

InnoTrans 2024 Report



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FOCUS ON

RAILWAY INFRASTRUCTURE

Big data and artificial intelligence

In order to achieve climate targets, more trains should travel on the rail network. Digital data analysis and artificial intelligence support the safety and efficiency of the systems.



3 Opportunities and limits of AI
Artificial intelligence relieves the burden on administrations in the transport industry, making it more agile and cost efficient, says AI expert Thomas Böhm in an interview with InnoTrans Report.



6 A 5G network
By 2024, the 5GMED project will ensure connectivity in cross-border rail transport between Spain and the south of France.



8 A good climate underground
Ventilation systems enable unrestricted work during tunnelling and ensure compliance with occupational health and safety regulations.



Shaping the future thanks to artificial intelligence

Deutsche Bahn is using Boston Dynamics' walking robot "Spot", equipped with sensor technology, on a test basis.

Photo: Messe Berlin GmbH

In the new AI Mobility Lab exhibition area at InnoTrans 2024, companies will be showcasing solutions from the fields of AI, robotics, data protection and cybersecurity for transport systems.

Progressive digitalisation is revolutionising almost every industry, and the mobility sector is no exception. Intelligent transport systems and networked mobility are no longer science fiction, but reality. Artificial intelligence (AI) plays a crucial role in this, and it is precisely this topic that the AI Mobility Lab at InnoTrans, which is 97 per cent booked up, is dedicated to.

Great potential

The new exhibition area is located in the established Public Transport exhibition segment in Hall 7.1a. "With the further development of the segment we are taking another step into the future. InnoTrans is always committed to reflecting the latest developments in the mobility industry," says

Kerstin Schulz, Director of InnoTrans. "AI has already arrived in the heart of the industry. With the AI Mobility Lab, we would like to offer small and medium-sized companies in particular the chance to showcase themselves at InnoTrans."

Industry experts anticipate that AI methods and solutions will increase the efficiency, sustainability and cus-

tomers-friendliness of transport in the future. AI, for instance, can be used to develop intelligent systems to optimise operations, predict servicing, increase safety and offer personalised services for passengers. This applies not only to rail operations but also to buses, which have their own exhibition area with an adjacent test circuit in the form of the Bus Display on the open-air site at InnoTrans.

Targeted solutions

At a time when networked systems and autonomous driving are becoming ever more common, however, the demands on safety and data protection are also increasing. Therefore, the AI Mobility Lab also creates a stage where exhibitors can present their approaches to improving cybersecurity and data protection to provide valuable insights into future-proof solutions.

The AI Mobility Lab offers exhibitors a dedicated platform with ready-to-use booths. The new exhibition segment will be accompanied by expert lectures and discussion panels in the AI Mobility Corner. In this forum, companies will present their innovations and ideas. This is where leading thinkers from the AI industry will come together to present groundbreaking technologies and discuss solutions for the challenges of future-oriented mobility. Visitors will benefit from first-hand industry news and take home important insights.

COMMENT

Unleashing the digital gamechanger for the future of rail!

Dr Florian Eck,
Managing Director
German Transport



Photo:
Erika Borbély Hansen

The railways of the future need quality, a solid infrastructure, committed specialists – and up-to-date digitalisation. The building blocks for this are already in place today. Automated rail operations with CBTC, ETCS and ERTMS are state of the art and part of every performance specification. Artificial intelligence supports capacity analyses, optimised driving, maintenance and the human-machine interface. Robotics can make our lives easier in the future, and step in where skilled workers are lacking. Digital twins help to simulate scenarios, detect errors at an early stage and transparently feed decisions back into the real system. There is plenty of data: the German high-speed train ICE4 alone has 7,000 sensors. In order to make this vision of the future a reality and to unleash the digital gamechangers, the railway industry, operators and the public sector must work closely together.

CONTINUED ON PAGE 2

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CONTINUED COMMENT

It is now a matter of swiftly rolling out innovations. A low level of bureaucracy in the approval process, sufficient skilled employees, funding programmes focused on implementation and tenders with leeway for innovation are the key elements needed to reach this goal. Financing is just as important. Digitalisation is an element of general interest services, so that public transport systems can be operated in a timely, demand-oriented and environmentally friendly manner. This must be made a requirement and funded.

The regulatory environment must also be fit for the future. Approvals related to data protection and data processing must be granted once for entire product ranges and then recognised throughout the EU. New regulations such as the EU Data Act and the Cyber Resilience Act are important. But they must also address the specific concerns of the rail industry, respect intellectual property, encourage innovation and not stifle it.

We are all working at full speed to make mobility even more sustainable, more connected and more easily accessible for people. The timeframe is short, the future is decided now. Let's get moving!

How to clean vehicles successfully and sustainably



The guests at the MCC could be convinced of the effectiveness of innovative cleaning agents.

Photo: Messe Berlin GmbH

The Mobility Cleaning Circle brought together experts from the transport and cleaning industries.

■ In a speech at CMS Berlin, the leading trade fair for cleaning and hygiene, Alexander Bernhard, Head of International Marketing at Tana Chemie AG, said that cleaning trains, buses or planes is like a pit stop during a car race: it has to be as quick and efficient as possible, and it should also protect the environment.

Bernhard thus succinctly summed up the core theme of the Mobility Cleaning

Circle (MCC), which took place at CMS Berlin on 20 September. This was the third time that InnoTrans and CMS Berlin had invited representatives from the transport sector and the cleaning industry to an exclusive exchange of views where they could discuss the special challenges of cleaning vehicles and ways of dealing with them. This year, sustainability was the main focus of the event, in which about 70 experts participated.

Getting the customers on board

"These sustainability issues concern us all: customers, suppliers and ourselves as service providers," noted Tom Dreiner, Managing Director of Transport Maintenance and Building Cleaning at WISAG Gebäudereinigung Holding during the panel discussion at the start of the MCC. His company has set itself the goal of achieving zero carbon emissions by 2024.

This is quite expensive, and in the end the customers will have to be prepared to pay for it. It is important to approach sustainability as a top-down issue: with a clear goal set by owners and managers, who then inspire the employees. And there is still great potential in interlinking along the supply chain.

Integrating cleaning into the design

Ramona Belkot, who is responsible for vehicle and maintenance management at metronom Eisenbahngesellschaft mbH, agrees. "When you look at a vehicle from the inside, you wonder what the manufacturers can have been thinking about," she said. In trains there are "hundreds of corners and edges" which cannot be reached for cleaning. If manufacturers would think about cleaning when designing a vehicle it would be helpful. The same goes for a deposit system for delivery boxes of cleaning products. And even if passengers don't see whether a vehicle has been cleaned sustainably or not, "we have to push the issue for ourselves." In the end, sustainable solutions are often even more economical than conventional ones.

After the panel discussion and the networking lunch, a tour of the trade fair showed exactly that. In one of the presentations, Dr Schnell showed the live exterior cleaning of a DB Regio Ost long-distance bus with his Purol N-Dry cleaning system, which allows trains and buses to be manually and drip-free cleaned in three steps.

A digital success



Connected from all over the world: the 16 participants of the Career Boost came from countries such as India, Peru, Japan, France, Italy and Germany. Foto: Messe Berlin GmbH

For the first time, the Eurailpress Career Boost offered a virtual format to international talents for their presentation.

■ On 26 September 2023, DVV Media Verlag and InnoTrans hosted the first digital Eurailpress Career Boost. The networking event brings together recruiters, human resources departments and talents from the rail industry. The format is both simple and challenging: in 90-second pitches, job seekers from the fields of engineering, sales & marketing, project management, IT and PR made their presentations to the HR departments of the rail industry via livestream. A total of 20 recruiters from five countries took part in the event, including the companies ÖBB, Siemens, Spitzke and Wabtec. They then had the opportunity to engage with the talented participants at meetings in separate breakout rooms.

In its analogue form, the Eurailpress Career Boost had already celebrated its premiere in September 2022. It was highly successful when it was held as part of the InnoTrans Campus at the world's leading trade

fair for transport technology in Berlin. Many talented people found jobs, including Poonam Shinde from RWTH Aachen University. Her performance at the Career Boost earned her a traineeship as a RAMS engineer with Alstom in December 2022.

She now returned for the digital premiere of the Career Boost just before her Master's degree in Transportation and Mobility Engineering. "I'm looking forward to talking to companies about how my career so far aligns with their objectives and values," she says.

The other 15 candidates participated for the first time, including Laura Pantone, aged 26, from Rome, who not only holds various academic degrees, but was one of the youngest train drivers in the Italian regional transport sector at the early age of 17.

"I am truly impressed to see so many top talents from all over the world taking part in the Career Boost. The format is an efficient way for ap-

plicants and recruiters to quickly and easily find the right professional or the right employer," says Kerstin Schulz, Director of InnoTrans.

Live from Japan and Peru

"The many rehearsals and conversations with these talented people were incredibly exciting," says Daniela Hennig, Event Manager of DVV Media Group, Eurailpress. Holding the event in a virtual format meant significantly more effort for the organisers than in an analogue format, she explains. However, the digital option also opens up new possibilities, so that Sota Narikiyo from Japan and Luigi Huamán from Peru, for example, were able to take part.

The Eurailpress Career Boost will take place again at InnoTrans 2024 from 24 to 27 September 2024 in Berlin – live on stage as part of the InnoTrans Campus.

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INTERVIEW WITH ...

THOMAS BÖHM

Chief Product Officer KONUX



Thomas Böhm

Photo: KONUX

? InnoTrans Report: Mr Böhm, on which exciting product is your company currently working?

Thomas Böhm: It is difficult for me to pick out one, because all our products are exciting and each for a different reason. On the one hand, we have KONUX Traffic, our latest product, which uses data fusion and AI to create a historical model of capacity utilisation and delay events. It is designed to reveal reserves and increase resilience. For the first time we are mapping the train traffic of an entire network. It excites me to see what is being created in such a short time. For example, when I saw for the first time how train delays spread, "move" and disappear across the network over a day. The other is KONUX Network, with

"AI will change our world even faster"

The scale-up KONUX was founded in 2014 in Munich to digitalise the rail network. Today, it uses artificial intelligence (AI) to develop solutions for the rail industry. Its portfolio includes predictive maintenance, network traffic load and traffic monitoring as well as railway infrastructure management planning. InnoTrans Report spoke to Chief Product Officer Thomas Böhm about the opportunities and limitations of AI in the railway sector.

which we bring together actual load, conditions and external events to predict ageing and maintenance needs. For the first time, we are addressing the major challenge of linking data and, above all, analytical models across several products and very different use cases. We're racking our brains on how to depict logical relationships while making efficient use of cloud infrastructure.

And then there is the predictive maintenance of switches, which is currently being rolled out at Deutsche Bahn. Here, it is exciting to face surprises which we have never thought of before, for example, a situation in which the mobile network in an entire region is unavailable for more than a day. At the same time, we are continuing to develop the system, for example for monitoring switch blades.

? Where do you see the biggest changes through AI?

Thomas Böhm: In the handling of large unstructured volumes of data, in a boost in productivity and in interaction with computers in general. AI has been part of KONUX for a very long time and for me, as a trained data scientist, it has been part of my life for even longer. Therefore, only the breakthrough of generative AI was surprising for me. And this is exactly where I am experiencing significant changes at KONUX, in my environment and in the "bubble" in which I find my-

self. In our company, AI has recently been helping us to write software. And some colleagues are programming again thanks to ChatGPT or CoPilot, because they can now again achieve results in the little time they have.

? In what ways can AI put the rail sector on track for the future?

Thomas Böhm: The answer to this question is directly related to the previous one. Many infrastructure and transport enterprises as well as manufacturers and suppliers will be relieved of administrative work. This will make the sector more agile and cost-effective. Furthermore, AI seems less alienating or mystical, and I believe that AI-driven products will be accepted more quickly as a result. There are already numerous solutions that use AI to solve problems in the rail sector, for example InstaDeep in the dispatching and control of rail operations, Machines with Vision in tracking and the AI solutions of Deutsche Bahn itself. The biggest lever, however, is the ability to interact with computer systems using natural language in generative AI. This gives more people access to problem-solving methods - such as machine learning - and solves more problems which today require an in-depth analysis.

? What areas does AI not have an impact on?

Thomas Böhm: I don't think there will be anything that AI doesn't have an impact on - just as there was actually nothing that the internet didn't have an impact on. But there will be some areas, namely in the rail sector, which will be less affected, such as all kinds of work with a desirable, direct contact to humans. Likewise, physical work such as maintenance, construction and assembly will be less affected, as will anything involving direct contact between people. I hope that increased productivity in administration will result in increased salaries and attractiveness in maintenance. As soon as I suddenly don't have to document everything three times, there will be more time for repairs.

? What are the growing challenges which the use of AI will bring for transport companies?

Thomas Böhm: AI will change our world even faster, which will put even more pressure on transport companies to be more modern and offer higher quality and more attractive jobs. In addition - and this applies to all companies - we will also have to demand much more transparency and prove authenticity. Many AI systems are supposed to get better over time and adapt to new circumstances. But AI also makes mistakes and can even degenerate. That's why we already implement a monitoring system

for our models and systems during their development.

? What decisive developments in the use of AI have taken place in the railway sector since KONUX was founded almost ten years ago?

Thomas Böhm: AI is no longer a fancy topic, no longer an abstract future. Many fields of AI have arrived in use - even if not yet across the board. In addition, many companies understand better that opening and sharing data dumps offers a lot of benefits. It is simply better to work with them than to hide data.

? Is KONUX already working on ideas which the industry has not yet thought of?

Thomas Böhm: That's almost an unfair question, because I can't know what all the other clever colleagues in the industry are dreaming about. The best I could imagine is that we are already much further ahead in how we keep the human being in the loop. Especially in the areas with very specialised and implicit knowledge, AI systems will take a little longer to learn. And this will also be the case where the relevant events, such as an infrastructure disruption, are rather rare. That's where we need humans and their experience to improve systems. That's why we are also working on integrating them.



50 years of know-how in tunnel construction

Sustainability in tunnelling is the name of the game.

Photo: Maïke and Björn Bröskamp on Pixabay

Since 1972, the German Committee for Underground Construction (DAUB) has been working at national and international level for harmonised and safe underground construction.

At an OECD conference in Washington, D.C., USA in 1970, it was suggested that national tunnelling committees be founded in response to the sharp increase in the construction of traffic tunnels worldwide. In an international association, these were to promote global cooperation and the development of common rules in tunnel construction. In December 1972, the time had come in Germany: the German Committee for Underground Construction, DAUB, was launched in Bonn. Immediately afterwards it began its work, and in April 1974 the DAUB was one of the 20 founding members of today's International Tunnelling and Underground Space Association (ITA). Its office is located at the Research Association for Tunnels and Transportation Facilities (STUVA e.V.).

DAUB recommendations are considered important rules and regulations for research and planning, approval and implementation of tunnel structures. The

topics of the last three years included Building Information Modelling (BIM), project risk management, life cycle costing and the selection process for tunnel boring machines. Occupational health and safety has also been an important topic for many years. Only recently, the DAUB once again updated its guidelines for health and safety on underground construction sites. Currently, the major topic of sustainability in tunnelling is being highlighted. "Tunnels in themselves are already very sustainable," says STUVA Managing Director Professor Dr.-Ing. Roland Leucker, referring to the long lifespan of underground structures. Many are already a century old or even older and will be in use for many more decades after refurbishment. The task now is to develop recommendations for sustainable tunnel building, be it new construction or refurbishment. "For example, we are looking at reducing the use of cement because its production releases a large amount of carbon dioxide."

NEWS

New President of the Federal Railway Authority



Stefan Dermach is the new President of the German Federal Railway Authority (EBA). He succeeds Gerald Hörster who retired on the first of September. Dermach has been serving at the EBA since 1994. Hitherto he has been head of Department 5, which includes the areas of planning approval, the environment and passenger rights. Before that he had already held various positions, amongst others in the legal department and as head of the hazardous goods supervision unit.

Photo: Eisenbahn-Bundesamt

IN FOCUS

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On the safe side

A great deal is demanded of the world's rail networks. Increasingly exposed to extreme weather conditions and in some cases no longer young in years, their reliability is relied upon in the transport transition. Digitalisation and artificial intelligence are helping to identify the need for maintenance of the infrastructure at an early stage and to carry out maintenance safely and efficiently.

Wireless monitoring for safer,
more efficient infrastructure

Sensors for tunnel monitoring

Photo: Senceive

Rail engineers are increasingly realising the value of IoT technologies such as Senceive's range of wireless remote condition monitoring solutions for track, structures and earthworks. Simple, precise and reliable sensors deliver continuous data, supporting safer, more efficient asset management.

Pressures facing infrastructure managers include ageing infrastructure, a more volatile climate and the need to increase traffic volume – whilst striving to reduce the risks associated with people working on the tracks.

Many types of technology are being used to collect and process plant data, including train-mounted surveying and monitoring platforms on trains and static sensors and scanners. The advent of IoT (Internet of things) technology has resulted in a growing range of autonomous sensors which are getting smaller, smarter and easier to use. Wireless condition monitoring, which Senceive has been focusing on for almost two decades, is a good example. The company offers a range of instruments built for the demands of the rail sector which are used on track structures and earthworks worldwide.

Detecting changes in track geometry

The core elements of a typical wireless monitoring system include sensors, a cellular communications platform and an online data portal which enables stakeholders to access and process their data.

Track monitoring applications include measuring changes in track geometry such as twist, cant/cross-level and relative settlement. These are typically used where there is a need to manage risk associated with ground movement or adjacent construction activity.

The technology is often used to monitor the condition of rail structures, such as bridges and tunnels. Many useful parameters can be measured and reported automatically, for example stresses, strains, cracks and

movements of the rail joints as well as deformations of the structure.

Monitoring soil movements

The most common application however, is monitoring ground movement to detect failure of slopes such as embankments and cuttings. The Senceive team has worked with UK infrastructure manager Network Rail

to develop InfraGuard™ – an intelligent monitoring system which detects both long-term incremental movements and sudden events such as landslides and rockfalls. InfraGuard can even send site photos triggered by movement sensors.

With minimal maintenance needed over a 10-15 year lifetime it is clear to see why wireless monitoring is becoming a key component of the rail asset management toolkit.



Wireless track sensors

Photo: Senceive

NEWS

Bonded insulated rail joints

A kit for the bonded insulated joint

Photo: Forlam

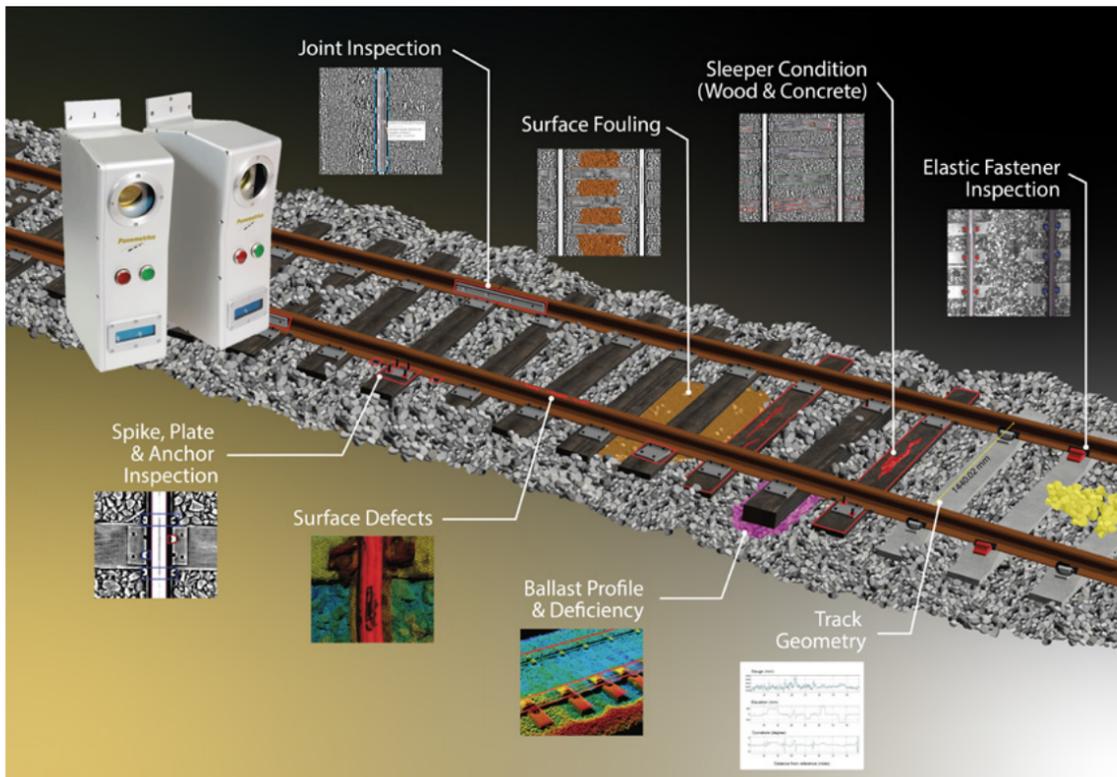
With the ALMAR bonded insulated joints, the joint venture between Forlam Rail and Martin Schienentechnik KG, developed an effective and durable solution for the railway industry. The joints are sold in rail sections with insulated joints or in kits (including insulated rail joints, insulating rail profile, glue and bolts) and are available for all lengths and profiles. With easy assembly and an improved curing time, the kit allows quick, high-quality production of electronically insulated rail joints without replacing the rail. The assembly can be done directly on the construction site or when replacing the rail. Rail sections with bonded insulated joints are manufactured directly in Forlam's factories and are available according to customer specifications and countries. Their increased resistance makes them more robust against wear and tear and provides optimum transmission despite the extreme compressive and tensile forces which act on a welded track. As the railway market grows, there will be many construction sites around the world which will need to meet key requirements for environmental protection, safety and smooth operation of the network. ALMAR bonded insulated joints are ISO 9001 certified and can be combined with a complete range of railway equipment.



Rail sections

Photo: Forlam

AI-based autonomous track inspection



Inspection-related areas captured by LRAIL

Graphic: Pavemetrics

The LRAIL autonomous inspection system, developed by Railmetrics, a division of Pavemetrics Systems Incorporation, inspects the tracks of the American railway company CSX Corporation around the clock, every day of the year.

■ With annual revenues of nearly 15 billion US dollars in 2022 (approximately 14 billion euros) and a track network of 35,750 miles (approximately 57,534 kilometres), CSX is one of the top three US Class I railways both financially and in terms of network under management.

To ensure the safety and reliability of such a network, precise and reproducible inspections are required. They must provide the necessary details for informed infrastructure decisions.

To complement its existing inspection programme, CSX recently deployed Railmetrics' LRAIL autonomous inspection system on a fleet of

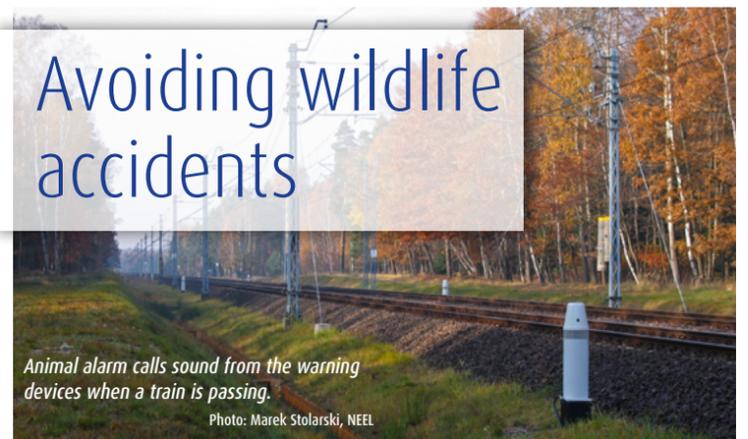
enclosed freight cars, which allows inspection systems to be easily integrated into scheduled operations and provide around-the-clock monitoring of key routes.

Insights for all departments

The LRAIL systems are capable of continuously inspecting the track day and night while travelling at permitted speed and capturing 2D images, 3D scans and track geometry. The scan data is automatically processed on board according to CSX's business rules to identify track locations which require further investigation.

The systems' inspection functions include: centreline mapping, tie/sleeper inventory and grading, rail joint connector and rail bolt inventory and counting, elastic rail fastener inventory and inspection, spike inventory and inspection, anchor inventory and inspection, ballast cross section and surface fouling detection and more.

The system outputs both linear and georeferenced data and uses open data formats to enable organisation-wide use, including Geographic Information Systems (GIS), engineering and maintenance departments.



For humans, railway lines are part of the transport infrastructure; for animals, they are part of their environment, familiar but potentially very dangerous. Warning devices from the Polish company NEEL alert animals in their own language.

■ The easiest way to avoid railway accidents with animals is to fence off the railway line. However, this method has serious negative consequences for the environment, as it leads to its fragmentation. Therefore, fencing should always be accompanied by the construction of special passages for animals, which in turn are very expensive. A better way is to make the animals aware that crashing into a train can cost them their lives. So it is necessary to warn them of the danger and make them leave the tracks before a train passes through. To effectively control animal behaviour, knowledge of their behaviour is required. To do this, it is necessary to understand the instincts of animals.

Animals only respond to the signals which have meaning for them. The message must therefore be translated into the "language" of the animals. The "UOZ-1" animal protection devices manufactured in Poland by NEEL work in this way. They use recorded animal voices to indicate potential danger. The devices, which are installed along the railway line, emit a sequence of sounds shortly before a train passes. It consists of alarm calls of birds, voices of predators and screams of frightened

(attacked) animals. It is a sound spectacle representing a situation in which a large predator chases and catches its prey. When the animals hear it, they retreat to a safe distance. Once the train has passed the devices, the sounds fade away and the animals can safely return to near the tracks.

There are currently 1,070 UOZ-1 devices in use on the railway network of the Polish railway infrastructure manager PKP Polskie Linie Kolejowe SA, which corresponds to the protection of about 75 kilometres of main railway lines. Russian Railways have been using them since 2012, Lithuanian Railways since 2022. The years of operational experience confirm the high effectiveness of the devices. A long-term study conducted by the Warsaw University of Life Sciences also underlines the benefits of the system. What is important is that the animals do not get used to the natural signals employed, so that the effectiveness of the devices remains high for many years after installation. "Even after 20 years of operation, the UOZ-1 devices are still the most innovative animal protection devices on the global railway market," the company says.

Securing track construction sites



The axle counter detects arriving trains and forwards the signal to the base station.

Photo: Frike electronic AG

By combining "long-range" and "near-field" radio, the AILALERT® warning system from Frike electronic AG from Switzerland can transmit incoming train alerts via its pager and over distances of several kilometres.

■ The global utilisation of rail traffic is a key issue, especially in densely populated areas and on busy routes. Rail companies are increasing their capacities and improving efficiency to meet the rising demand. This leads to increased night construction work in order not to disrupt daytime traffic as far as possible. However, the risks are higher during night work, as poor visibility makes it more difficult to detect hazards. But daytime construction sites also involve an increased level of risk, as they are usually located right next to the tracks.

To ensure safety, safety wardens are employed to monitor construction work and to protect and warn workers. Since their introduction, the number of accidents on tracks has decreased significantly. However, ac-

cidents on track worksites still occur far too often. The reasons are usually human error, lack of training or experience, as well as excessive workload or distraction. Technical problems or changes in working conditions can also be reasons for accidents.

The use of warning systems in rail transport can reduce accidents and increase the efficiency of construction work. The RAILALERT® warning system offers a cost-effective solution to improve safety on track worksites and keep rail traffic running smoothly. This warning system aims to eliminate rail traffic accidents altogether. The protection of the track construction workers is the main focus. Arriving trains are detected via an axle counter and the system issues a visual, acoustic and haptic warning. The "low-cost"

warning system supports or replaces the safety wardens in the task of actively securing the worksite. The modularly expandable system is particularly convincing due to its quick and easy installation, especially on mobile construction sites. All components are in constant radio contact and immediately report a technical alarm should there be any malfunction of the system. Thanks to the modular design as well as the unique combination of "long-range" and "near-field" radio, miles of distance between the detection of the train and the worksite can be overcome in addition to the direct pager warning. The base station forms the heart of the system and serves as an alarm, relay or evaluation station for train detection.

On a 5G network



Infrastructure Figueres - Perpignan

Photo: LFP (Línea Figueres - Perpignan)

COMSA Corporación is part of the consortium of companies in the telecommunications and mobility sector which is carrying out the deployment of the 5GMED project to connect the Spanish railway and road network with the south of France.

Specifically, the company is working on the cross-border railway section between Figueres and Perpignan via Le Perthus, where it is also participating in the validation of the con-

nectivity of an SNCF train to support cloud-enabled artificial intelligence services. This section of the border between France and Spain is strategic, as it carries 65 percent of the rail

traffic between the two sides of the Pyrenees.

In this sense, 5GMED will test railway services on a broad range of technologies beyond 5G, including

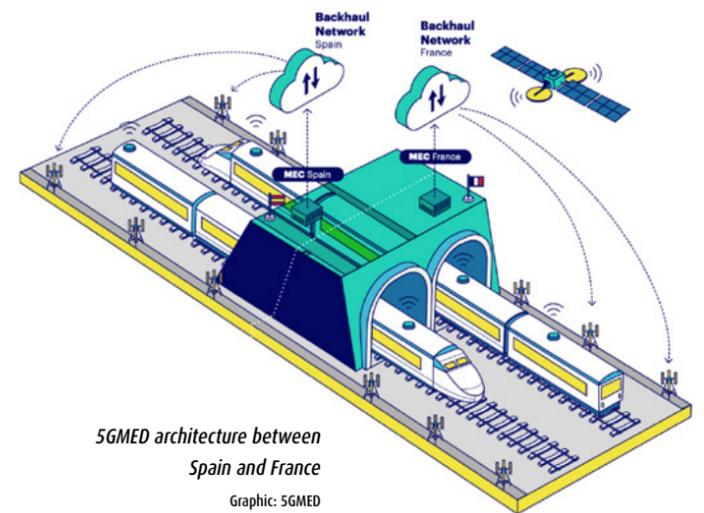
onboard telco mobile services, Internet of things (IoT) and artificial intelligence (AI), providing advanced connectivity services in a scalable and replicable manner across transport paths.

Digital mobility without limits

At the end of the project, on the 31 August 2024, the infrastructure will support continuity of digital applications and business services on the railway across the border. Thus, passenger service, economic viability and attractiveness of the railways will improve with the newly developed connectivity. The use case demonstrations are being

carried out in three small scale testing facilities in order to replicate real conditions. Based on the outcomes of the tests, a final integration and validation will be executed in the cross-border section between Figueres and Perpignan.

The 5GMED project has an investment of 16 million euros, 75 percent of which is funded by the European Commission through its Horizon2020 Programme, and is also supported by the public administrations of both countries, including the Occitania Region and Generalitat de Catalunya. The consortium working on the development of 5GMED involves twenty-one partners from the telecommunications sector of seven countries.



Energy supply made to measure



Variable frequency drives TDX(S)-3300 and VDX-10K

Photo: Premium PSU

In August this year, Premium PSU, the Barcelona-based provider of power supply solutions, launched the AC Master series, a new range of AC/AC railway variable frequency drives (VFDs).

Electric motors play a critical role in various railway applications, such as compressors, fans and pumps, requiring electrical energy to function effectively. By incorporating variable frequency drives (VFDs), the AC motors can be adjusted to run at the precise speed demanded by the equipment they drive.

Premium PSU has developed three units for its AC Master series: the TDX-3300, TDS-3300 and VDX-10K. Each model boasts distinct capabilities, catering to diverse railway applications and ensuring reliable and efficient power delivery in demanding environments.

The TDX-3300 features an additional converter stage, known as the step-up converter, which ensures exceptional stability in power output, even in the face of input voltage fluctuations to guarantee a

consistent and independent output voltage, safeguarding critical railway equipment from power loss.

The VDX-10K is a solution designed specifically for diesel-electric trains. It efficiently powers essential components, such as cooling fans for diesel engines, without requiring a step-up converter, resulting in lower costs. Its state-of-the-art technology enhances operational efficiency, reduces wear and tear on motors, and extends the lifespan of critical railway components, ensuring safe and reliable railway operations.

Custom power supply solutions

The introduction of the AC Master Series represents a significant milestone in the railway sector's quest for efficient and

reliable power solutions. These devices empower railway operators with cutting-edge technology, meeting the highest railway standards and requirements.

Premium PSU designs and manufactures highly reliable power conversion systems for railway, energy, extreme environments and high-tech industry sectors. It has designed over 260 standard products, (DC/AC inverters, DC/DC converters and UPS units) as well as over 900 custom power solutions, making customisation its essence. It has more than 40 years of experience. During development and throughout the entire manufacturing process, Premium PSU relies on state-of-the-art testing systems. All projects are developed in compliance with the specifications and regulations which each application requires.

NEWS

IoT for rail freight transport



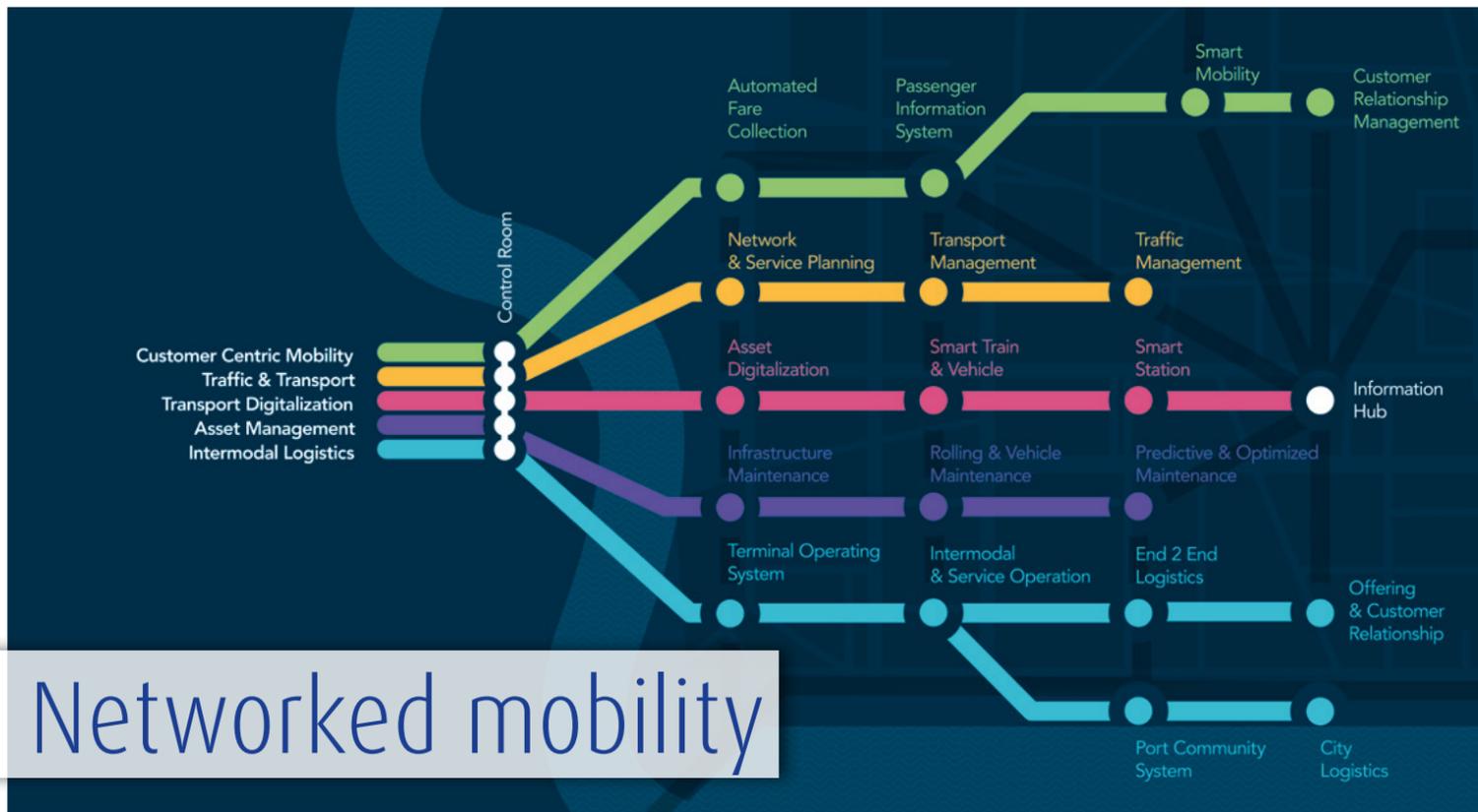
The RailBlazer application for rail freight provides fleet owners, railway companies and shippers with instant insights into a freight car's location, condition and functionality. Through the hybrid communication system, precise tracking, including the positioning of wagons in the train formation and marshalling yard, is possible.

Using intelligent sensor analysis, RailBlazer allows servicing work to be planned in such a way that interruptions can be reduced and maintenance intervals extended. In real time, the system warns of anomalies in the condition of the wagons and in the train completeness check, thus

protecting staff and freight. According to the company, RailBlazer can reduce maintenance costs by 25 to 30 percent and increase fleet availability by 12 to 20 percent.

Integrated with Trilogical's cloud-based platform, RailBlazer has features such as order management, wagon dispatching, history and mileage-based servicing requests, increasing operational and servicing efficiency. Data analytics provide supply chain transparency by showing real-time load status and end of train (EOT) information in the interest of shippers.

RailBlazer is easy to install and maintenance-free for a battery life of more than six years.



Information is collated in the MOOVA control room, where it is also evaluated.

Graphic: MOOVA Map

With MOOVA Italian Almoviva Group, a service provider for information and communication technology, offers a common platform for fast, networked and flexible mobility of different transport modes.

"Mobility must become a service," urges the Almoviva Group, "it should be flexible, simple, accessible, networked and made up of different sectors, with new models of cooperation and competition." It must combine existing modes of transport into integrated, diversified and multimodal services and be managed and provided by public authorities and operators in one system, says the group.

With the Internet of Things (IoT), augmented reality, big data, blockchain, artificial intelligence (AI) and cybersecurity, it says, technology is so mature

that rapid change can be achieved for the mobility sector.

A new way of moving

Almoviva has brought these technologies together to create the integrated, modular and seamless MOOVA mobility platform for different modes of transport. It is designed to meet the needs of the five areas comprising the mobility and logistics ecosystem, customer services, multimodal and intermodal transport operations, asset management and digitalisation. To manage

the end-to-end processes for passengers and freight, 19 different products converge on one platform.

Micro-services and a container-based architecture process the data, and the information is provided via the cloud. The concept of the platform is focused on the mobility service for the customer and not limited to the internal organisation of the activities of the individual operator. Thus, it facilitates the interoperability between different operators as well as the integration of services and monitoring by authorities which administer a given mobility ecosystem.

All services, operations and assets converge in the integrated environment of a control room, where they are managed. An information hub transforms all data into an intelligent, integrated, standardised and powerful information asset.

Almoviva's MOOVA platform and products make it possible to offer solutions which cover the complete spectrum of mobility. They are present in France, the United States, Spain, Peru, Morocco, Egypt, the United Kingdom, Finland, Switzerland, Poland, Turkey, the United Arab Emirates, Saudi Arabia as well as in Italy.

NEWS

Railway services from a single source



DV-Rec: On-board video surveillance system
Photo: GMV

The SAE-r® multi-application platform from Madrid-based GMV enables railway operators to run their railway services in a bundled way so that writing service rosters and managing real-time performance of the entire fleet, generating accurate passenger information and distributing it through the desired channels, is now possible. Reports and statistics can also be generated based on all the information collected. SAE-r® can be implemented as a stand-alone configuration or integrated with external systems. These include planning and dispatching tools, communication systems - for example TETRA and Wi-Fi -, Clever Train Control (CTC) or signalling systems, passenger announcement, information and ticketing systems on board the trains or the train control and monitoring system TCMS.

SAE-r® is produced by the on-board segment, which is managed by a high-end computer. This is connected to the driver interface and the offline Occasionally Connected Computing (OCC) software tools.

SAE-r® is currently used by mainline and suburban railways, freight railways, tramways and light railways. Customers are located in Spain, Poland, the Philippines, Australia and Taiwan.

Form and function



A fixed mount for entertainment devices in the ICE 3neo train.

Photo: Deutsche Bahn AG / Siemens / Andreas Hackl

Clerprem from Italy supplies comfort seats for the ICE 3neo and the Mexican Maya.

Two years of design and prototyping, tens of thousands of tests to shape the backrest and a survey of 900 persons to find the "most comfortable seating system" preceded the development of the seats by the Italian manufacturer Clerprem for Deutsche Bahn's ICE 3neo train.

Railways around the world need a completely new comfort concept to be accepted as a mobility option by passengers, according to Clerprem headquarters in Carrè in Veneto, Italy. New colours, warmer tones and a homely lounge atmosphere are key to providing passengers with an exceptional journey, they say. Clerprem wants to play its part in the "evolution of transport". In its developments, the company pays attention to functionality and aesthetic design. For the seating system of the German ICE 3neo train, for example, the decision was made to use new flat-woven fabrics in a metallic look. There are tablet holders and sockets at every seat, allowing

passengers to use their electronic devices comfortably and without limits. The first ICE 3neo trains with Clerprem seats have been in service since December 2022.

First delivery in Mexico

In June of this year, Clerprem delivered the first seats in Mexico and thus entered the North American railway market. In addition to the modern design, the comfort of the seating system was the decisive factor in winning the contract for the Maya train. Clerprem will equip the restaurant area of the Tren Maya with various modern seat types. These are intended to underline the exclusive restaurant character of the fleet. Clerprem has been represented with a plant in Mexico since 2015. More than 2,000 seats are to be produced there by the end of 2023.

Tunnel construction with clean mine atmosphere

With the systems from CFT GmbH Compact Filter Technic in Marl, Germany, underground tunneling construction and rehabilitation works can be carried out without any restriction and under occupational health and safety regulations.

■ CFT's systems are used to remove dust, ventilate and control ambient temperatures during the construction and refurbishment of tunnels, and in particular during track maintenance and renewal operations, so that diesel exhaust gas and dust emissions do not exceed occupational exposure limits which might cause delays or downtimes.

CFT designs ventilation systems to remove polluted air from the workplace in such a manner as to comply with applicable regulations. In cases where the air is laden with hazardous dust particles, the additional use of dust removal systems plays an important role. CFT dry dust extraction systems

clean the polluted exhaust air so that a residual dust content below 0.05 milligrams per cubic metre is guaranteed. The dedusting systems are equipped with differential pressure sensors to trigger an automatic self-cleaning process in the form of compressed air pulses in a counterflow cycle as soon as the differential pressure is too high when the compact filter elements become clogged. The removed dust from the compact filter elements is then extracted via a rotary valve by a specially developed discharge system and fully automatically filled into BigBags. The dust removal systems can thus be operated over long periods of time without requiring maintenance, thus

ensuring long uninterrupted working periods.

Adapted choice of location

Depending on the particular conditions, the plants can be installed underground in the construction area or above ground. The location should be chosen on the basis of the logistical aspects of the construction site to allow unrestricted work to be carried out in the tunnel while at the same time occupational health and safety conditions are ensured. Complex projects can benefit from a comprehensive solution by CFT which covers all aspects – from the individual planning of the ventila-

tion design (including fan layout, energy supply and monitoring concept) to commissioning, day-to-day operation and system control by the company's own specialist staff and final dismantling.

Since 2006, CFT systems have been used in more than 200 projects for ventilation and in some cases also for dust removal from railway and road tunnels. Tunnels with lengths of up to ten kilometres on mainline railway lines, including the high-speed lines of Deutsche Bahn AG, as well as urban underground and suburban railway lines of regional transport associations have been equipped with the systems.

New opening hours for InnoTrans

■ New opening hours for visitors to InnoTrans 2024 will apply on Friday. On Friday, 27 September, the event will close as early as 4 p.m. Reduced-price tickets will be available for this day in the online ticket shop. From 24 to 26 September the doors of the trade fair will be open to visitors from 9 a.m. to 6 p.m.



Digital assistant – Register now for InnoTrans Plus!

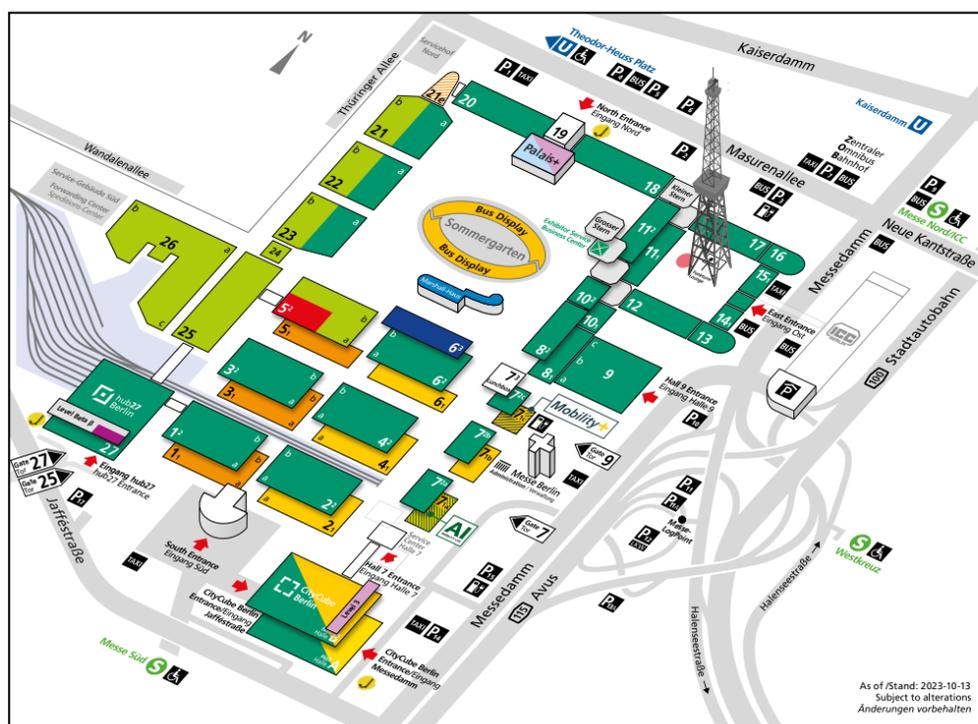
■ The InnoTrans Plus online platform is a digital extension to on-site trade fair participation after the trade fair. Users can benefit even more intensively from the world's leading trade fair for

transport technology with their own profile - even before the start of the fair. Exhibitors and trade visitors can already register for the portal free of charge to present their products and

services and to network with decision-makers. InnoTrans Plus also offers the opportunity to organise meetings and participate in webinars. Livestreams of the InnoTrans Convention and the

entire supporting programme will be available here during InnoTrans and on demand after InnoTrans.

Register free of charge at [Innotrans.de/en/](https://www.innotrans.de/en/)



Exhibition grounds InnoTrans 2024



- Railway Technology
- Interiors incl. Travel Catering & Comfort Services
- Railway Infrastructure
- Tunnel Construction
- Public Transport incl. Mobility+
- AI Mobility Lab
- Outdoor Display · Gleis- und Freigelände
- Bus Display
- Opening Ceremony · Eröffnungsveranstaltung
- InnoTrans Convention
- Speakers' Corner
- InnoTrans Campus
- Business Lounge (Marshall-Haus)
- Press Center · Pressezentrum
- FoodCourt · Restaurant
- J Jelbi hub shared mobility Pickup & Drop-off for rental two-wheeled vehicles Mobilitätsflächen für Miet-Zweiräder

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