail production.

**FOR MORE INFORMATION
VISIT OUR WEBSITE AND
BOOK A DEMO TODAY!**

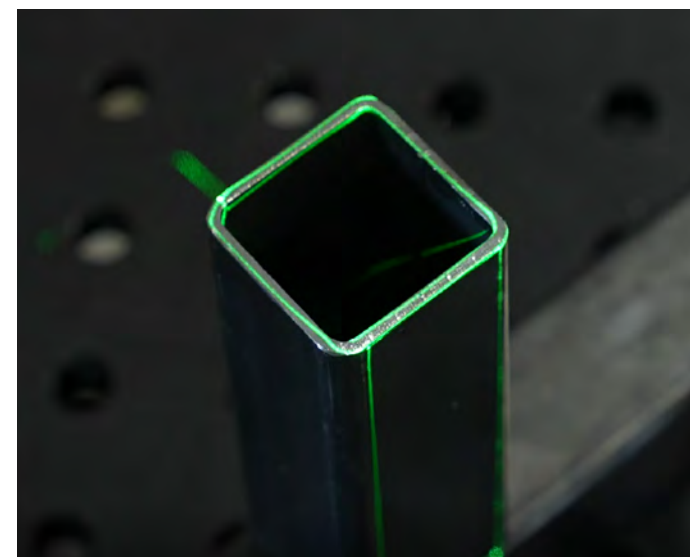
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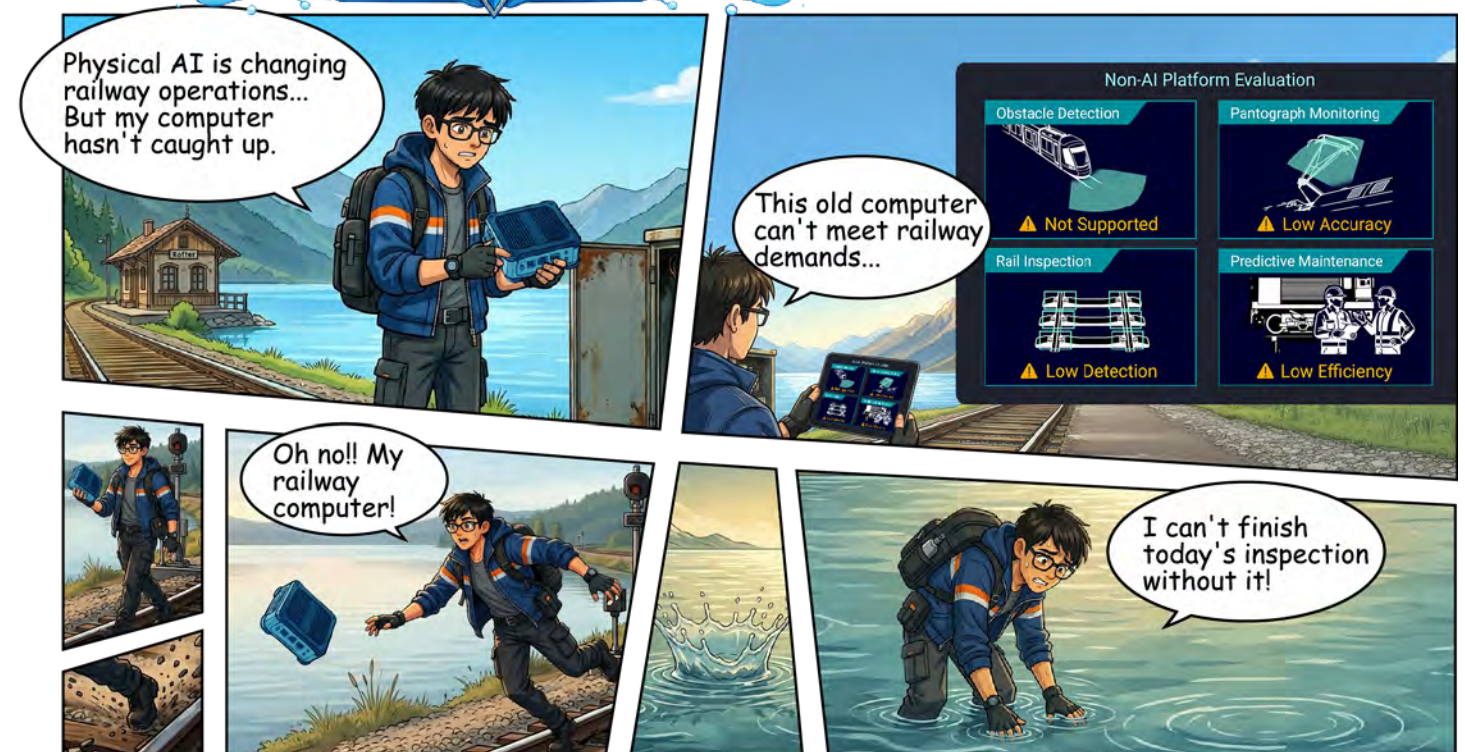
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Rolling Stock Manufacturing & Maintenance

NEXCOM



Huh... what happened?

I dropped my railway computer.

What did you lose in the water?

Did you lose this... ATC 3760?
Powered by NVIDIA® Jetson Thor™

Then perhaps... aROK 8030?
Powered by Intel® Core™ Ultra Processor (Series 4)

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Jetson T4000™/T5000™
Physical AI
IP67
GMSL2
EN 50155
PoE

CPU + NPU + GPU
Nova Lake-S
Physical AI
IP67
MXM
EN 50155
PoE

No... Mine was much older

No, that's not mine either

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Rail Inspection

Predictive Maintenance

Your honesty deserves an upgrade. Keep them both.

Now that's railway-ready AI.

My computer fell in too!

I only reward honest engineers!

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NEXCOM Unveils Physical AI Railway Computing Platforms Powered by NVIDIA® Jetson Thor™ and Intel® Architectures

NEXCOM has expanded its **Physical AI portfolio** with a new generation of edge inference platforms designed to accelerate AI deployment across modern railway infrastructure. Combining NVIDIA Jetson Thor and Intel-based architectures, the solutions enable scalable AI processing from onboard vehicles to stations and wayside systems.

The ATC 3760, an IP67-rated railway computer powered by NVIDIA Jetson Thor, and the aROK 8030, an IP67-rated platform based on Intel® Nova Lake-S with MXM GPU expansion, deliver rugged, high-performance AI computing for rail applications. When deployed with optional AI cameras, LiDAR, and other sensors, the platforms enable Physical AI applications that bridge real-world sensing and real-time edge inference, enhancing railway safety, operational efficiency, and passenger experience.

Visit NEXCOM at Booth #615 during InnoTrans 2026 to learn more about its latest Physical AI solutions for rail transportation.

High Performance Edge AI Computer Powered by NVIDIA® Jetson Thor™

ATC 3760

- Jetson T4000™/T5000™, up to 1,200/2,070 FP4 TFLOPS AI performance with 128GB memory
- 8 × PoE+ (120W), 1 × 10GbE, and 1 × 2.5GbE LAN (model dependent)
- 8 × GMSL2, 1 × 10GbE, and 3 × 2.5GbE LAN (model dependent)
- Optional 5G and Wi-Fi 6 support



Intel® Core™ Ultra Processor (Series 4) with AI Inference Accelerator

aROK 8030

- Up to 138 TOPS AI performance from the CPU
- 8 × PoE+ (120W), 1 × 10GbE, and 1 × 2.5GbE LAN
- Supports NVIDIA RTX™ 2000/3500/5000 Ada Generation MXM GPUs
- Optional 5G and Wi-Fi 6 support
- Multi-wireless support with up to 4 WWAN modules and dual SIM per modem (model dependent)





Rolling Stock Manufacturing & Maintenance

SŽ-VIT

Growing Together with Rolling Stock

From the moment the first train chugged down the track on present-day Slovene network, maintenance was needed to keep it in service. Fast forward almost 170 years, and what used to be simple steam locomotive sheds grew into five large workshops and five light maintenance depots. Together, they supply complete maintenance services for all types of rail vehicles operating on the two key European rail corridors which run through Slovenia.

The country's favorable geographical location and the steady growth of the fleet owned by the incumbent train operating company, Slovenian Railways (SŽ) allowed SŽ-VIT to gain the know-how required to offer rail maintenance services to rolling stock owners across Europe.

In Europe most rail maintenance workshops owned by national rail operators have one chief role – deliver reliable and quality rolling stock maintenance services to the controlling company, and SŽ-VIT was no exception to that rule. The liberalisation of the European rail

market at the turn of the 20th century, especially in rail freight, however, opened the rail network to rolling stock leasing companies and to other train operating companies, which was a game changer for us. Almost twenty years ago, our first post-liberalisation partnerships were with freight fleet owners, and over the past decade we have built successful long-term cooperation with owners of electric locomotives, also.

Each new vehicle added to SŽ's fleet is a new opportunity for our growth – from upgrading our workshop with new tools or machines and training our staff to acquiring new certifications. The quality of our maintenance work, individual approach to every customer and flexibility helped us earn the trust of many rolling stock owners, some who do not even operate on Slovene rail network but bring in their locomotives specifically for scheduled overhauls.

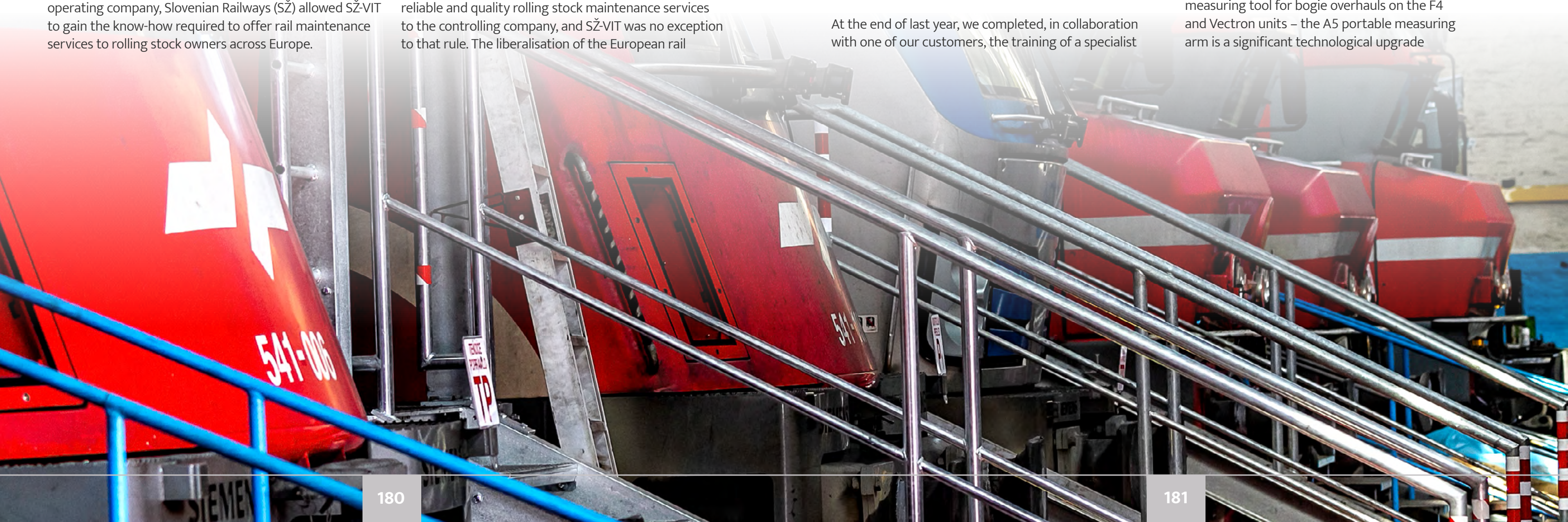
Maintenance of electric locomotives for international customers started years ago with Siemens ES64 F4 electric locomotives, continued with the ES 64 U4 later on, and today we are fully qualified to maintain the Vectron locomotives built by Siemens, which are some of the most common locomotives operating in Europe. Each of those vehicles was a valuable source of know-how, as well as a source of new challenges.

At the end of last year, we completed, in collaboration with one of our customers, the training of a specialist

technician for the maintenance of ETCS, SCMT and TBL+ on-board train control systems in Siemens Vectron (X4). Another important milestone in Vectron maintenance was reached earlier this year in June, when we launched an overhaul of the first locomotive of this type for a long-standing international customer. Before we could take on this challenge, we had to satisfy certain conditions, such as upgrading our shop with a measuring arm and getting certified to Knorr braking system maintenance.

The brakes certificate is held by the team of technicians who carry out electric locomotive maintenance for international customers. The training was done by Knorr at our facilities in Ljubljana and involved passing a competency assessment to obtain the certificate. Having become certified for Knorr brakes maintenance on Vectron (X4) on top of Siemens ES 64 U4 and ES 64 F4's brake systems, we now have the 'full package'. At the highest level, this kind of maintenance involves overhauls (also known as 'revisions' in continental Europe), in which all brake components are unmounted and sent to Knorr for servicing.

At the start of this year, we purchased a new measuring tool for bogie overhauls on the F4 and Vectron units – the A5 portable measuring arm is a significant technological upgrade





for our workshops. While currently used by a few workshops in Europe, it is still far from common. The tool is mainly intended for high-precision dimensional inspection of bogies, but can also be applied to other large components. High-resolution rotary encoders integrated into each joint continuously record the angular position of every axis. Based on the known geometry of the arm and the measured angles, the software calculates the exact three-dimensional coordinates of the probe tip in real time. This enables technicians to create highly accurate digital models of components, which can be used to build replacement parts.

The investment in this technology allowed us to secure a major two-year contract covering bodywork and bogie overhauls on the F4 and Vectron. It also boosted both our maintenance capabilities and the expertise of our technicians, making sure our locomotive maintenance services stay competitive in the greater area alongside the RFC 5 and RFC 10 European rail freight corridors. We are also looking forward to the Traxx locomotives entering service on the Slovene rail network, which will serve as another opportunity to grow.

Electric traction aside, we also offer modernisations of diesel and shunting locomotives. Recently, we completed two major modernisation projects on diesel locomotives which mostly run service in the Balkans, which remains one of our key markets for diesel traction maintenance. These projects typically involve completely refurbishing the locomotive and replacing the engine but can also extend to the refurbishment and replacement of other components.

Another important milestone was reached with the maintenance of the new generation of Stadler EMUs and DMUs, operated by Slovenian Railways' passenger train

operator, SŽ-Potniski promet. After the first inspections back in 2020 along with some workshop adjustments to be able to undertake double-deck unit overhauls, we are now fully qualified to offer comprehensive maintenance capability on both FLIRT and KISS trains. Maintenance of various levels is delivered from points across Slovene rail network to maximise fleet availability. Although Stadler multiple units have a maintenance sequence that is different from the one usually applied to the vehicles in our care, we have successfully adapted and are now able to offer almost all maintenance levels. At present, we carry out maintenance on more than half of the multiple units no longer covered by the manufacturer's warranty, and within the next few years we plan to cover the maintenance needs for the entire fleet of 72 Stadler units. Amongst other, our specialist services include a dedicated wheelset replacement workshop in Ptuj and engine replacement on diesel multiple units.

As new rolling stock enters service – be it on Slovene rail network or elsewhere in Europe – we continue building our name as a trusted maintenance partner for all types of rail vehicles with a focus on long-term partnerships that allow us to grow as our customers' fleets evolve and new technologies emerge. Each new project is an opportunity to deliver technical excellence and, in particular, to create relationships that last, allowing us to offer support for the long haul.

At SŽ - VIT, we keep your vehicles FIT.

For more information, [visit our website](#), leave a message or give us a call.

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Rolling Stock Manufacturing & Maintenance

DST-CHEMICALS

Cleaner Bogies. Lower Energy Bills.

Hheavy contamination, high operating temperatures and short bath life are costing rail maintenance workshops more than they realise. DST-CHEMICALS has been solving exactly this problem for nearly 40 years. Here is what it looks like in practice.

The Real Cost of Cleaning a Bogie

Ask a workshop manager what their cleaning chemistry costs and they will give you a price per litre. Ask them what their cleaning process costs and the conversation gets more interesting.

In a typical rail maintenance workshop, bogies, wheelsets and driveline components arrive contaminated with oil, grease, brake dust and particulate residues. The standard response is high-temperature washing, frequent bath changes, and a chemical spend that rarely gets scrutinised. The process works. It just works expensively.

At DST-CHEMICALS, we look at the total cost of a cleaning process, not just the product price. Energy consumption, water usage, bath lifetime, wastewater disposal, downtime and workplace safety all carry real costs. When you add them up, the chemistry is rarely the biggest line item. The temperature is.

45% Less Energy. Improved Environmental Impact.



Hamburger Hochbahn AG has operated Hamburg's subway network for more than 100 years. Keeping rolling stock in service means keeping components clean. DST-DEGREEZ/9E handles the degreasing so the engineers can focus on what matters.

Hamburger Hochbahn AG has operated Hamburg's subway network for more than 100 years. As a city-owned company in one of Europe's most sustainability-conscious cities, they take their environmental responsibilities seriously, right down to what happens in the

bogie cleaning plant at their Barmbek maintenance workshop.

Bogies and add-ons are regularly degreased, repaired and remounted in the Barmbek workshop. The process long relied on high operating temperatures and consumed

significant energy. The goal was clear: find a solution that reduces energy consumption without compromising on cleaning quality.

DST-DEGREEZ/9E, a water-based cleaner, has made it possible to reduce the temperature of the BVL cleaning plant from 60°C to 45°C with the same high-quality result. Team Manager Michael Schnabel from Hamburger Hochbahn AG put it plainly:

“It was important for us to find an energy-saving solution for the degreasing process.”

The results speak for themselves. A 15°C temperature reduction delivered energy savings of up to 45%. Water consumption dropped significantly. Bath life extended beyond six months, reducing waste and cutting the frequency of bath changes. Precise additional dosing became possible, reducing evaporation and further improving efficiency. Workplace safety improved, which also resulted in the inspection pass rate improving by up to 37%.

“A temperature reduction of 15°C resulted in significant energy savings of up to 45%! And we have further reduced our water consumption significantly.”

Michael Schnabel, Team Manager, Hamburger Hochbahn AG

Water-Based Chemistry and the Objection That Isn't

The most common objection we hear is that water-based chemistry cannot handle serious industrial contamination. We have been

Oil, grease, brake dust and particulate residues: a typical day in a rail maintenance workshop. Water-based chemistry from DST-CHEMICALS clears the contamination at 45°C, not 60°C, and keeps the bath running for more than six months.



proving that wrong since 1987, across metalworking, automotive, in general manufacturing and also in rail maintenance.

The key is not simply switching products. It is understanding the specific cleaning process including the contamination profile, the component geometry, the washing equipment and the performance or cleanliness requirements. That is what our ‘Pure Performance’ approach is built on: evaluate, test, convert and support. We do that for every customer.

For rail maintenance operations, the contamination loads are demanding, we know that. But nothing our water-based chemistry cannot handle when the process is set up correctly. The energy savings are not a side benefit. They are a direct consequence of using the right chemistry at the right temperature.

Meet Us at InnoTrans 2026. Hall 6.2, Stand 440.

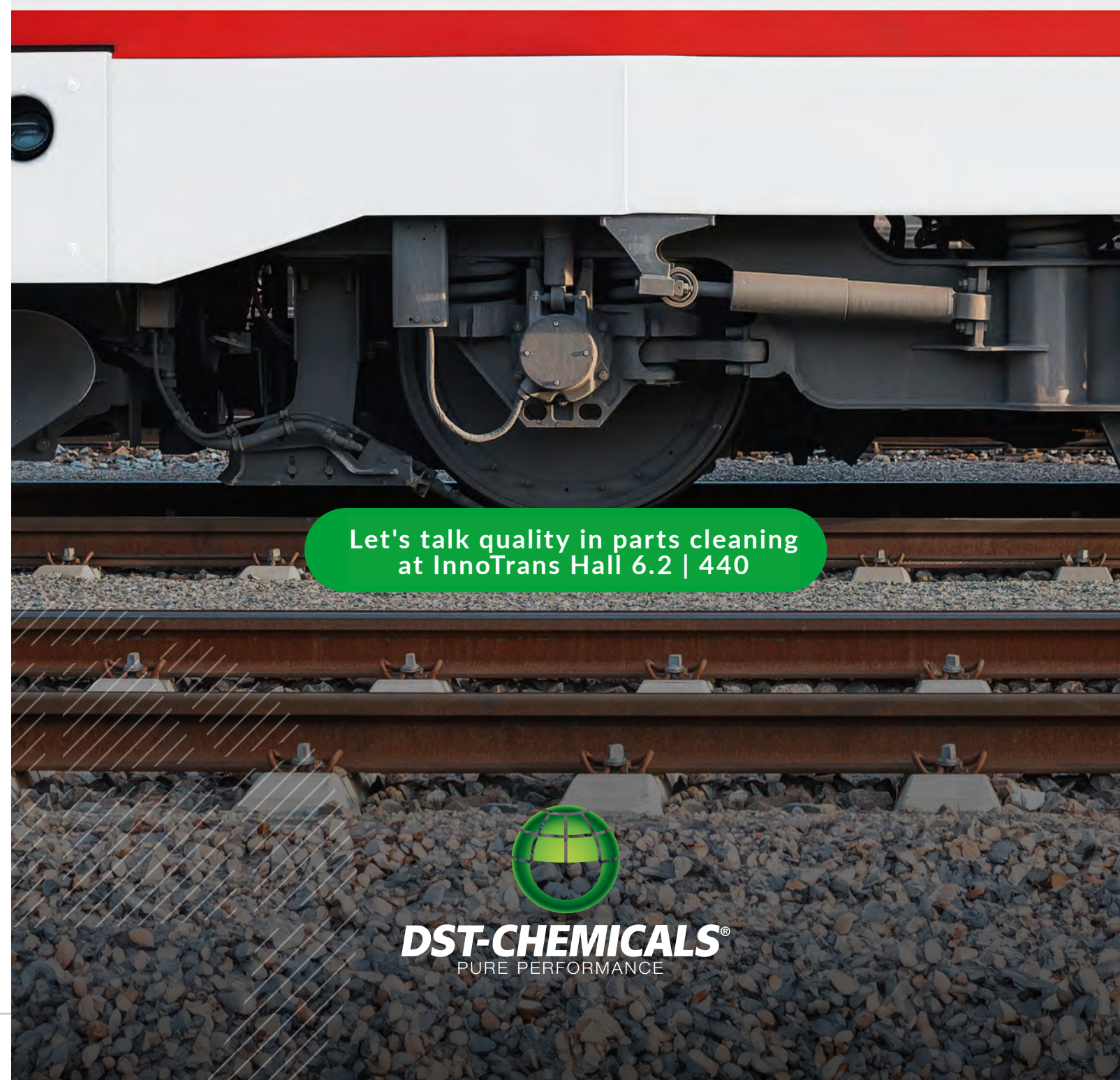
DST-CHEMICALS will be at InnoTrans 2026 in Berlin, on 22 - 25 September, Hall 6.2, Stand 440.

If you run a maintenance workshop, manage a rolling stock overhaul operation, or specify cleaning processes for bogie and driveline components, we would welcome a conversation.

Bring your process challenge. We will bring the numbers.



Keep your industrial cleaning on track



Let's talk quality in parts cleaning at InnoTrans Hall 6.2 | 440





Rolling Stock Manufacturing & Maintenance

griwecolor

Up to 40% Weight Reduction for Modern Railway Vehicles

Why griwephon® AN2-900 light Is More Relevant Than Ever

The requirements for modern railway vehicles continue to increase. Manufacturers and operators alike face the challenge of reducing energy consumption and operating costs, achieving sustainability targets, and at the same time further improving passenger comfort.

As a result, every component of a vehicle is coming under closer scrutiny. Every kilogramme saved contributes to improved energy efficiency, supports the reduction of operating costs and helps promote more sustainable mobility.

Alongside materials, vehicle structures and propulsion systems, vibration damping is therefore becoming increasingly important.



Product Container 'griwephon AN2-900 light'

Vibration Damping as a Contribution to Lightweight Design

Vibrations in sheet metal and structural components are a significant source of structure-borne noise and unwanted sound generation in railway vehicles. Effective vibration damping helps increase passenger comfort and sustainably improve a vehicle's acoustic performance.

At the same time, modern solutions must meet growing demands for lightweight construction, energy efficiency and sustainability.

This is exactly where **griwephon® AN2-900 light** comes in.

The water-based anti-drumming coating was specifically developed for applications where high vibration damping performance must be combined with the lowest possible weight.

Up to 40% Less Weight

One of the key benefits of **griwephon® AN2-900 light** is its ability to significantly reduce the weight of vibration damping systems.

Compared to conventional materials, weight reductions of up to **40%** can be achieved.

This weight saving has a direct impact on the overall performance and efficiency of a railway vehicle.

Lower weight means:

- reduced energy consumption during acceleration
- improved energy efficiency
- lower operating costs
- reduced CO₂ emissions throughout the entire service life
- support for modern lightweight design concepts

Particularly in vehicles where energy efficiency and sustainability are key requirements, eliminating unnecessary weight can make a valuable contribution to overall vehicle optimisation.

Proven Technology for Modern Requirements

Weight reduction, energy efficiency and sustainability are among the primary development goals of modern railway vehicles. Manufacturers and operators continuously seek solutions that provide measurable benefits and

help optimise vehicle performance.

griwephon® AN2-900 light has proven itself for many years in demanding railway applications and continues to represent the state of the art in modern vibration damping systems.

Its extensive practical track record, combined with today's requirements for weight reduction, energy efficiency, and sustainability, makes **griwephon® AN2-900 light more relevant than ever.**

Especially where acoustic performance, passenger comfort, and lightweight construction targets must all be achieved at the same time, the system provides a proven and economical solution.

How griwephon® AN2-900 light Works

Vibrations in sheet metal and structural components are among the primary causes of structure-borne noise and unwanted sound generation in railway vehicles.

griwephon® AN2-900 light is applied directly to the relevant components and forms a highly effective damping layer after drying. The coating reduces vibration amplitudes by dissipating vibration energy within the material itself.

As a result, both vibration and structure-borne noise are effectively reduced, contributing to greater passenger comfort and improved acoustic performance.

A key advantage is its low surface weight. Compared to conventional materials, **griwephon® AN2-900 light** can achieve weight reductions of up to **40%** without

compromising effective vibration damping performance.

This provides several advantages for vehicle manufacturers:

- up to 40% weight reduction
- lower energy consumption
- support for modern lightweight design concepts
- improved sustainability performance
- effective reduction of vibration and structure-borne noise
- enhanced passenger comfort

Sustainability Through Water-Based Technology

In addition to weight reduction, the environmental compatibility of materials is becoming increasingly important.

Today, railway vehicle manufacturers consider the entire lifecycle of materials and coating systems. Factors such as resource efficiency, processing conditions, and sustainability play an increasingly important role in material selection.

With its water-based formulation, **griwephon® AN2-900 light** supports this approach and helps combine technical performance with modern sustainability requirements.

The combination of weight reduction, energy efficiency, and water-based technology makes the system an attractive choice for manufacturers seeking solutions that address both current and future challenges.

Future-Proof Solutions for the Railway Industry

Rail transport plays a central role in the mobility of the future. To

achieve ambitious energy efficiency and sustainability targets, every component within a railway vehicle must continuously evolve.

Lightweight construction, resource conservation, and passenger comfort are no longer isolated objectives. They are closely interconnected and increasingly influence vehicle design decisions.

With **griwephon® AN2-900 light**, griwecolor offers a solution that has proven itself over many years and directly addresses these requirements: effective vibration damping, significant weight reduction, and water-based technology for modern railway vehicles.

griwephon® AN2-900 light at a Glance

- Up to **40% weight reduction** compared to conventional materials
- Water-based anti-drumming coating
- Reduction of vibration and structure-borne noise
- Enhanced passenger comfort
- Supports modern lightweight design concepts
- Successfully used in the railway industry for many years
- Proven technology that remains state of the art

Visit us at InnoTrans – Hall 8.1, Booth 310.



See you at InnoTrans
Hall 8.1 Booth 310

griwephon[®] product series



The Silent Solution for Railway Vehicles.

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Meet TÜV SÜD at InnoTrans 2026

22 - 25 September | Berlin
CityCube A | Booth 645

tuvsud.com/rail





Rolling Stock Manufacturing & Maintenance

TÜV SÜD



From Compliance to Risk Intelligence: Rethinking Safety for Battery and Hydrogen in Rail

Battery and hydrogen propulsion are entering a decisive phase in the evolution of rail transport. What was once limited to pilot projects is now moving rapidly into large-scale deployment. Across Europe, rising order volumes, an increasing number of tenders, and first operational experience in daily service of battery trains clearly show that alternative propulsion is becoming part of the new normal. This shift is changing the rail industry's perspective on innovation, safety, and operational readiness.

"The key question is no longer whether these technologies will be deployed, but how they can be introduced safely, efficiently, and at scale."

Tolga Wichmann, Lead Assessor Alternative Propulsion for Rolling Stock, TÜV SÜD

Innovation Outpacing Standards

At the same time, the regulatory landscape is still catching up. Unlike conventional rolling stock technologies, battery energy storage systems (BESS)

and hydrogen energy supply systems (HESS) are not yet fully covered by harmonised railway standards. Manufacturers are therefore required to bridge multiple worlds: combining railway-specific requirements with regulations from other sectors, such as automotive or stationary energy systems, while applying explicit risk assessment methods to demonstrate safety.

For operators and infrastructure managers, this creates a new level of uncertainty. What constitutes an acceptable level of risk? How can innovative systems be integrated into existing networks without introducing unintended

hazards? And how can safety be demonstrated in a consistent and comparable way across projects?

From Compliance to Risk-Based Thinking

In this evolving environment, safety assurance is undergoing a fundamental shift. Traditional compliance-driven approaches, built around predefined rules and standards, are no longer sufficient on their own. Instead, risk-based thinking is gaining importance. This means looking beyond individual components and understanding how systems behave under real operating conditions. Interactions between vehicles, infrastructure and operational processes must be considered, as well as failure scenarios that go beyond established design assumptions.

Battery and hydrogen technologies illustrate this challenge particularly well. While technically distinct, they both introduce system-level risks that cannot be addressed through component-level compliance alone. Battery systems, for example, involve risks such as thermal runaway, fire propagation, and the release of toxic gases. Hydrogen systems, in contrast, require careful management of high-pressure storage, potential leakage, and complex refuelling interfaces. In both cases, safety depends not only on the robustness of individual components, but on how the entire system is designed, integrated, and operated.

Beyond Approval: The Role of Operation and Maintenance

A critical aspect of this transformation lies beyond initial vehicle approval. The safety case established during the approval phase provides an essential baseline, but it does not fully reflect the realities of long-term operation. In daily service, additional risks emerge from battery ageing, changing operating conditions, maintenance procedures, and interactions with infrastructure. Workshop environments, charging processes, or hydrogen refuelling introduce further layers of complexity. In the event of a system failure or emergency scenario, technology-specific emergency response plans must be in place and clearly understood by both personnel and emergency services.

As a result, safety responsibility is no longer limited to manufacturers. Operators and maintenance entities play a central role in managing residual risks

throughout the lifecycle. Clear operational procedures, transparent communication of safety-related application conditions, and targeted training of personnel are key to ensuring safe and reliable operation over time.

Smart Assessment: Focusing on What Matters

With increasing system complexity, the need for more efficient and targeted assessment approaches becomes evident. Traditional full-scope conformity assessments often struggle to reflect the actual risk profile of innovative technologies. Risk-oriented methodologies, often referred to as "smart assessment," provide a more effective alternative. By aligning the depth and scope of assessment with the severity and likelihood of risks, they allow resources to be focused on what truly matters. This not only improves the quality of safety validation but also enables faster and more scalable approval processes: a crucial factor as alternative propulsion technologies move into widespread deployment.

Enabling Safe Innovation

The transition to alternative propulsion is essential for achieving climate targets and modernising rail transport. However, technological innovation alone is not enough. It must be accompanied by a shift towards true risk intelligence. Only by systematically identifying, assessing, and managing risks across the entire lifecycle, from design and integration to operation and maintenance, can the full potential of battery and hydrogen propulsion be realised safely.

TÜV SÜD supports this transition with established risk-based methodologies and extensive international rail expertise. By combining independent testing, inspection, and certification services with practical project experience, TÜV SÜD helps manufacturers, operators, and authorities to focus on what matters most: managing critical risks efficiently and enabling safe innovation at scale.

Further insights can be found in the [comprehensive assessment guide](#) developed by TÜV SÜD. You can also discuss the challenges and opportunities of alternative propulsion technologies directly with our experts at this year's InnoTrans.

Visit us in CityCube A, Booth 645.

[For more information visit our website.](#)



Traction & Power Supplies

RECOM Power GmbH

Full-Range Power: RECOM's Railway DC/DC Line-Up

40W and 75W Railway DC/DCs are Fully Featured.

All options are included in rail DC/DCs for a 'Plug and Play' experience.

RECOM is announcing two new cost-efficient DC/DCs for the rail market with an ultra-wide 11:1 input range to cover all nominal input voltages from 24V to 110VDC, with 24V output and a 12V and 15V output version coming soon.

Models RMD40-UW and RMD75-UW have trimmable outputs with reinforced isolation, rated at 40W (60W/10s boost) and 75W (90W/10s boost) respectively. The parts are offered as lightweight baseplate-cooled modules and thanks to their high conversion efficiency of better than 90%, they can operate at full power for OT4+ST1&ST2 classes from -40°C to +85°C with no additional cooling in any mounting position.

A wealth of features are incorporated as standard, including EN50121-3-2 filtering and disturbance protection, input reverse polarity protection, inrush current limiting, remote on/off, power-good signal/contacts, output trim and internal OR-ing diode for paralleling/redundant operation. An active hold-up circuit provides >10ms ride-through across the whole input range. Comprehensive protection



RMD40-UW series and RMD75-UW series

is included against short circuits, over-current, over-temperature and over-voltage. Along with comprehensive EN50155 certification and approvals for rail applications, these features make for easy 'plug and play' system integration with 'fit and forget' confidence from a high MTBF figure and 20 year design lifetime/useful life class L4.

The RMD40-UW is presented in a compact 100 x 60 x 30mm package while the RMD75-UW is just 110 x 73 x 40mm. Connections are by block terminals or optionally by Cage Clamp terminals as suffix /PT and a DIN-rail mounting option is available

for both versions. The units come with aluminum housing in IP20, the electronic part is conformally coated for OV2/PD2 environment and both families fulfil EN45545-2 - HL3 fire protection hazard level.

"These DC/DCs require no extra components and no external circuits for compliance with all of the relevant railway emc, safety, environmental and fire protection standards, making them a cost-effective, compact and straightforward solution for auxiliary systems that need an isolated 24V bus," comments Marco Kuhn, Product Manager DC/DC Plug & Play of RECOM.

300W Railway DC/DC Features 110VDC Output and 12:1 Input Range

Wide input railway-certified DC/DC range extended.

RECOM has also extended its 300W railway DC/DC range with the cost-effective RMD300-110-110SUW model, featuring a fully regulated 110VDC output.

Input range is ultra-wide 12:1 or 16.8V to 137.5V, to cover all common nominal rail voltages worldwide, with dips and surges according to standard EN 50155. Operation is allowed to 14.4V for 100ms and to 170VDC for three seconds and hold-up of 10ms minimum is also included across the whole

ST1 and ST2 according to EN 50155. Additionally, the DC/DC can provide a boost of 330W for 10s.

Certifications include EN 50155, EN 50121-3-2, and IEC/EN 61000-4-2,3,4,5 for EMC, EN 50124-1 for insulation coordination, and EN 45545-2 for railway fire safety. Isolation is 3.5kVAC/5kVDC reinforced.

The products are equipment Class I-rated and are designed for IP20/pollution degree 2 (PD2) and overvoltage category III (OVC III) environments up to 2000m altitude (Class II to 5000m). Additionally, the internal PCB is protected by coating according to IPC -A-610G Class 2 standard.

The product complies with environmental standards including

Full protection is included against input reverse polarity and undervoltage, overtemperature and output overcurrent, short circuits and overvoltage. For increased power or redundancy, an output OR-ing diode function is included for paralleling outputs. Control and monitoring features include remote ON/OFF, current share pin, output trim, and a Power OK signal indicated by an LED and volt-free relay contacts.

The product is offered in a compact 209 x 141 x 48mm open-frame package with protective cover. Connections are by screw terminal.

"Our RMD300 range now includes 110VDC output which is ideal for powering downstream railway equipment that has a limited input range," comments Marco Kuhn, Product Manager DC/DC Plug & Play of RECOM.

"The DC/DC is fully compliant with rail specifications without need for external components."



RMD300-UW series

input range, to allow for supply dropouts with no loss of function.

The RMD300-110-110SUW operates to 85°C ambient without derating using convection/conduction cooling and to 90°C with derating, allowing the product to be rated for Class OT4 and extended Classes

EN 60068 for temperature testing and EN 61373 for life, shock and vibration testing in Class B body-mount applications. Reliability is 1.36M hrs MTBF calculated at 40°C according to IEC 61709/UTE C80-810 and design lifetime is 20 years, rated 'Useful Life Class' L4, according to EN 50155.

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RECOM



Traction & Power Supplies

Stäubli

Stäubli: One Partner. All Railway Connections. Supporting the Next Generation of Rolling Stock with Integrated Solutions

As trains become more complex, the connections between their critical systems are becoming just as important as the systems themselves. At InnoTrans 2026, Stäubli will demonstrate how integrated electrical and fluid connection solutions can help simplify the design and operation of next-generation rolling stock.



Michel Schmitt,
Global Business Head
for Railway at Stäubli



Alexandre Lagrange,
Product Manager for
Railway at Stäubli

A System-Level Approach Built for Rail Realities

Connection technology may not be the most visible part of a train, but every critical onboard function depends on reliable electrical and fluid interfaces. These connections must withstand vibration, thermal cycling, electromagnetic interference and decades of continuous operation – while remaining easy to maintain.

For more than forty years, Stäubli has supported the railway industry with connection solutions designed specifically for these demanding environments. As Michel Schmitt, Global Business Head for Railway at Stäubli, puts it: *“Our job is to ensure the continuity of critical energy and fluid systems throughout a train’s entire service life, and to do so safely, reliably and sustainably.”*

But today’s trains incorporate more onboard systems, run at higher frequencies and increasingly rely on battery technologies alongside traditional electrification. At the same time, rail operators are under pressure to do more with less: less installation space, less downtime and lower lifecycle costs – ultimately placing greater demand on the connections that link every subsystem together.

“In cities such as London or Paris, trains are running every 90 seconds,” says Alexandre Lagrange, Product Manager for Railway at Stäubli. *“If one train stops during commercial operation, you affect traffic across the entire network. The margin for error is essentially zero.”* This is forcing designers, and suppliers, to think more carefully about how different onboard systems connect – especially where electrical power and thermal management have to coexist within the same limited space.

EvoTrak Lite product range



Reliable Power Across the Traction Chain

The traction chain is one of the areas where a train’s electrical architecture is most exposed to stress, with connectors required to perform under continuous vibration and extreme temperature variations.

“The EvoTrak range was designed to address that challenge across multiple rolling stock types and power levels,” says Alexandre Lagrange.

Building on that range, a newer addition to the traction chain offer is EvoTrak Shield, specifically developed for shielded power cables in response to increasingly digitalised rolling stock. *“With each new generation of train incorporating more communication systems, the risk of electromagnetic interference affecting power cables has grown, making shielding essential for reliable power transmission,”* says Alexandre Lagrange.

Integrated Solutions for Battery Systems

Battery applications, too, reflect broader shifts across the rail market, particularly on non-electrified lines where alternatives to diesel are gaining importance. But as battery capacity increases, so does the need for effective thermal management. As Alexandre Lagrange explains: *“When you increase the power in a battery system, you also increase heat generation. And when you increase heat, you need more cooling.”*

A traction battery therefore requires both electrical connections for power transfer and monitoring, and fluid connections to manage cooling circuits. Stäubli’s approach is to address these

requirements together, combining electrical and fluid expertise within a single connection strategy.

This integrated approach is reflected across Stäubli’s battery connectivity solutions and is already evident in the company’s multi-connections for cooling applications (MCC) range, designed for power electronics applications such as converters, transformers and inverters. By combining electrical and cooling circuits into a single docking operation, MCC helps simplify installation while reducing the risk of connection errors. Meanwhile, integrated guidance features support accurate positioning during assembly, while non-spill

Multi-connections for cooling applications



disconnection and overpressure protection enable repeated maintenance operations throughout the vehicle’s service life.

Engineered for Forty Years of Service

That focus on long-term performance is essential in the railway industry, where the value of connection technology is measured by its ability to perform over decades.

“Train platforms are built for forty to forty-five years with midlife operation at 20-25 years,” Michel Schmitt notes. *“There is no opportunity to change a connector halfway through their operational life.”*

To meet these expectations, Stäubli develops, qualifies and manufactures its products in-house. Supported by railway-related activities certified to IRIS ISO/TS 22163, the industry’s quality management standard, Stäubli also relies on a dedicated railway testing laboratory. There, products undergo comprehensive validation under conditions encountered throughout

Power & Energy

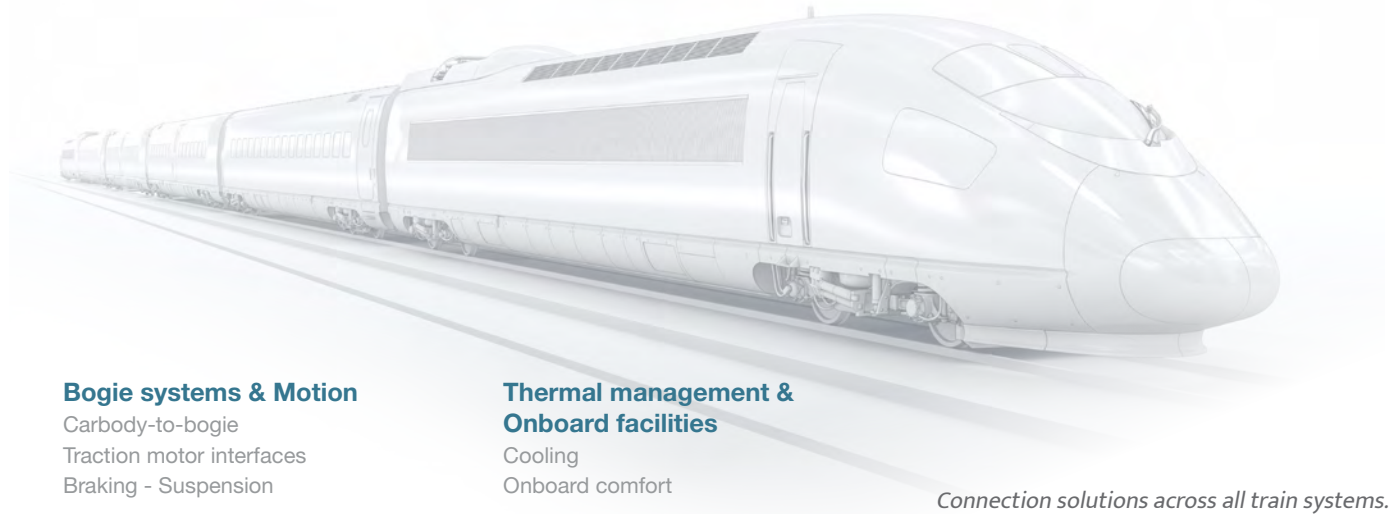
Pantograph - Transformers
Traction - Auxiliary converters
Batteries - Fuel cell

Fluids & Maintenance

Filling - Draining
Service operations

Traction chain

Inter-car/train connections



Bogie systems & Motion

Carbody-to-bogie
Traction motor interfaces
Braking - Suspension

Thermal management & Onboard facilities

Cooling
Onboard comfort

Connection solutions across all train systems.

railway service, including shock, vibration, thermal cycling, salt spray and electromagnetic stress.

Meanwhile, the company's patented MULTILAM contact technology helps ensure consistent electrical performance over the lifetime of the connection, maintaining low contact resistance over hundreds of mating cycles – particularly valuable in railway applications where connectors are repeatedly disconnected and reconnected during maintenance.

"We have forty years of experience in this market," Michel Schmitt adds. "We develop our products, we qualify them, we produce them. We manage the complete value chain. That's what stands behind the reliability we talk about."

One Partner. All Railway Connections.

For Stäubli, this lifecycle approach goes beyond individual products. It means supporting customers from the initial engineering phase through integration, operation and maintenance.

"Whatever connection challenge exists on a train – electrical, fluid, or both – there is one team to talk to, and one supplier accountable for the solution across the full lifecycle," Michel Schmitt says.

"Combining electrical and fluid systems within a unified approach simplifies installation, facilitates maintenance and reduces operational risk over the lifetime of the train. But beyond a portfolio of products, what we offer is a cross-functional approach to connections –

reducing complexity for our customers and ultimately saving both time and cost," Michel Schmitt concludes.

As rolling stock becomes more sophisticated, the ability to manage these interfaces effectively will become increasingly important. By combining electrical and fluid connection expertise with decades of railway experience, Stäubli aims to provide customers with a single, reliable partner for the critical connections that keep trains running.

Visit Stäubli at InnoTrans

Visitors to Stäubli's stand at InnoTrans 2026 in Berlin (Hall 12 / Booth 350) will be able to explore this integrated approach through demonstrations of the company's latest electrical and fluid connection technologies, including a model train illustrating traction chain and battery applications in their operational context.

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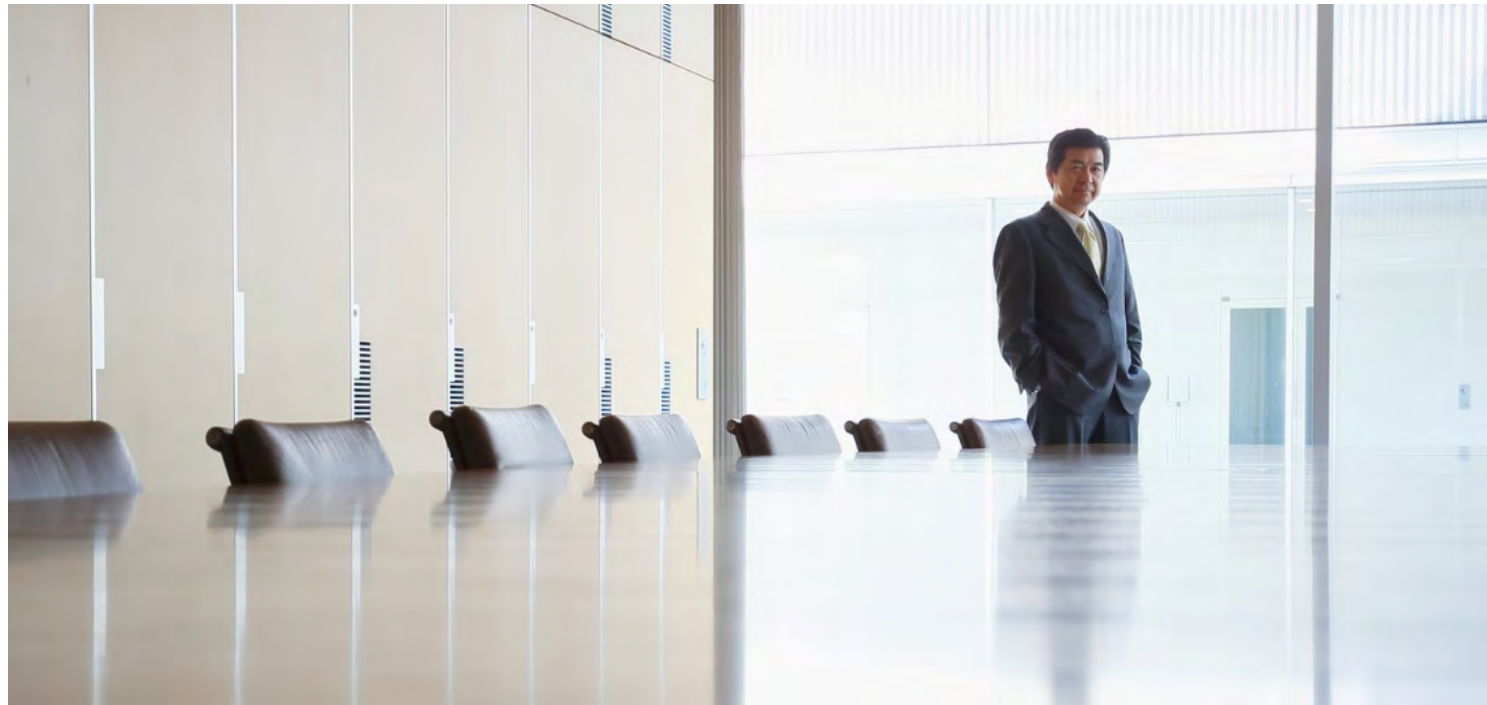
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Staff Training & Recruitment

Stahl Recruiting Executive Search



The Invisible Drag on Growth: Why Your Leadership Searches Are Stalling

In the high-stakes world of rail infrastructure and logistics, the difference between a thriving enterprise and one struggling to scale often boils down to a single variable: leadership. Yet, when companies face the urgent need to fill a critical executive role, they frequently find themselves trapped in a cycle of diminishing returns. The search drags on for months, the candidate pool feels shallow, and the momentum required to drive strategic growth dissipates.

For many organizations, the primary friction in executive recruitment is not a lack of talent in the marketplace, but a failure of precision and reach in the identification phase.

The Misalignment Trap

The most common point of failure in an executive search occurs before a single candidate is even contacted. When a search begins without absolute, organization-wide consensus on the mandate, the process is compromised from the start. Committees often approach these roles with competing visions – one stakeholder prioritises immediate operational efficiency, while another demands long-term transformational leadership. This lack of alignment doesn't just slow the search; it leads to a 'satisfactory' hire rather than a transformative one.

Stahl Recruiting intervenes by stripping away this ambiguity. We shift the focus from merely filling a vacancy to defining the specific strategic, financial, and operational levers the new leader must pull to move your business forward. By securing total alignment at the executive level before the search begins, we transform a chaotic, multi-month slog into a directed, intentional pursuit of excellence.

Beyond the Reach of Standard Networks

In highly specialised sectors like global rail transportation and infrastructure, the most qualified leaders are almost never actively job hunting. They are deep in their current roles, delivering results. Traditional recruitment channels – job boards, automated outreach and broad-spectrum headhunting – are ineffective because they fail to capture this passive, high-impact talent.

The struggle is often a result of relying on shallow networks. True executive search requires deep, decades-long connectivity that only comes from being embedded within the industry ecosystem. Stahl Recruiting solves the problem of 'narrow pools' by leveraging an intimate understanding of the industry's human geography. We don't just look for candidates; we engage individuals whose careers and trajectories are already known to us, bypassing the friction of discovery and moving directly into substantive, high-level dialogue.

Preserving Momentum and Confidentiality

A stalled mandate is a risk to the business. When search processes lose momentum – due to slow feedback loops, fragmented communication or the inability to handle the delicate dance of a senior-level recruitment, your brand's reputation in the marketplace suffers. Furthermore, the sensitivity of executive moves requires a degree of discretion that is difficult to maintain without a dedicated, single-point-of-contact strategy.

Stahl Recruiting operates as an extension of your leadership team. We manage the delicate balance of confidentiality and urgency, ensuring that the process is professional, streamlined, and airtight. By taking ownership of the feedback loop, we prevent the 'ghosting' and delays that typically sour high-caliber candidates. We move the mandate with a pace that reflects the importance of the hire, ensuring that your search for leadership doesn't become an obstacle to your company's next phase of growth.



Is your current executive search process stalling your strategic objectives? Connect with Stahl Recruiting to refine your approach and secure the leadership your infrastructure projects require.

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Pearland, Texas, 77584, United States





Financial & Professional Services

KfW IPEX-Bank

Why Türkiye Is One of the World's Most Promising Rail Markets

Türkiye occupies a uniquely strategic position as a Eurasian logistics hub. Not only is it within a four-hour flight of 67 countries, on the ground it's also a key link in the 'Middle Corridor': the trade route that connects China, Central Asia and Europe

The country's strategic positioning is set to be reinforced as global trade routes adapt to a more volatile geopolitical landscape – the impact of disruptions at the Strait of Hormuz being a case in point – and by a significant expansion of the country's rail network.

Türkiye's Transport Master Plan aims to more than double the national rail network from 13,919km today to 28,590km, and to increase rail's freight share from 5% to 22% and passenger share from 0.96% to 6.2% by 2053. It also targets 35% of rail energy demand to be sourced from renewables, positioning rail as central to decarbonising transport.

High speed rail is central to this growth. At 2,251km, Türkiye's high-speed network is already the sixth largest in Europe and eighth largest in the world, with plans to reach 6,000km by 2035. All these goals sit alongside Türkiye's wider climate commitment of a 41% reduction in greenhouse gas emissions by 2030, and achieving net zero by 2053.

Due to its topography, much of Türkiye's rail expansion will run through demanding terrain, requiring the



With billions of euros in ECA-backed financing already secured and a pipeline of major projects still to come, Türkiye is proving itself one of the most active and promising rail investment destinations, says Olgaç Emir Aksoy, Vice President of KfW IPEX-Bank Türkiye.

construction of costly tunnels and viaducts. This is one reason why, over the next 30 years, the government plans to invest US\$70bn in rail infrastructure and rolling stock, positioning its rail expansion as one of the country's most strategically significant infrastructure undertakings, drawing increasing international attention as a result.

Funding the Master Plan

Given the scale of investment required, the Ministry of Treasury and Finance of Türkiye, in coordination with the Ministry of Transport and Infrastructure of Türkiye, aims to identify the optimal external financing mechanisms, particularly through Export Credit Agencies (ECAs) and Multilateral Development Banks (MDBs), to enable the realisation of Türkiye's rail ambitions.



ECA-covered loans work by providing a state-backed export credit guarantee to the lending banks, mitigating the risk of non-payment. This allows investors to access long-tenor financing on favourable terms, while suppliers are protected against payment risk, in turn enabling European manufacturers and banks to enter markets that might otherwise be considered relatively high-risk.

A critical enabler of this model is the early involvement of the engineering, procurement and construction contractor (EPC), as sourcing decisions from European suppliers directly affect a project's eligibility for ECA coverage. Turkish EPCs have built considerable expertise in this area, having delivered ECA-backed projects not only domestically but across multiple geographies worldwide, making them sophisticated, reliable partners for structuring complex financing deals.

Green rail projects, including electrified lines, benefit further still, with ECA tenors extended to construction plus 22 years, making such schemes more financially viable for fast-growing markets like Türkiye's.

This expertise has been instrumental since 2020, when the Turkish Treasury began acting as borrower for rail projects under an EPC-F (engineering, procurement, construction and finance) structure. The shift opened the door for ECAs to play a far more prominent role in the sector, with multilateral development banks frequently providing additional coverage alongside them.

The first transaction under this structure was a €2.1bn financing with a guarantee from UK Export Finance (UKEF) for the Ankara-İzmir high speed rail project in 2021. Five further ECA-backed rail financings have followed since then.

KfW IPEX-Bank's Presence in Türkiye

KfW IPEX-Bank has been involved in three of these transactions, including Ankara-İzmir. The others were a €2.6bn financing for the high-speed rail line connecting Türkiye to Azerbaijan, structured as a

green loan, and a €1.6bn rail and tunnel project in the earthquake-affected south-east. Across these transactions, the bank has taken participant roles with strong commitment – and it has an appetite to act as arranger/co-arranger depending on the project's size, structure and ECA eligibility, in the following period.

KfW IPEX-Bank's flexibility, combined with its deep sector expertise, has made it a trusted partner in Türkiye. Mobility is the bank's largest business segment, and rail infrastructure sits at its core. This gives it the technical grounding to work closely with EPCs, borrowers and government counterparts including Türkiye's Ministry of Treasury and Finance and Ministry of Transport.

This is reinforced on the ground by a Representative Office in Istanbul, which has helped support European exports to Türkiye since 2006. KfW IPEX-Bank manages a balanced portfolio spanning renewable energy, transportation, financial institutions and infrastructure in Türkiye. The Istanbul team is here to represent the bank, follow the developments in the country and provide a cultural bridge.

But KfW IPEX-Bank's experience extends well beyond Türkiye, with rail financing delivered globally in markets including India, Egypt and Tanzania, alongside expertise in meeting environmental and social standards on greenfield infrastructure projects. That breadth of experience, paired with its established track record inside Türkiye, positions the bank to play a continued prominent role as the country's rail pipeline develops.

What's Next?

Türkiye's appetite for new rail projects shows little sign of slowing. In this respect, General Directorate of Infrastructure Investments of Türkiye (AYGM) is heavily working on new rail infrastructure tenders for expanding the high speed & conventional rail network of the country while the Ministry of Treasury and Finance of Türkiye is intending to finance 2–3 mega transactions each year.

Despite this strong project pipeline, some headwinds remain as securing financing is becoming increasingly complex. Several ECAs active in Türkiye are approaching their country exposure limits, potentially constraining the amount of export credit support available for future projects. At the same time, the scale of planned investment is likely to require a broader mix of financing sources, including Multilateral Development Banks (MDBs), Development Finance Institutions (DFIs) and

commercial lenders, with increasingly sophisticated financing structures to bridge funding gaps.

Execution may also be influenced by competing public investment priorities. Significant resources continue to be directed towards post-earthquake reconstruction, while the expansion of renewable energy and other strategic infrastructure sectors is creating additional demand for public funding and external finance. These competing priorities could affect both the timing and sequencing of future rail procurements.

Against this backdrop, maintaining the current pace of rail development will depend not only on sustained government commitment, but also on the continued availability of external financing and sufficient risk appetite among ECAs and other lenders. While Türkiye retains a substantial pipeline of rail projects and a well-established EPC market, financing constraints are likely to become an increasingly important factor shaping project delivery in the years ahead. As KfW IPEX-Bank, we intend to further increase our strong commitment to assist the promising targets of the country in the rail sector.

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KfW IPEX-Bank



Crew Management

Menlo79 GmbH

Workforce Orchestration: The Next Performance Frontier for Rail



The rail industry has never managed more complexity than it does today.

Operators and contractors are expected to deliver reliable services while dealing with increasing cost pressure, ageing workforces, changing regulatory requirements and growing expectations around punctuality, safety and operational resilience. At the same time, projects are becoming larger, workforces more specialised and operational environments more dynamic.

Over the last decades, the industry has invested significantly in infrastructure, rolling stock, signalling and digital traffic management. Yet one critical operational asset has often remained supported by fragmented systems and highly manual processes: the workforce.

People are at the centre of every railway operation.

Drivers, dispatchers, maintenance teams, shunters, controllers, inspectors and many others ensure that services run safely every single day. Coordinating these resources efficiently has become one of the industry's greatest operational challenges.

Increasingly, this is no longer simply a planning exercise. It is about orchestrating people, competencies, compliance, operational services and real-time information as one connected system, creating the foundation for intelligent, AI-supported operational decision-making across workforce, assets and operations.

Workforce Management Has Become a Performance Discipline

For many organisations, workforce management is still perceived as an administrative function. In reality, it directly influences operational performance.

Every roster adjustment, every qualification check, every fatigue validation and every payroll correction consumes valuable time. Small manual activities accumulate throughout the organisation, creating unnecessary administration while reducing the time available for operational decision-making.

Many railway organisations continue to work across multiple disconnected applications, spreadsheets and legacy systems. Information is entered several times, operational changes are transferred manually between departments and valuable workforce data remains fragmented across different platforms. The result is familiar throughout the industry: higher administrative effort, slower decision-making, reduced flexibility and increased operational risk.

Organisations that have digitised these processes consistently report significant improvements. Modern workforce management solutions can reduce administrative effort by around 70%, lower workforce administration costs by approximately £250 per employee per month and increase workforce productivity by 10–15%, depending on the operational environment.

As operational data becomes increasingly connected, organisations are moving beyond digitalisation towards intelligent optimisation. AI and mathematical optimisation can automate complex planning activities, evaluate thousands of operational scenarios in seconds and support planners with transparent recommendations, while keeping people firmly in control of every operational decision.

Perhaps even more importantly, digital workforce management enables organisations to react

more confidently to disruption.

Whether managing last-minute changes, unexpected absences or evolving operational requirements, planners gain greater visibility and significantly more time to focus on making informed decisions rather than completing repetitive administrative tasks.

Beyond Rostering: Connecting the Entire Operational Workforce

Today's operational reality requires considerably more than simply assigning shifts. Modern workforce platforms should bring together every aspect of workforce coordination into one integrated environment.

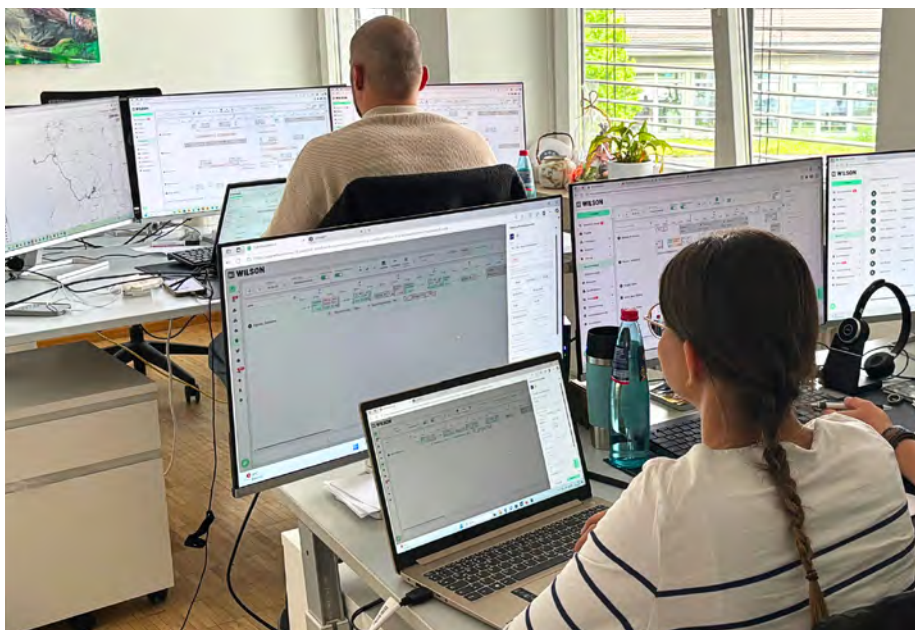
Planning itself is also evolving. Instead of manually building compliant shifts, assigning staff or coordinating rolling stock across multiple systems, optimisation technologies can automatically generate, evaluate and continuously improve operational plans while respecting contractual, regulatory and operational constraints. This allows planners

to focus less on repetitive planning activities and more on delivering reliable railway operations.

That includes competency and qualification management, fatigue management aligned with RSSB and ORR guidance, operational service planning, digital time capture, payroll preparation, mobile workforce communication and seamless integration with existing business systems. Rather than treating these as isolated processes, they become part of one continuous operational workflow.

Operational services – whether train driving, shunting, inspections or other railway activities – can be planned, assigned, monitored and completed within the same digital environment. Changes become immediately visible across the organisation, while automated rule validation supports planners in maintaining compliance without increasing administrative effort.

The result is greater transparency, improved operational resilience and more efficient collaboration between planners, operations teams and service providers.



From Workforce Management to Workforce Orchestration

At Menlo79, this broader perspective has shaped the development of the software solution WILSON. Instead of focusing solely on crew rostering, WILSON has evolved into the digital operational foundation for workforce and asset management, connecting planning, competency management, fatigue management, workforce deployment, digital time tracking, payroll preparation and, increasingly, asset planning within a single ERP environment.

Building on this operational foundation, Menlo79 is expanding its portfolio with AI and optimisation solutions that automate complex planning tasks such as shift creation, workforce allocation and asset planning. Rather than replacing existing operational systems, these solutions integrate with them, connecting operational data across the railway ecosystem and synchronising results automatically in the background. This enables planners to benefit from advanced optimisation without changing the systems they already rely on.

Operational decision support is evolving in parallel. By connecting information from operational systems, maintenance platforms, emails and other business applications, intelligent assistants can identify disruptions as they emerge, provide contextual recommendations and help dispatchers respond faster while maintaining full transparency over every suggested action.

Designed specifically for complex operational environments, WILSON supports organisations in managing their workforce more efficiently while remaining compliant with UK industry requirements, including fatigue management principles aligned with RSSB and ORR guidance.

The objective is not simply to digitise existing processes. It is to create an operational environment where information flows automatically, planners have complete visibility and routine administration is significantly reduced, allowing teams to focus on delivering safe, reliable and efficient railway operations.

As rail continues its digital transformation, workforce orchestration is becoming an increasingly important capability. The organisations that achieve the greatest operational improvements over the coming years are unlikely to be those that simply automate individual



tasks. They will be those that connect people, assets, operational services and business processes into one intelligent operational ecosystem.

Artificial intelligence will undoubtedly play a major role in this evolution. However, AI can only create value when it is built upon high-quality operational data and well-structured workforce processes. Organisations that invest in workforce orchestration today are laying exactly this foundation.

Menlo79 believes this foundation is strengthened by combining a robust operational ERP, AI-powered optimisation for planning and intelligent decision support for live operations. Together, these capabilities help rail organisations reduce complexity, improve operational performance and make better-informed decisions every day.

If these challenges resonate with your organisation, we'd be delighted to continue the conversation. Meet the Menlo79 team at InnoTrans 2026 in Berlin (CityCube, Joint Stand Berlin-Brandenburg Hall B | Stand 320) and discover how our evolving portfolio is helping rail organisations move beyond workforce management towards truly intelligent rail operations.

M79
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Upcoming Rail Events & Exhibitions

Click [here](#) to see
all of our event
and exhibitions
listings

September-November 2026

Event	Dates	Location
SEPTEMBER 2026		
Rail Technical Conference	2 September 2026	Birmingham, UK
AREMA Annual Conference and Expo	13–16 September 2026	Indiana, USA
IAA Transportation	15–20 September 2026	Hanover, Germany
Monorailex 2026	17–20 September 2026	Cairo, Egypt
InnoTrans 2026	22–25 September 2026	Berlin, Germany
EXPO Ferroviaria	28–30 September 2026	Milan, Italy
OCTOBER 2026		
APTA EXPO	4–7 October 2026	Chicago, USA
Rail Forum Annual Conference	8 October 2026	Doncaster, UK
TransCityRail South	15 October 2026	London, UK
Rail Cyber Resilience Summit 2026	20–21 October 2026	Tallinn, Estonia
Persontrafik	20–22 October 2026	Stockholm, Sweden
NOVEMBER 2026		
Singapore Urban Mobility Week	4–6 November 2026	Singapore
RIA Annual Conference	4–5 November 2026	London, UK
Scandinavian Rail Optimisation	4 November 2026	Stockholm, Sweden

Full listings at railway-news.com/events-exhibitions

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Upcoming Rail Events & Exhibitions

Click [here](#) to see all of our event and exhibitions listings

November-December 2026

Event	Dates	Location
NOVEMBER 2026 cont.		
TransCityRail North	5 November 2026	 Manchester, UK
Intermodal Europe	10–12 November 2026	 Rotterdam, Netherlands
Railway Interior Innovation Summit Europe	17–19 November 2026	 Lille, France
ERS Passenger Summit 2026	18–19 November 2026	 Prague, Czech Republic
AusRAIL	23–25 November 2026	 Brisbane, Australia
Melbourne Build Expo	25–26 November 2026	 Melbourne, Australia
London Build Expo 2026	25–26 November 2026	 London, UK
RailStaff Awards 2026	26 November 2026	 Birmingham, UK
Global Transport Expo 2026	30 November– 2 December 2026	 Riyadh, Saudi Arabia
DECEMBER 2026		
New Zealand Rail	2–3 December 2026	 Auckland, New Zealand
ARTS 2026: Shanghai International Advanced Rail Transit Technology Exhibition	9–11 December 2026	 Shanghai, China

Thank you for reading Issue 2 2026 of
the Railway-**News** magazine.

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with the rail sector.