Railway-News

The latest news & reviews from the industry

Railway-News

M A G A Z I N E

Inside:

ISSUE FOUR 2021

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Letter from the Editor

Dear Readers,

TRAKO, which takes place every two years, is being held in Gdansk, Poland for the 14th time this month. To find out what's in store at this year's event, read our Trako feature on p.5.

One aspect that makes TRAKO stand out is its outdoor display, which this year will include Alstom's Coradia iLint hydrogen train. The iLint has recently run for the first time in France and with countries moving away from diesel fuel while also having a lack of infrastructure in terms of unelectrified lines, this technology can bridge that gap. Of course, this technology will also require its own infrastructure, such as refuelling stations and hydrogen production facilities.

Another Alstom rolling stock unit at TRAKO this year will be the TRAXX DC3 locomotive with its optional last-mile feature. This locomotive was displayed at TRAKO in 2019 too, but at that time still as a Bombardier locomotive.

2021 is of course the European Year of Rail and one of the visible celebrations of this event is the Connecting Europe Express, which is travelling the continent from 2 September to 7 October. It will be stopping off at TRAKO for visitors to see. Read our in-depth feature on the Connecting Europe Express on p.9.

As always, you will also find our directory of railway suppliers in this issue. Find out about the latest products and technologies in the field of condition monitoring, real-time traffic planning, rail reprofiling, traction motors and more.

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

We will publish our final issue of 2021 on 8 November. It will focus on the Australian rail market and the AusRail Plus exhibition. As always, if you want to be featured on our site or in our e-magazine, please get in touch with Andrew Lush at **al@a2bglobalmedia.com** or **+44 7432 725001**.

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

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Alstom TRAXX DC3 locomotive © Alstom

This Year at TRAKO

The 14th International Railway Fair

When: 21–24 September

Where: AMBEREXPO, Gdansk, Poland

TRAKO is the largest railway event in Poland and also one of the largest in the CEE region. Held in the European Year of Rail, 2021 will see almost 500 exhibitors from 20 different countries taking part. With national pavilions from countries such as the United Kingdom, the Czech Republic and Switzerland, exhibitors will be both major international players and Polish companies in the railway and tram industries.

For the first time this year, rolling stock and railway machines will be displayed in a new setting, at the exhibition tracks of the Gdansk Zaspa Towarowa (freight) station. One of the highlight items on display will be Alstom's Coradia iLint hydrogen train. Alstom will also display its TRAXX DC3 locomotive with its (optional) last mile feature.

TRAKO Conference Programme

In addition to being an exhibition, TRAKO also hosts an extensive conference with topics such as:

- The Fourth Railway Package
- Railway climate neutrality – is it possible in Poland?
- Digital automatic coupling
- Development perspectives of intermodal transport in Poland
- Control systems for rail
- Rail safety
- The Eurasian railway market
- New technologies and solutions for the railways

Event Highlights

In addition to Alstom's Coradia iLint, the French company will present its automatic train operation system via a simulator so it can demonstrate features such as stopping accuracy, adherence to timetables and efficient use of energy. Rail automation is widespread in closed systems such as metros and APMs, but there are additional challenges for mainline operations.

Stadler will also present its automatic train operation system, which is built on its automatic train protection system. Stadler will

Alstom Coradia iLint © Alstom

further present its CBTC system, which it has deployed in Switzerland and the United States, and its on-board European Train Control System (ETCS) in a joint venture with MerMec called GUARDIA, which is now authorised in several European countries, including Poland, Germany and Switzerland.

The Connecting Europe Express, which departed Lisbon on 2 September and will complete its trip around Europe in Paris on 7 October, will also stop at TRAKO.

Awards

A number of awards will be handed out at TRAKO, such as the Józef Nowkuński Award for completed line projects and enclosed buildings as well as designs for new rail infrastructure projects implemented in Poland and rolling stock authorised for placing into service in at least one EU Member State and presented at TRAKO. There will be two statuettes, one for the infrastructure category and one for the rolling stock category.

Another award will be the Ernest Malinowski Award for products and technical innovations applied to the rail industry. There are three statuettes for this award.

Exhibitors at the show will also all be automatically entered into the TRAKO Best Company Stand Design Award. There will be two categories: stands up to 30 square metres and stands above 31 square metres. Three equal prizes will be awarded in both categories.

Supplier Spotlight

Supplier	Stand
Alstom Transport	B31, TB12, TB14
BÄR Bahnsicherung AG	A40
Camira Fabrics	D08
Frequentis AG	C16
GGT Gmeinder Getriebetechnik GmbH	C28
Harsco Rail	E19
Hübner GmbH & Co. KG	A46
IG Watteeuw	E35
IMA Materialforschung und Anwendungstechnik GmbH	E24
Pandrol	B18
PaxLife Innovations	E36
Plasser & Theurer	C06, TB16
Radionika	E02
Robel Bahnbaumaschinen GmbH	TZ10
Treadmaster Flooring	B15
Wabtec Poland	C17
Wikov MGI	C28
Witt Solutions	E36
Zöllner Polska	E36

TRAKO Education and Career Day

For the third time now TRAKO will host its Education and Career Day, where exhibitors can present jobs, internships and traineeships available at their companies. The aim of this day is to enable a direct exchange of information and mutual expectations between employers and employees.

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Celebrating the European Year of Rail

– The Connecting Europe Express

In 2020 the European Commission proposed that 2021 be designated the European Year of Rail, which the European Parliament and Council approved in December.

The EU wishes to promote the use of trains as safe and sustainable transport because it sits well with its European Green Deal objectives.

For instance, 25% of the EU's greenhouse gas emissions come from transport, but only 0.4% of them come from rail. It is also the only mode of transport that has substantially reduced its emissions since 1990.

Rail is also the safest mode of land transport with 0.1 fatalities per billion passenger/km, meaning that for every 1km of railway line

The Connecting Europe Express in Portugal © Nelso Silva

there will be 0.1 fatalities per 1 billion passengers per year.

The European Union is also interested in fostering cohesion between its Member States and rail connects remote areas, cementing internal and cross-border cohesion. The establishment of a unified European railway area is hampered, however, by old infrastructure, outdated business models and high maintenance costs. Highlighting these issues and the advantages of rail could help move the sector in the right direction and drive a modal shift to rail.

2021 is fitting in other ways too. It is the first year that the Fourth Railway Package – the legislative package designed to create a fully integrated European Railway Area – has been fully implemented. Furthermore, Covid-19 demonstrated the central importance of the rail sector, with freight rail being key to keeping goods moving during the pandemic and passenger rail running services to ensure key workers could still travel to and from work.

One of the events of the European Year of Rail is the Connecting Europe Express. It departed Lisbon on 2 September and will stop in more than 100 towns and cities during its five-week journey that ends in Paris on 7 October.

Various events are planned to welcome the train at the stations it will call at. The train is equipped with a Galileo and EGNOS-enabled device. It transmits the train's position using both European navigation satellite services – central elements to the digital rail agenda. Follow the train **here**.

In total, the Connecting Europe Express will visit 26 countries, crossing borders 33 times. The total journey will be more than 20,000km long. However, there will be three trains in total. That's because the route covers three different track gauges. This fact alone demonstrates that the EU has a fair way to go towards creating a unified rail network.

After departing Lisbon, Portugal on 2 September, the Connecting Europe Express travelled to Madrid, Spain, the following day. Locomotives had to be switched in Vilar Formoso before crossing the border.

Day 3 saw the Connecting Europe Express travel to Bordeaux. Both Portugal and Spain use the Iberian gauge, but France uses standard gauge. The final gauge of the CEE will be the Baltic gauge. The ultimate goal is to upgrade both the Iberian and Baltic gauges to standard gauge. But for now, the second train of the CEE begins its journey on the Spanish-French border. This second train has a conference coach and two passenger coaches – one from Deutsche Bahn and a panoramic one from SBB.

On day 4 the Connecting Europe Express crossed into

Italy, switching out the SNCF locomotive for an Italian FS locomotive in Modane before travelling onwards to Turin. Days 5, 6 and 7 are full Italian days, with the CEE travelling south to Milan, Rome and then Bolzano.

Another border crossing on day 8, this time into Austria, travelling to St. Pölten via Innsbruck and Salzburg with a crew from ÖBB.

On day 9, the CEE crossed from Austria into Slovakia. This too required another locomotive, but it was switched in Vienna at the end of day 8. Day 9's destination was Bratislava.

Day 10 and this time the Connecting Europe Express crossed two borders, entering Hungary before then crossing into Croatia. It also required 3 locomotive changes – a different electric one crossing into Hungary, then another one in Hungary, but this one diesel and lastly a new locomotive for Croatia. Croatia is also the first country on this tour that is not in the Schengen Area so although there have been different track gauges and locomotive changes, this is the first time the passengers had their passports checked.

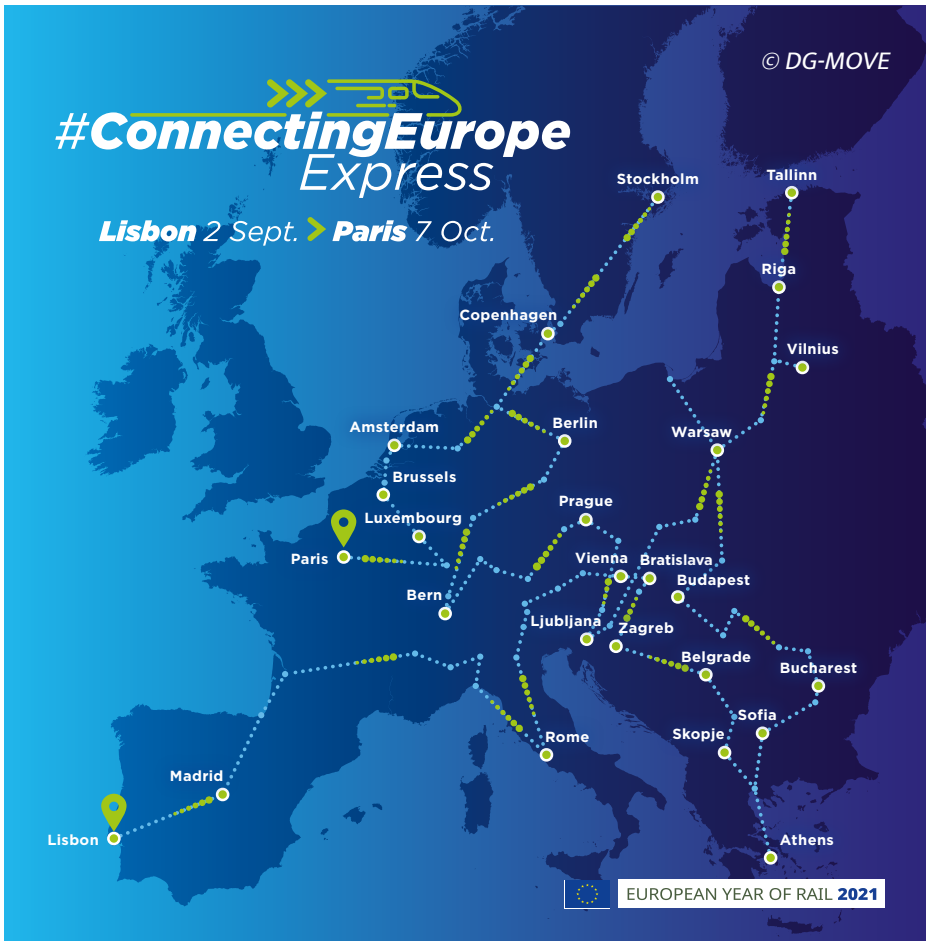
On day 11 the CEE crossed from Croatia (Zagreb) to Serbia (Belgrade). Serbia is the first country on this tour that is not in the EU. This means extra admin: passports were stamped and the EU's vaccine passports weren't accepted, hence passengers had to be tested for Covid-19 at the station.

Upcoming destinations from here (at the time of writing) will be Skopje, then Athens on 15 September – the southernmost stop on the CEE tour (just beating Lisbon) – before heading north again to Sofia, Bucharest and Budapest before reaching Poland on 20 September.

Next, the train will travel to its northernmost point, Tallinn in Estonia before heading west with another northern detour to Stockholm, Switzerland via Prague, Berlin and Copenhagen. The final stops on the route will be Amsterdam, Brussels, Luxembourg and Paris.

The Connecting Europe Express will arrive in Gdansk at TRAKO at 4:20pm on 20 September and depart at 5:35pm on 21 September.

Follow the progress of the Connecting Europe Express via its blog **here**.



Directory

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

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When travelling, there are multiple Premium devices that work in order to get us to our destination. Railway safety is present in all the elements that make up the railway system, from the communications to the lines or procedures. **With this in mind, the company based in Barcelona guarantees that all products comply strictly with the regulations**, offering solutions that cover a wide variety of rolling stock applications. The company has worked with worldwide manufacturers and suppliers of transportation systems since 1981, which places them as a trusted technological partner.

A Wide Catalogue

Premium's catalogue stands by their standard range of DC/DC converters, DC/AC inverters and custom-made power supplies that comply with regulations. **The wide knowledge of the company allows Premium to develop a product from scratch, reducing costs and delivery times.** As a result, it ensures a reliable and long life in hostile environments. **Premium's range of DC/AC inverters** is an excellent example of variety and availability, prioritising a **compact design** without sacrificing security and reliability.

Premium solutions can be found in vehicles such as trams, light rail, subways, locomotives or on-board equipment from all over the world and in applications like HVAC systems, auxiliary and emergency systems, propulsion systems and low-battery starters, among others.

Custom Process

One of Premium's specialities is custom-made products, that fit the needs of each application regardless of the size of the project. Premium's customisation is a 360 process: we design, test, validate and manufacture all of our solutions

in our facilities in Barcelona with a team of more than 50 engineers. **We assist the customers throughout the whole process and offer technical advice based on a unique know-how to make the solution excellent.**

Premium continually strives to achieve the necessary means to elevate solutions and exceed the costumers' expectations.

New Product Designed for the Railway Market

The new CLS-120 DC/DC converter is the perfect fit for railway applications and allows for operation with battery voltages **between 14.4 and 154VDC**.

This new series offers a high input-output isolation and is available with **output voltages of 12V, 24V, and 48V**. It can operate at 85ºC (OT6 with derating) and has been designed according to EN50155 (Class S2: hold-up time 10ms). All models are convection-cooled, can be DIN rail, wall and rack-mounted and offer optional Oring and remote sensing. The CLS-120 is protected against overload and short-circuits by means of a current limiting circuit and against reverse polarity input voltage.

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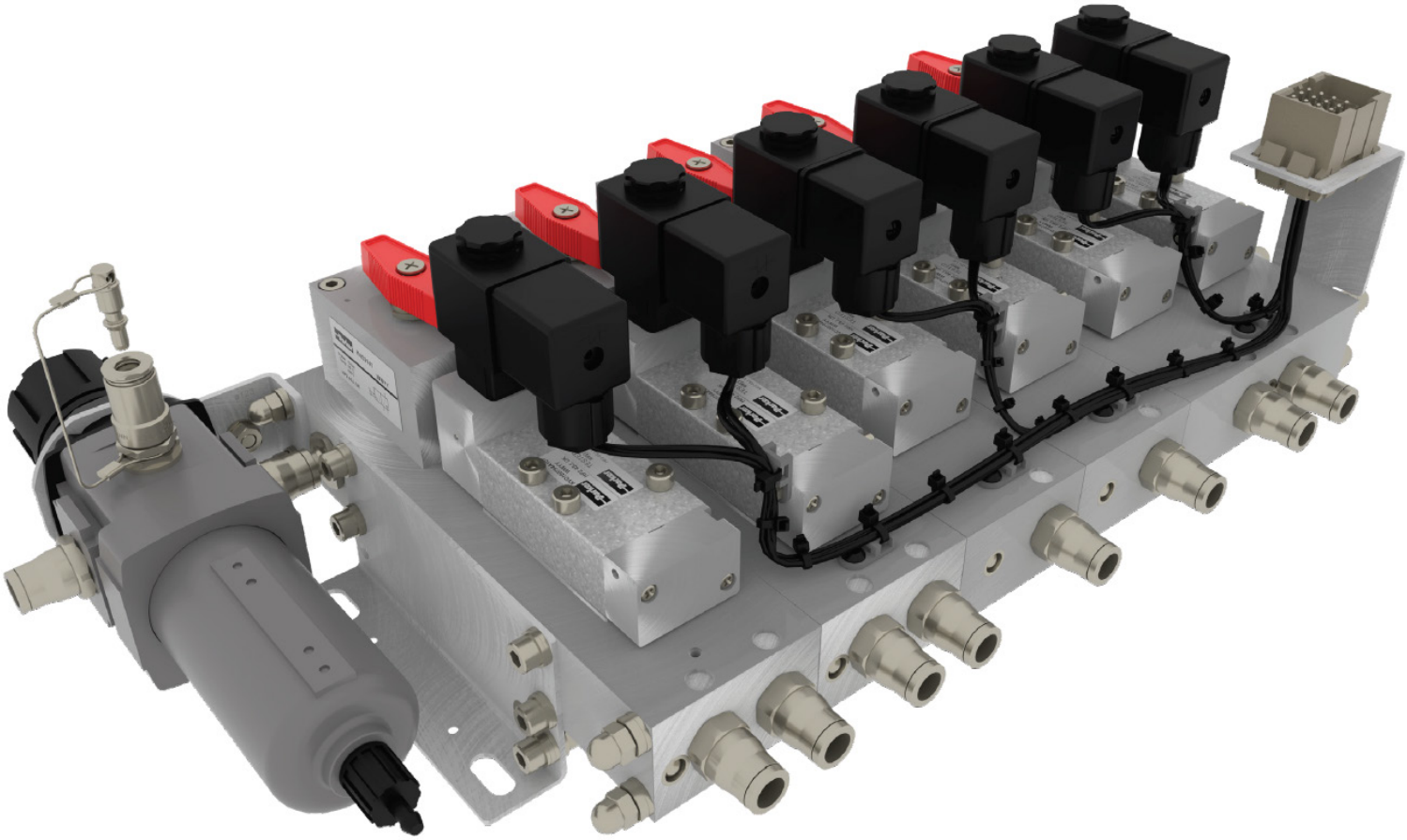

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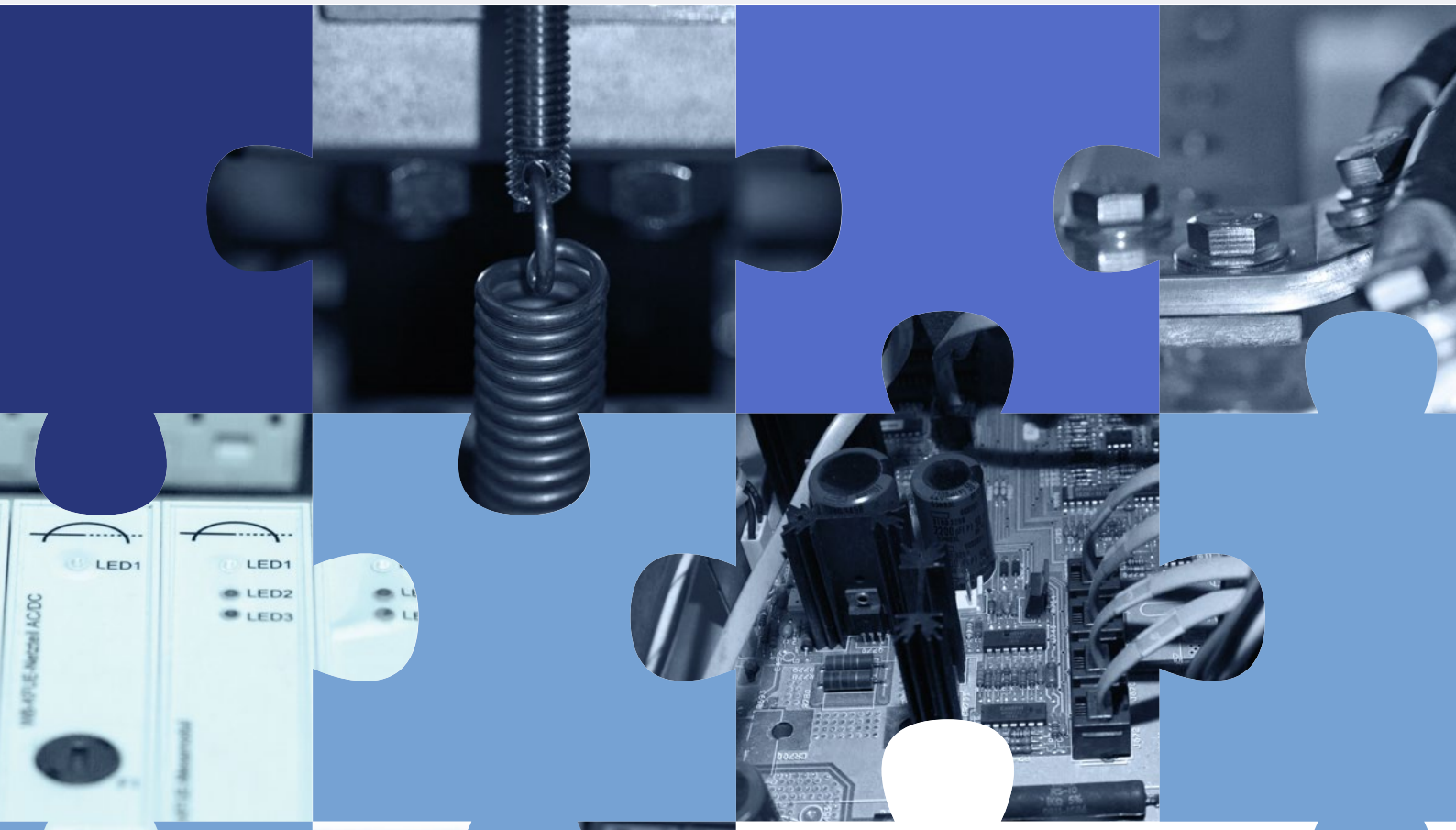

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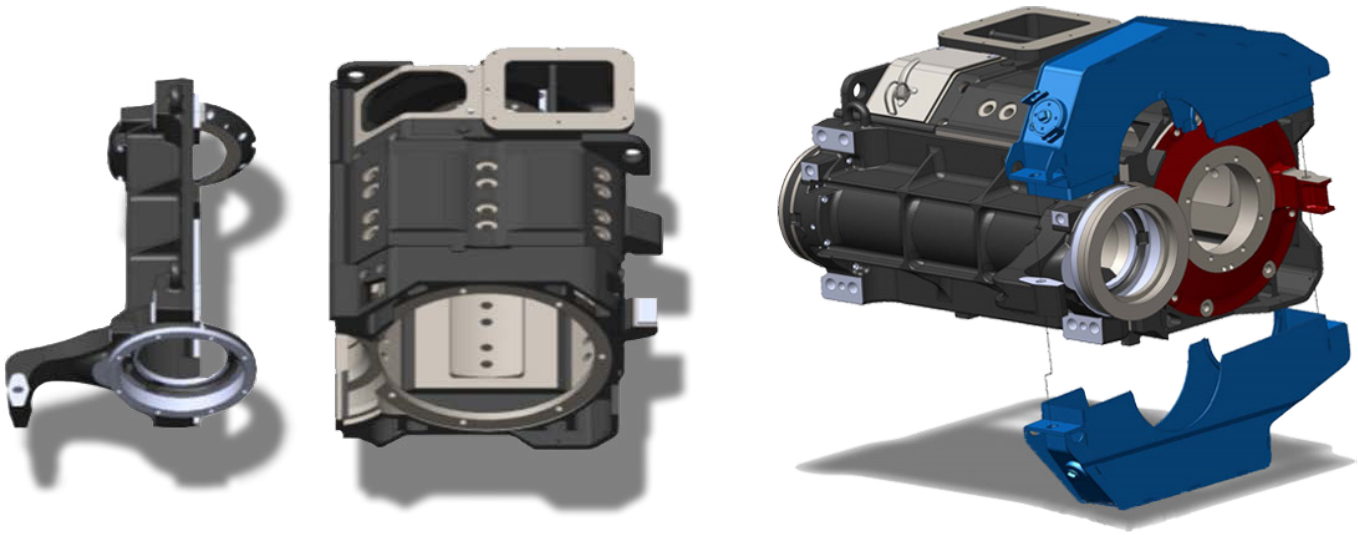
PowerRail

Let's Talk Traction Motors



Powered by electricity and tasked with generating the power to rotate the wheels, traction motors play a vital role in keeping locomotives moving.

When a traction motor goes down, repairs and/or replacement parts are needed, and time is of the essence to get the locomotive running back on track.

PowerRail proudly offers a complete line of new and remanufactured traction motors, with standard and premium rebuilds in stock for immediate delivery. They are approved by Class Is, regional lines, short lines, and passenger transits across the USA, as well as internationally approved. With an experienced staff and quality workmanship, PowerRail is an AAR M-1003 quality certified company. Utilising an OEM verification process and the SolidWorks CAD system, PowerRail's engineering staff complete full product development, enhanced designs and failure analysis.

In addition, if you're looking for improved reliability, lower maintenance costs, and extended service intervals for your traction motor, PowerRail offers state-of-the-art, enhanced design, BTR/ axle bearing housing traction motor conversions. Conversions are available for most EMD and GE Models.

Benefits include eliminating brass support bearings and the wick assembly, allowing less maintenance and longer life. Tapered roller support bearings are sealed, eliminating wick lubricators, and the addition of oil. Tapered roller support bearings also only require a visual inspection of the seals every 90 days, versus sleeve-type bearings which require inspection and oil addition every 45 days. With the BTR traction motor, wheelset removal from the traction motor is more simplified. And axle wheel

gear assembly can be removed from the motor, complete with suspension bearings, and be applied to other motors, as required.

In addition to all the benefits that come from upgrading your fleet with BTR traction motors, PowerRail's conversion to axle housing bearings, also known as 'U-Tubes', offers an improved design with heavier wall thickness at the commutator end, sensor holes drilled (ready for sensor installation), and cable cleat supports pre-installed.

With over 18 years of experience in supplying the rail industry, PowerRail utilises its expertise in development, manufacturing, and operation to create custom solutions for railroads across the world. When an Australian-based railroad was faced with a need for replacement BTRL traction motors, PowerRail configured the optimal solution to meet their requirements.

PowerRail offers both new and remanufactured AAR quality Traction Motors.

PowerRail U-Tubes offer an improved design with heavier wall thickness at the commutator end.

To purchase new BTRL traction motors for the GT46C locomotive would have come with an increased price tag and a lead-time of almost six months. That just wasn't an option for this railroad. Instead, PowerRail developed a way to convert the existing BTR cores that they had in stock to BTRL traction motors.

The BTRL traction motor is a mechanical hybrid between the latest DC traction motor models, like the D90 and D100, and the standard D87BTR. The mounting is similar to these more recent models and therefore will not mount into a BTR model truck assembly. Thanks to the innovation of PowerRail, they were able to rebuild the connection on the rear of the motor to complete the conversion.

PowerRail is the leading expert for innovation and quality of traction motors and other related electrical rotating components. Made in the USA for railways around the world, PowerRail utilises a proven design that meets OEM specifications. In addition, they offer cost-competitive options including all new or a combination of new and requalified components. With a full line of support products and offering technical support, PowerRail can be your one-stop-shop for all electrical rotating parts and components.

PowerRail is a United States-based company, with several locations in various parts of the world. Originally formed in 2003 in Wilke-Barre, Pa., the PowerRail Corporate Offices and Main Distribution Center are now located on a 7+ acre site in Duryea, Pa. PowerRail proudly offers a wide range of new and rebuilt rail-related parts and components including bearings and journal boxes, electrical rotating parts, engine components, compressors, pumps, and motors, from their various manufacturing facilities across the US. In addition, PowerRail offers locomotive rebuilds, overhauls, and mobile maintenance at their locomotive shop. PowerRail is also a global supplier with locations in Europe and Australia.

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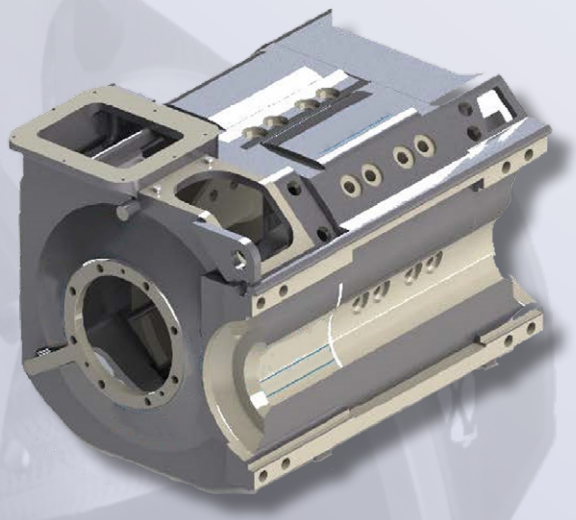

D27/D37/D47	D57/D67	752E6	752E8
D77/D77B	D78	752 AF	752AG
D87/D87B	D90	752AH	GEB

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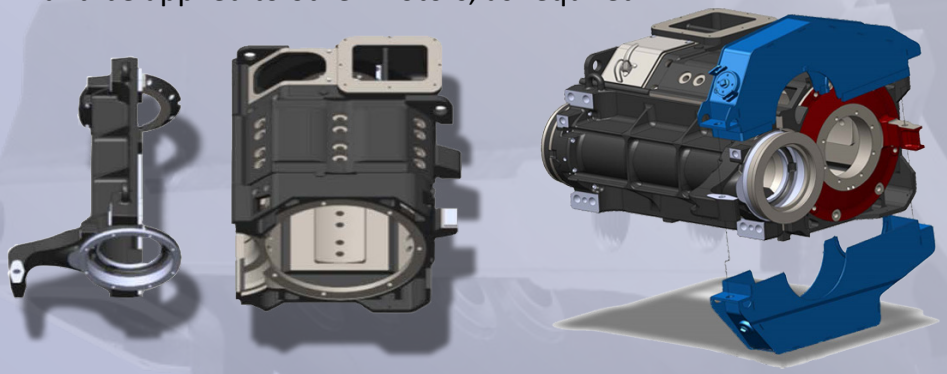
- ✓ Wheelset removal from the traction motor is simplified
- ✓ Axle wheel gear assembly can be removed from the motor, complete with suspension bearing, and be applied to other motors, as required



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The Sky Is the Limit for IGW US

Almost 20 years ago, the very first rail gearboxes were delivered for US customers in cities such as New York, Chicago, Los Angeles and more.

These projects established IGW's strong foundation in the US market and since that time there have never been any failures reported for our gearboxes.

A New Plant Is Born

Officially, the Zanesville plant in Ohio became an IGW US branch in 2014, having previously been part of Omco (another part of the BMT Group). However, as stated above, work on the first project for the US began many years earlier.At the time, our team at the Zanesville plant consisted of four people. Today that number has grown to 21 as more and bigger projects have been taken on.

Thanks to that ever-growing number, we have already been able to expand our working hours. Initially, we were able to work one 8-hour shift per day whereas right now, we have been able to plan in a second shift. Aside from expanding the working hours, hiring more people has also allowed us to grow more organically. Indeed, we can now assign people specifically to

project and sales management while also expanding our planning and purchasing team. A natural consequence of that is more focus for our people as plant manager Eric Stottsberry explains:

"As our people have fewer side responsibilities, they can focus more on their core tasks. Our quality department, for instance, has been strengthened meaning that we can now deal with obstacles more easily."

As our workforce continues to grow, so does our name in the US market. Currently IGW US is doing some good work for NYCDT (New York City Department of Transportation) which might lead to further commercial possibilities with other partners. For that particular project, we will be delivering a total of 755 units with the first deliveries taking place this year.

A Pandemic to Contend with

In March 2020 a pandemic forced many companies worldwide to shut down as health organisations were coming to grips with the new and unknown Covid-19 virus. Luckily, the pandemic's influence on the business of IGW US was fairly limited. Although several projects were postponed, none were cancelled, meaning that we could keep working as usual, taking into account sanitising and social distancing measures.

That being said, we did feel the consequences of the pandemic in our supply chain, which has been disturbed – as has happened to many companies worldwide. That disturbance has caused delays in some of our projects, but we're pleased to report that they are

now back on track. While it's fair to say that Covid-19 has slowed down our progress, we are optimistic about the near future with the prospect of adding more people to our team as well as further adapting our assembly area.

Becoming a One-Stop Service Provider

part from manufacturing gearboxes, IGW plants worldwide also offer aftermarket services such as overhauls. The plant in Ohio is no exception as we're currently undertaking steps to extend our service capability. After all, the first gearboxes we built in Zanesville will have to be overhauled soon and as Eric Stottsberry says:

"As the OEM of those gearboxes, we are in a perfect position to overhaul them. Also, with IGW performing the overhaul, there's more peace of mind for the customer as they only have to rely on one partner. In other words, it's a time and cost-saving measure for them."

Aside from performing overhauls, we will also start up the production of grease-filled couplings at IGW US. The couplings can either be made in combination with gearboxes or separately. We are convinced that offering these services to potential customers will strengthen our reputation in the US even further. Indeed, we have already carried out overhauls of gearboxes used in the public transportation systems of Seattle and Phoenix. For those projects, we initially provided 156 and 217 units respectively.

In conclusion, the story of IGW US is far from over. Indeed, over the years the plant in Zanesville, Ohio has experienced a stable growth as more and bigger projects have come in. Last year, the Covid-19 pandemic halted the plant's progress somewhat, but plant manager Eric Stottsberry is optimistic about the future:

"We see that the toughest restrictions are being lifted meaning that things will open up again more and more. With the investments that we're planning, we're in good shape for the future."

IGW is part of the BMT Group. For more information, please visit www.igwpower.com.

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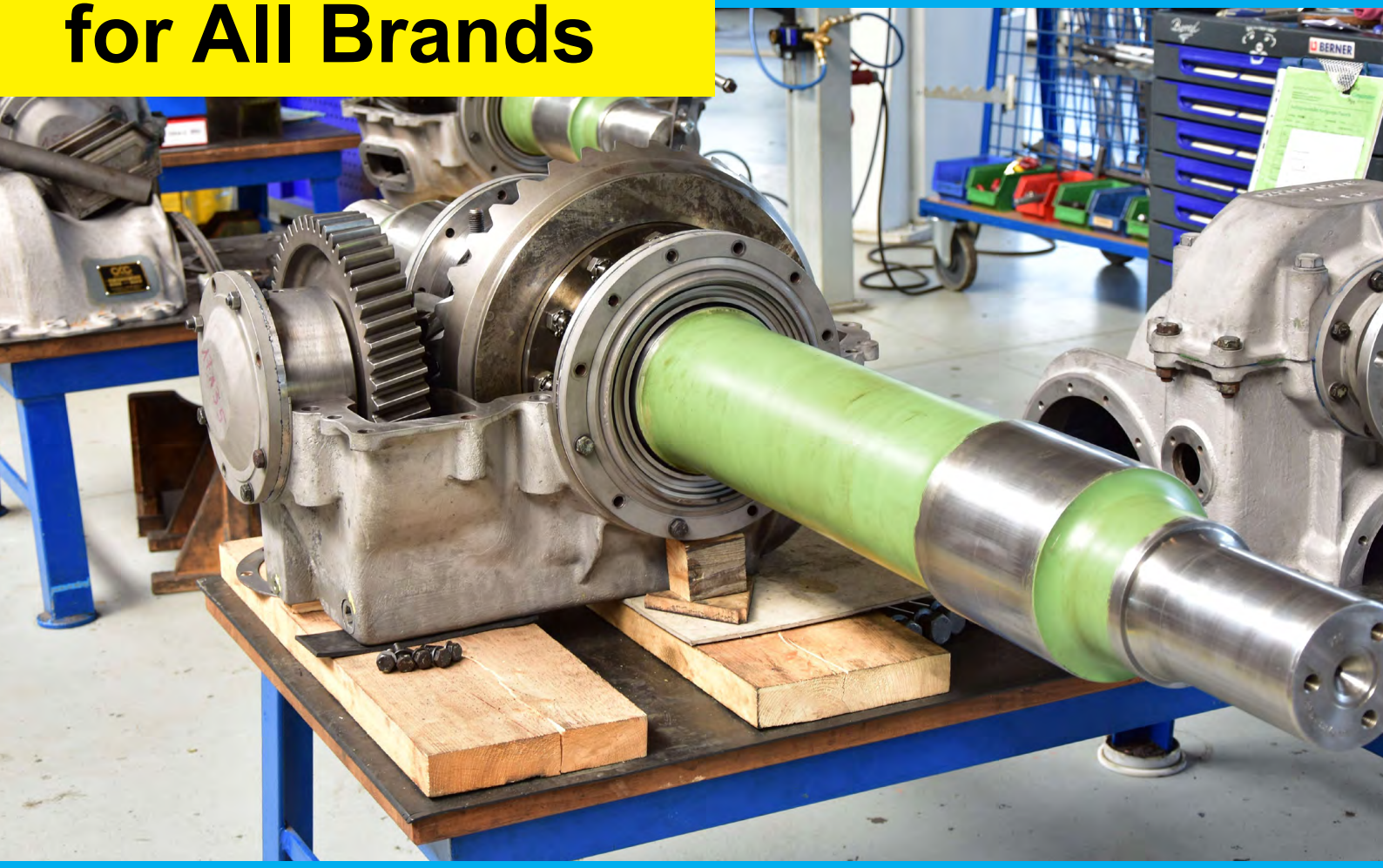

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- Modification and adaption
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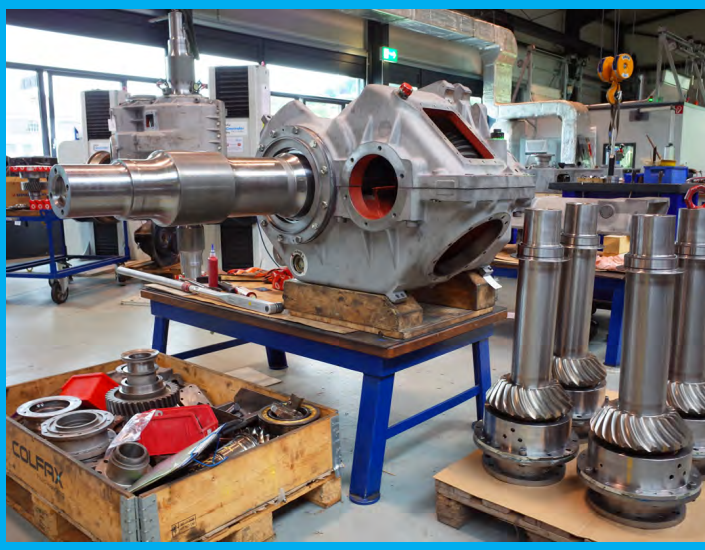

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griwephon AN2-800 and **griwephon light AN2-900** meet various requirement sets in the hazard levels HL1-HL3.

griwephon AN2-750/EU for highest fire protection requirements: classified as non-flammable, class A2, according to DIN EN 13501-1.

Turn over for more information!

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Phone +49 77 07 / 99 04 - 0 | **www.griwecolor.de**

griwecolor

Anti-Drumming of Rail Vehicles

So that Peace and Quiet Is Not Left by the Wayside: Our Flame-Retardant Sound Deadening Solution Absorbs Structure-Borne Noise in Trains

Solvent-Free Artificial Resin Dispersion Achieves High Acoustic Effectiveness

When talking about travel comfort, it's not only speed, comfortable seating and legroom that are important, so too is a feeling of spaciousness within the train compartment or aircraft cabin. Passengers who wish to work or rest undisturbed during their journey can choose quiet compartments in trains, where loud speaking, mobile phone use and other noisy activities are prohibited. In order to reduce the structure-borne noise of the rail carriages themselves and therefore to create the quietest-possible environment inside, many rolling stock manufacturers use sound deadening.

The metal sheets used in the interior construction of carriages – for cladding for example – are

covered in sound deadening materials to dampen the noise caused by the metal sheets. The paint and coating experts at griwecolor GmbH have two products in their portfolio that have been developed for this area of application: griwephon AN2-800 and griwephon light AN2-900.

Fire Safety

The product range has now been expanded to include the new griwephon AN2-750/EU, which is classified as a non-flammable product, class A2, according to DIN EN 13501-1. The product passed the toxicological testing for use in rail vehicles with flying colours.

All three ready-to-use one-component solutions have also been tested for fire behaviour in accordance to EU rail vehicle standard DIN EN 45545-2.

Griwephon AN2-800 and AN2-900 meet the requirement sets R1, R2, R3, R6, R7 and R17 in the hazard levels HL1, HL2 and HL3.

Furthermore, all three products have a very high acoustic effectiveness in accordance with DIN EN ISO 6721-3.

Some people find that the monotonous noise produced by train wheels on the tracks makes them sleepy; others struggle to cut out external influences of this kind in order to sleep or work in a concentrated manner.

Sound insulation and the reduction of structure-borne noise in rail vehicles to give passengers a relaxing journey is therefore a big challenge for engineers. Although some components can be produced from alternative materials, it is often not possible to avoid thin-walled sheet metal constructions, where significant vibration is unavoidable. This causes irritating background noises.

© GRIWECOLOR GMBH

Jörg Grieshaber, Managing Director Technology and Development at griwecolor GmbH, reports:

"The development of our sound deadening griwephon AN2-750/EU is based on the extensive experience that we have collected with AN2-800 and AN2-900 as well as in the construction material sector. With these products, we have gathered decades of know-how in the noise reduction of rail vehicles and façade elements or windows, which we have benefited from in the further development with regard to reduced smoke density and smoke gas toxicity as well as acoustic effectiveness and flame retardancy."

AN2-750/EU has been classified as a non-combustible product, class A2, in line with DIN EN 13501-1; it has also passed the toxicity and smoke gas density test in line with the DB Systemtechnik specifications without a hitch. It therefore meets the requirement set R1 for HL1, HL2 and HL3 for application in rail vehicles with regard to smoke development and toxicity.

Like the two variants already on the market, the sound deadening solution based on aqueous synthetic resin dispersion is also hydrophobic and solvent-free.

Sound Insulation through Structure-borne Noise Absorption

Large-scale sheet metal is often used in the manufacture of railway carriages. These vibrate when the train is moving, producing noise. This structure-borne noise spreads almost unhindered and without loss in metal vehicle components. These sound waves are then transmitted to the air so that the sound occurs as an audible noise inside the car.

In order to prevent this noise generation, which can be irritating,

homogeneous layers are placed between the individual elements for internal damping. Thanks to its composition of inorganic components in conjunction with a low proportion of organic components, the griwecolor sound deadening solution achieves a very high acoustic damping effect.

When the griwephon layer penetrates the material to which it has been applied, the vibrational energy of the material is largely eliminated because it converts high-frequency vibrations into low-frequency ones. As a result, rail vehicle bodies emit less noise to the air in their interior space.

Grieshaber explains:

"Thanks to the special composition of our sound deadening, we achieve a very good value in terms of internal damping. The loss factor, depending on the installation situation, application thickness and material in accordance with DIN EN ISO 6271-3, is between 0.22 and 0.24, so that large parts of the structure-borne noise energy are absorbed by the sound deadening."

Thanks to the application of a filler combination made of various mineral substances, such as aluminium hydroxide, as well as the development of a special binder with high toughness, an application thickness in double sheet thickness up to 5mm is possible. The quality of the filler and the unusual layer thickness are jointly responsible for the high absorption rate. Another advantage of the mineral components is their low thermal conductivity.

Easy Processing without Health Risks

Thanks to its composition, the sound deadening solution can be applied both with airless devices, with a ratio of at least 60:1, and with reciprocating pump devices, with atomising air of roughly 12:1, or screw conveyors with atomising air with an inlet pressure of 3 to 4 bars.

Grieshaber explains:

"As with all of our products, we have also paid attention with griwephon AN2-750/EU, AN2-800 and AN2-900 to environmental and health compatibility and easy application. On the basis of an aqueous synthetic resin dispersion, we do completely without solvents in order to achieve the lowest possible VOC proportion. Through intensive development work, we were able to achieve a value of less than 0.6 g/litre."

Manual application using a spatula or mortar adhesive trowel is also possible. The sound deadening solution is characterised by a high level of stability when applied to vertical surfaces. In wet application, a layer thickness of up to 5mm is possible in one go, without the product slipping off or cracks forming on the surface.

After the drying process, the layer thickness is approximately 4 to 4.5mm.

Grieshaber summarises:

"The processing is therefore quick, safe, clean and does not contain any health risks due to the ingredients. Even in the case of a fire, griwephon AN2-750/EU does not generate any toxic gases. The material was tested in accordance with DIN EN 45545-2 with very good results with regard to smoke density and smoke gas toxicity. Our griwephon sound deadening therefore connects fire protection with simple handling and efficient noise protection."

Further information at:
www.griwecolor.de

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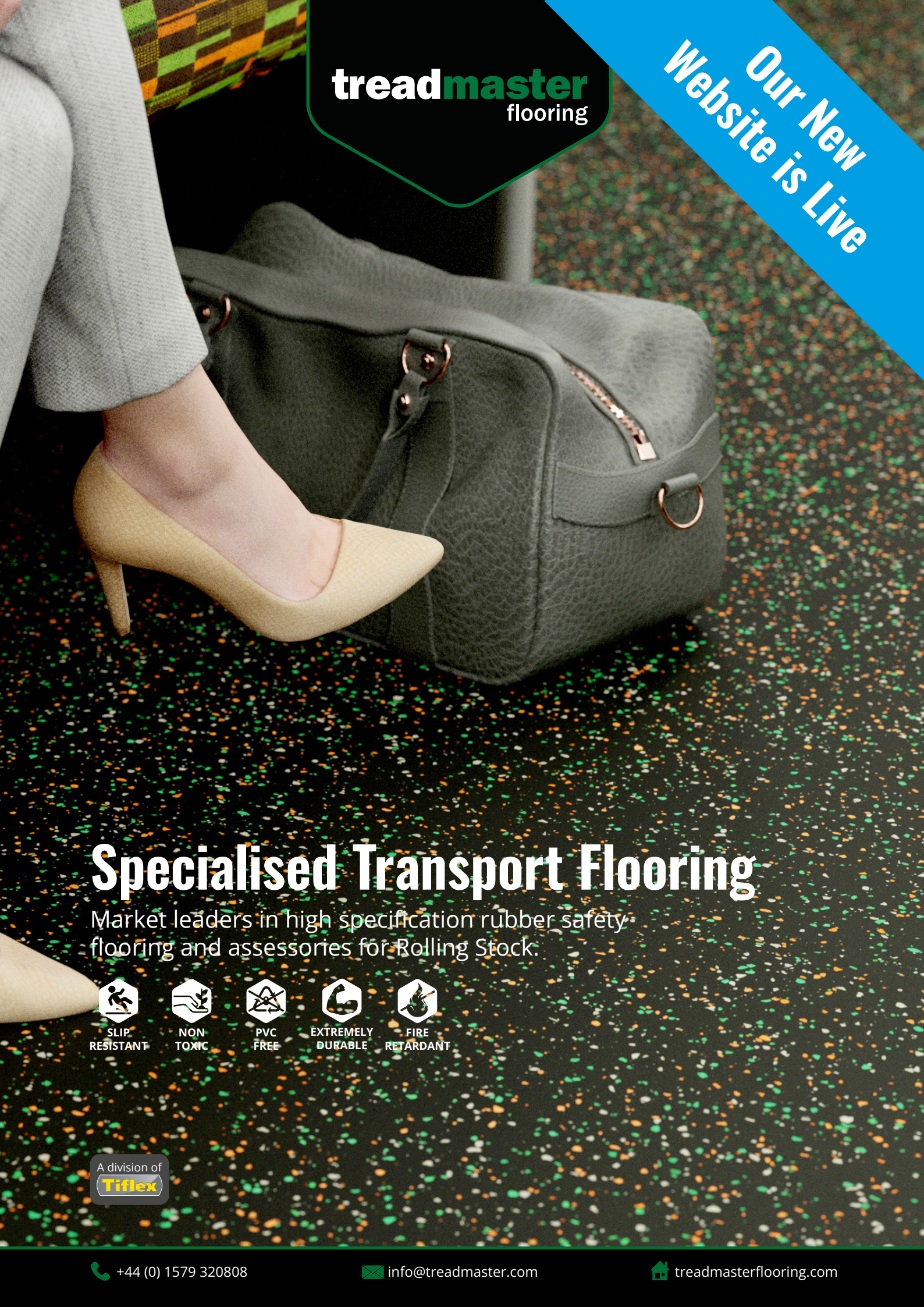
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Holmatro

Discover Holmatro's World of Rerailing

When a railway vehicle derails, the wish is to have the vehicle back on track in no time in a safe and controlled manner. It is important to have a system in place that can do the job.

Holmatro offers rerailing systems that are suitable for different rerailing applications.

The Holmatro rerailing systems are built with three main elements in mind:

- **Speed**
- **Safety**
- **Controllability**

Speed

One of the main reasons why a rerailing system needs to be fast is because time is crucial. Especially when the downtime costs can increase a lot every hour the track is blocked.

If you have a system in place which enables operators to work up to two hours faster, you are able to save a lot of time and money.

A great example of what makes the Holmatro rerailing systems fast is the use of lightweight components.

This means maximum performance at a minimum weight.

Safety

A safer rerailing system speaks for itself simply because the recovery team needs to work in a safe environment. That's why some unique safety features were added to the Holmatro Rerailing Systems.

Controllability

The Holmatro Rerailing Systems are developed with controllability in mind so features in the systems ensure that the user can operate the system in a controlled manner. You are in control!

Check our **animated video** or scan the QR code below and see how the Holmatro Rerailing Systems work.

Sneak Preview!

Time is key when a railway vehicle derails. With that in mind Holmatro has developed a Compact Rerailing Unit that is the lightest solution on the market to rerail a lightweight railway vehicle with the highest precision in a fast and safe manner.

We would like to invite you to join the Holmatro World of Rerailing webinar.

This webinar will take place on 23 of September 2021. During this webinar we will present the Holmatro Rerailing Systems and introduce you to our new Compact Rerailing Unit.

Sign up for this webinar via the following link and add in the subject: *Railway News – Holmatro Rerailing webinar*

www.holmatro.com/en/rerailing/contact

Today's Technology

Based on the previously mentioned three key pillars, Holmatro is convinced to have developed rerailing systems that are built for tomorrow's use but with today's knowledge and today's technology.

Check out **www.holmatro.com/en/rerailing** and get inspired!

Join the **Rerailing Specialists community** on LinkedIn.

More information?

Contact us directly via: **rerailing@holmatro.com** or via phone: +31 (0)162 75 15 00

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DISCOVER HOLMATRO'S WORLD OF RERAILING!

Sign up for the Holmatro Rerailing webinar, discover our rerailing systems and be the first to see the Holmatro **Compact Rerailing Unit**.

You are in control!

Curious? Sign up for the Holmatro webinar via the contact link below or scan the QR code. Add in the subject: Railway News - Holmatro Rerailing webinar. The Holmatro Rerailing webinar will take place on the 23rd of September 2021.

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Rerailing specialists community

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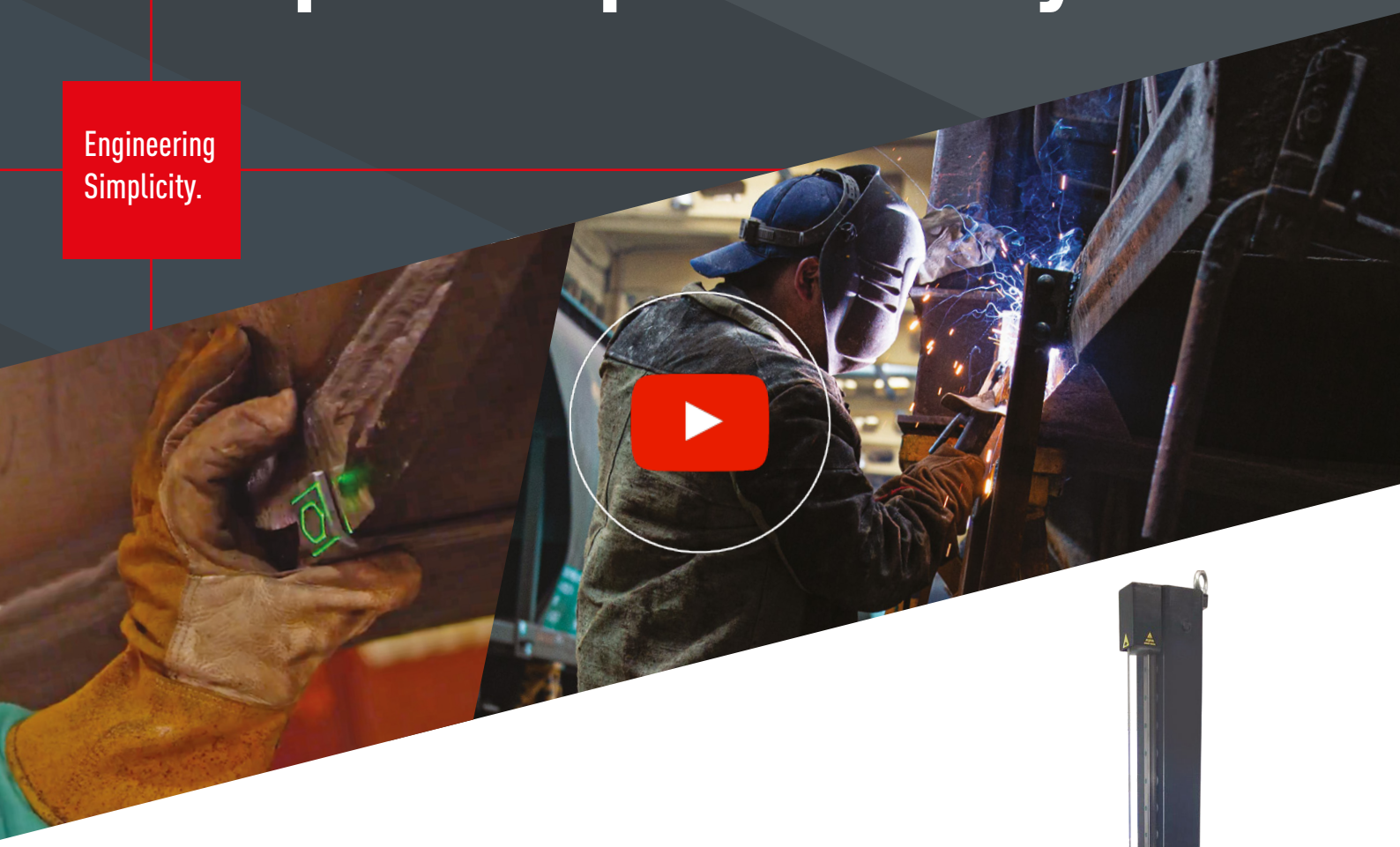

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TEST SYSTEMS

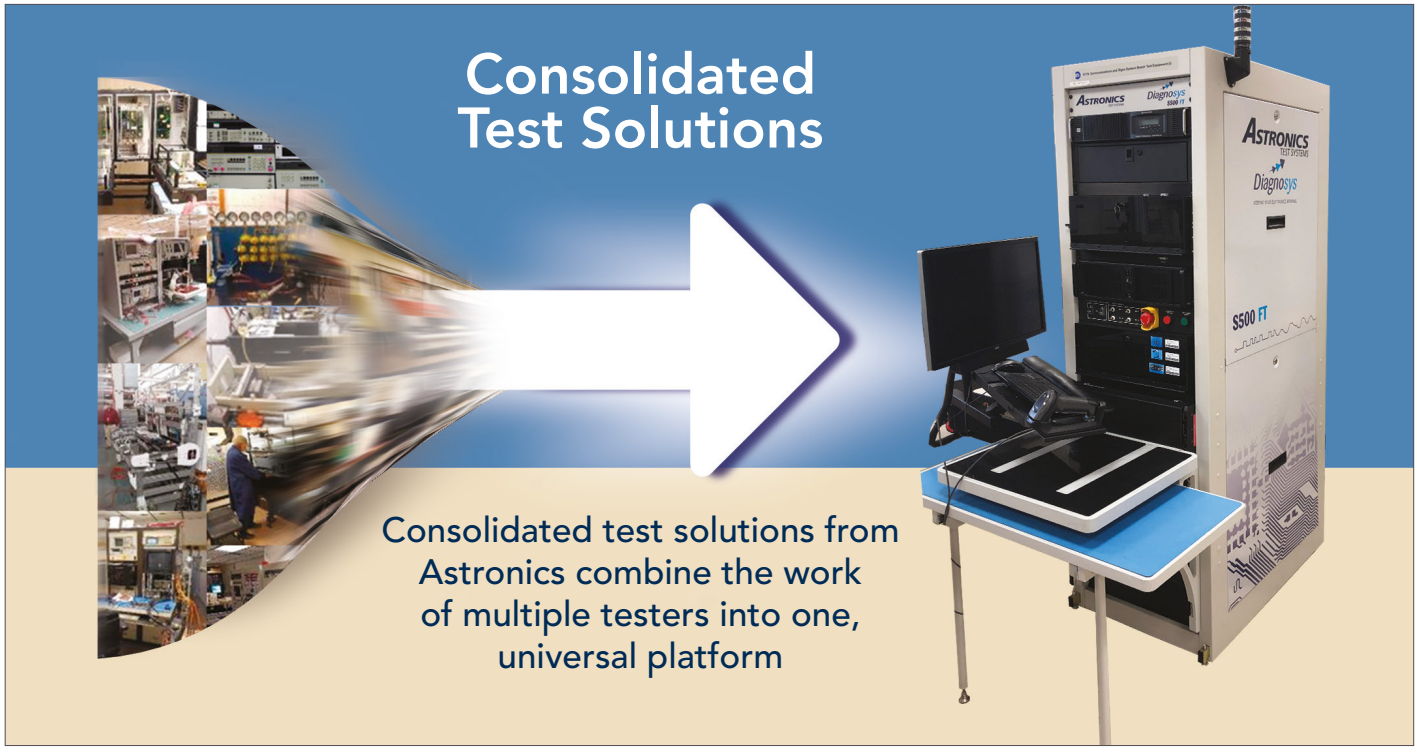
Feeling Crowded?

Reduce the footprint of your **test equipment** with consolidated solutions

The maintenance of public transportation systems is vital to the safety of their passengers. Transit authorities face various challenges when it comes to maintaining a state of good repair, but perhaps one of the most significant is that test equipment is typically specific to only one application or component of the rail car. This creates a serious issue in that most repair operations do not have the required floor space or budgets to support multiple pieces of test equipment from various manufacturers. Not to mention, these components are expected to have a long lifespan (upwards of 25 years), often rendering test equipment obsolete or inoperable by the current workforce responsible for maintenance and repair.

These issues have driven the need for truly universal, consolidated bench test equipment (BTE) that captures the capability of these various test systems in one scalable platform. With support for a variety of complex, on-board and wayside systems, including high power, communications and control, radio frequency, and electrical-mechanical-pneumatic, consolidated test solutions also reduce cost and precious floor space in the shop.

For more than 60 years, Astronics Test Systems has designed and manufactured test instruments and automated test systems that verify system performance, commission systems, and help test, diagnose, and repair complex electronics over the lifetime of the product. From this experience, we have developed a commercial off the shelf (COTS) "Common Core" family of consolidated support equipment for all maintenance and verification needs. Our portable systems support commissioning, maintenance of way, and onboard testing. The larger solutions provide factory and depot



or back shop support. All of our solutions share common software, operator tools, and instrumentation, with each system being configured and scaled to provide "just enough" capability for the application.

Astronics works with vehicle manufacturers and major systems providers using an integrated product team (IPT) approach. Our strong relationships allow us to coordinate, understand, and apply detailed design data from each supplier to create a solution that handles the work of dozens of testers. For our customers, this translates to savings on:

Space:

- Fewer testers required means less floor space occupied
- In-house capability to repair allows for reduced spare parts and inventory

Time:

- Training is simplified with technicians having to learn only one system
- Repairs can often be done in-house, helping return assets to service faster

Cost:

- Initial purchase is significantly less than the cost of multiple testers
- Reduced inventory and spare parts due to in-house capability to repair

New York City Transit (NYCT) has long been an advocate of consolidated BTE. Our work with them has helped provide 8,200 train trips and safe, on time arrivals for 5.58 million riders on an average weekday. With floor space at a premium in New York City, it was very important to consolidate the footprint of the test equipment as much as possible for them. NYCT has the largest self-maintained fleet in North America and the ability to turn product quickly back into the field has been invaluable.

With an ever-changing product mix, rapid technology advancements, and pressures to keep trains in service while cutting costs, consolidated test solutions are vital to the long-term sustainment of transit authorities and their suppliers. Contact Astronics Test Systems today to get started.

Astronics.com/mass-transit-test-equipment

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FREEDOM R8100 LMR/PTC
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Maintain a state of good repair for on board and wayside assets with universal, consolidated test solutions

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

From Consolidated Automated Bench Test Equipment (CABTE) to Portable Test Equipment (PTE), leverage our 60 years of test and measurement expertise to ensure optimal performance of your critical systems and provide safe, reliable transportation for your passengers.

Learn more: astronics.com/mass-transit-test-equipment

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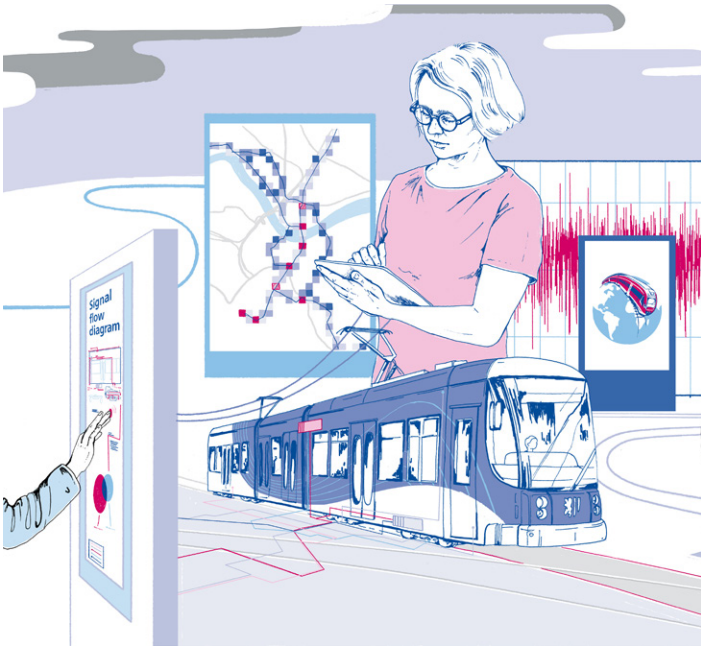
IMA Dresden is an independent and DAkkS-accredited test centre for the rail vehicle industry and for all other branches too.

We support manufacturers and suppliers in the development process and assist transport companies with damage analysis and product optimisation. We see ourselves as a competent partner by your side for testing, monitoring and certification of materials, components and structures.

Testing Is Our Vocation: From Test Planning to Test Report

We handle carrying or motor bogies for locomotives, freight or passenger trains on our 13 test



benches on a test area of over 3,000 square metres.

For testing railcar bodies, we operate three separate test tracks that guarantee a high test capacity. On average, we test between ten and twelve car bodies on our premises every year.

We carry out measurement runs all over the world and evaluate the measurement data. We define individual measurement programmes for you.

We perform FE simulations, assess the strength of products and areas of stress, and carry out strength and lifespan assessments.

We Measure the World: Test Drives and Stress Measurements

Irrespective of whether it is Helsinki or Melbourne, Düsseldorf or Dresden – utilising appropriate measurements, measuring runs and continuous monitoring enables us to record loads in actual applications – whether for approval trials and tests, calculation and simulation or for structure optimisation in problem cases.

We execute measurements of mechanical and electrical variables with static and dynamic loads under operating conditions and install complete measurement chains including the process adaptation.

Long-Term Measurements

We carry out long-term measurements for data acquisition in real operation, for example for the assessment of the impact and effects on the service life or the operating strength verification.

We develop systems for monitoring structures, components and plants, which we tailor directly to specific requirements; they issue alerts immediately in case of load or damage events. In numerous applications in different fields, we measure analogue signals such as strain gauges, accelerations and displacements in conjunction with GPS and bus data. This enables us to perform extensive analysis – including location-based evaluation – of measurement data with runtimes of several years.

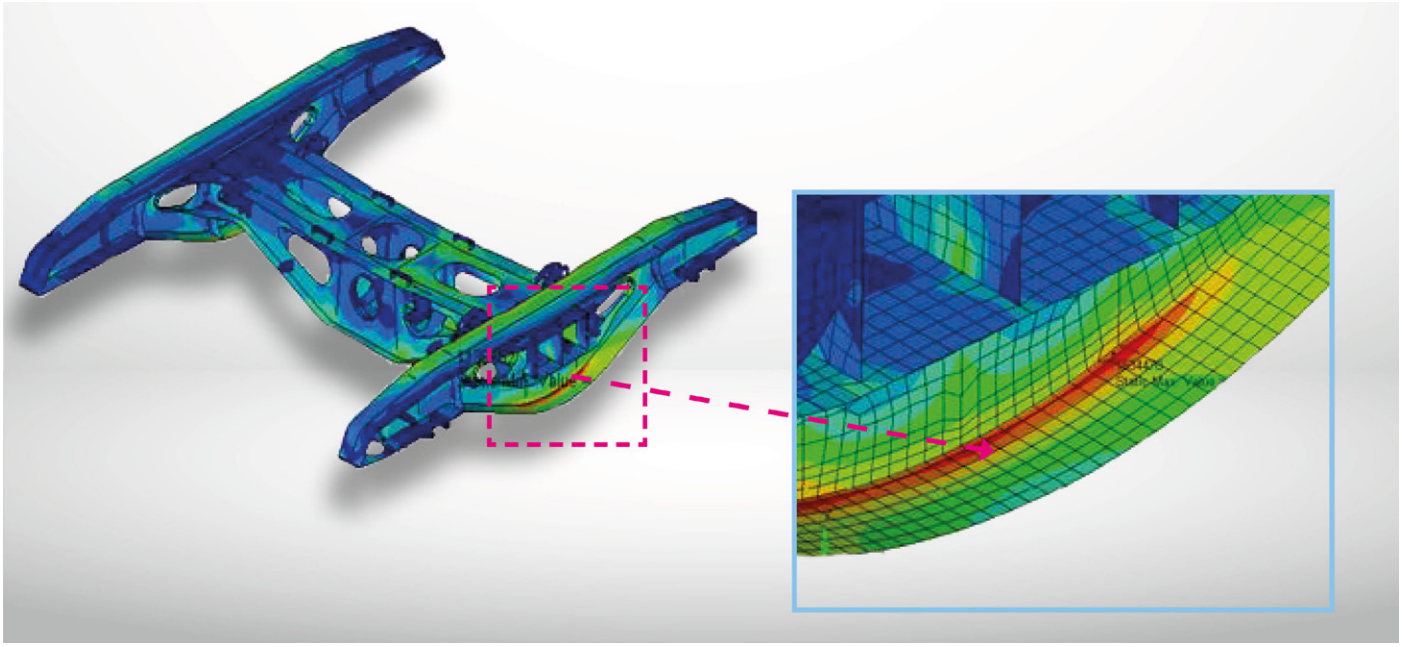
In Focus: Simulation and Strength Assessment

We provide support from the evaluation of measurement data, via FE analysis through to analytical and experimental strength assessment.

Our employees' 40 years of experience across all industries in the field of FE analysis, measurement data evaluation and strength assessment combined with young, innovative minds from science form the foundation for this and open up new possibilities in product development.

Range of Services in FE Analysis:

- Large structures as well as components and assemblies



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- DVS 1612, DVS 1608
- Eurocode 3, Eurocode 9
- DIN EN 12663, DIN EN 13749, VDV152
- DIN 743

Certified for Guaranteed Quality

We are accredited by the Deutsche Akkreditierungstelle (DAkkS), the national accreditation body of the Federal Republic of Germany.

We are also an officially recognised monitoring and certification body of the Federal Railway Authority (EBA) and Deutsche Bahn (DB) for GRP construction products.

IMA Dresden – And It Works:

- Structure and component testing
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- Electrical testing
- Simulation and strength assessment
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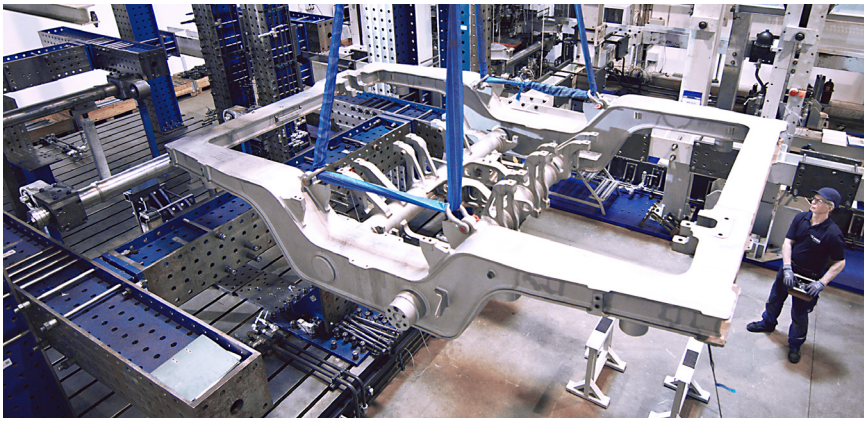

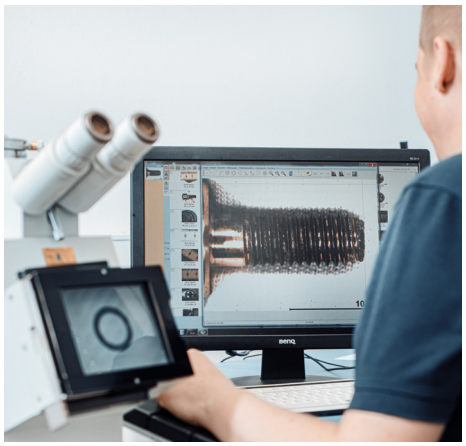

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- Electrical tests
- Material testing
- Mobile measurements
- Simulation and strength assessments
- Damage analysis

We are the accredited, certified and independent test center for the rail vehicle industry.

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Xenia

Crew Accommodation in the Travel Industry: An Evolving Business

For 30 years Xenia S.p.A. SB has been the main character in the travel industry and also an anchor for transport companies through crew accommodation services.

The context we are operating in is still very uncertain due to external factors that affect the travel industry such as the limitations and consequences brought on by the pandemic.

It has been two years now since Covid-19 started and, as crew accommodation operators, we have assisted our clients with services that could better answer their constantly changing needs due to this climate of uncertainty.

Even during this difficult period, we helped our clients and partners plan services for future opportunities which will challenge the pre-pandemic models.

In the travel industry, while the cargo segment experienced a steady increase in operations, the passenger transport segment was significantly affected even though business and leisure travellers said rail was their preferred mode of transport. One key reason for this is passengers' growing sensibility towards the environment.

Additionally, our company registered data that shows a willingness to travel that is mostly unaffected by the consequences of Covid-19, such as restrictive

regulations and health risks. Consequences which in the future will probably affect models of supply and demand.

Xenia, with its 30-year presence in the travel industry, has preserved and strengthened its dynamic identity during the pandemic by attentively observing the changes and the needs of businesses and also by becoming promoters of new paradigms.

The adaptability that has always distinguished our company from others allowed us to keep up with the needs of our clients through which we were able to identify effective and efficient solutions.

Sustainability is at the core of our services and models. It is a value that represents the nature of Xenia as a benefit company.

In conclusion, our advice for the travel industry during this period of uncertainty is to adapt, evolve and support. It is not possible to predict what will happen in the future, but we can make the best out of our current situation.

More about Us

Xenia S.p.A. was founded in 1992 and has always operated in the business travel market. In 2021 it transitioned into a benefit corporation. Xenia is a global provider specialised in managing the entire crew accommodation process and the layover and AOG services as a support to airlines, railways, shipping lines and cargo companies.

The key points of the services are:

- 24/7/365 customer service centre
- worldwide accommodation selection and inspections
- bespoke directories, with hotel chains and individual properties
- personalised rates and pricing models
- benchmark data and expense management dashboard and solutions
- innovative reporting tools
- technology system that can interface with any third-party platform
- prompt and effective responses to any request – from urgent enquires to long-term contracts – worldwide
- great capacity to block large banks of rooms for scheduled crews and individual bookings for crew members, business travel, distressed crews and delayed passengers handling

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KfW IPEX-Bank

Intermodal Freight Transport: Market Potential & Challenges

By Dr Carsten Wiebers, Global Head of Aviation, Mobility & Transport, Torsten Osterloh, Team Leader Mobility & Transport at KfW IPEX-Bank, and Wolfram Bahle, Managing Partner / CSO at the Swiss start-up MFD Rail

The federal government of Germany has been supporting the expansion and revitalisation of the intermodal transport system in Germany and Europe for more than 20 years.

During this time, the transport of goods, commodities and machine parts using at least two different modes of transport in the supply chain has developed into a segment with dynamic growth – the "moving average mid-term prognosis" of the German Federal Ministry for Goods Transport (BAG) currently estimates that the volume of rail freight transport will increase to 390 million metric tonnes by 2024. This is not only due to capacity that is much easier to scale, but also due to the role that intermodal freight transport plays in achieving the climate targets formulated in political discourse. It will not be possible to successfully transform transport without including railways in the supply chain. This is why KfW IPEX-Bank and MFD Rail, together with the majority shareholder of MFD Rail, a fund advised by Oaktree Capital Management, L.P., are involved in CO2-efficient rail freight transport and are thus contributing to the success of the transport transition.

"Grasshopper", 6-axle 90 ft container carrier, Sggmrss, produced by Tatravagónka a.s., Slovak Republic

The Development of Intermodal Freight Transport

The networking of global markets in the course of globalisation and the success of online retail have swept global goods transport along with them over recent decades; goods transport has grown by around 75 percent in the last 30 years – but rail transport has only played a very small part in this.

This disparity has tangible repercussions, two of which we will briefly discuss here. On the one hand, existing infrastructure is used unevenly. On the other hand, lorries produce significantly higher emissions per kilometre when compared to rail-based solutions and thus cause more damage to the climate. From an economic perspective, this creates a need for investments – the state, investors and even financial institutions will play a central role here, including KfW IPEX-Bank as a financing partner with a great deal of expertise in financing passenger and freight transport projects. It has been continually expanding its financing in the railway sector for years.

At the same time, the market potential for MFD Rail is rising as many railway companies are currently replacing their own rail vehicles with leased rail wagons.

The leasing rate in the European rail sector is still comparatively low – at 30 percent of the total fleet, compared to a leasing rate of considerably over 50 percent for lorries, aircraft or container ships. Due to the high efficiency gains through leasing, it can be assumed that this trend will also continue in the rail sector.

However, even if rail freight transport is catching up, there are several hurdles standing in the way of increasing demand, particularly concerning the use of intermodal approaches; when switching from road to rail or vice versa, it is not always easy to reload shipments – why?

Cranability of transport units for road transport is not always ensured and cannot necessarily be implemented without additional measures. Combining road and rail freight transport currently requires technical solutions to facilitate seamless and, above all, cost-effective transport.

How Can These Challenges Be Overcome?

Various solutions begin to become clear when reflecting on these structural challenges. The importance of ensuring general cranability for all transport units in goods transport is obvious. As such, the German Federal Ministry of Transport and Digital Infrastructure is planning a study to prepare a relevant legislative initiative. But modern trans-shipment stations also need to be created as part of integrated infrastructure to expedite loading processes and compensate for possible demand increases. Last, but not least: the number of available freight cars needs to increase considerably. In full knowledge of these developments, MFD Rail has specialised in procurement, leasing and maintenance of intermodal cars. The goal in the process is primarily to significantly increase the share of railway transport in freight transport. To this end, by the end of 2023, MFD Rail will set up a fleet of around 3,000 wagons which will only be used for intermodal goods transport. Meanwhile, KfW IPEX-Bank will be financing modern equipment in railway transport

to promote the advancement of intermodal transport as part of the transport transformation. The availability of more CO2-efficient or neutral railway vehicles is the focus of both companies' commitments.

Digital Rail Freight Transport

To provide additional support for the railways in the area of digitalisation, MFD Rail also set itself the goal of mining immense amounts of data. To do this, the company is investing in innovative technologies for environmentally friendly, efficient and digital freight transport. MFD Rail wagons and their cargo are seamlessly tracked throughout the entire transport chain. The result? Disposition occurs more accurately and in real time, which can speed up logistics processes and facilitate more efficient infrastructure capacity management.

Intermodality Becomes the Goal: Transport Transformation and an Economic Logistics Chain

CO2-emissions can be significantly reduced by choosing environmentally friendly means of transport for longer routes. One freight train requires around 20 percent of the energy of a lorry and only generates around 15 percent of its climate-damaging emissions.

If the current modal split of 75 percent road freight transport, 18 percent rail freight transport and 7 percent inland waterway transport remains as it is, annual CO2 emissions will increase by 80 million metric tonnes by 2030. This, in turn, would seriously jeopardise the ability to achieve the Paris Agreement goals by 2030.

The overview shows that there is no alternative to shifting goods transport to the railways.

By 2030, the share of railway use in goods transport is expected to rise in parallel from today's figure of 19 percent to 25 percent. This increase in rail freight transport was defined in the Rail Transport Masterplan in 2017 and was once again confirmed in 2020.

Within the context of a railway package from the Zukunftsbündnis Schiene (Alliance for the Future of Rail), 200 million euros in support will be available from the federal government between 2020 and 2025 for individual railway companies.

KfW IPEX-Bank and MFD Rail: Together for a Sustainable Transport Sector

Combining transport modes also needs to be simplified. Both KfW IPEX-Bank and MFD Rail support the European Rail Freight Vision 2030 from the Rail Freight Forward Initiative, which set itself the goal of increasing the share of European railway freight transport to 30 percent by 2030.

The co-operation between KfW IPEX-Bank and MFD Rail combines two partners whose names stand for sustainability, progress and expertise. By working together, these two companies prove not only their commitment to focusing on the future, environmental awareness, energy efficiency and carbon neutrality, they are also considered pioneers who will play a part in a successful transport transformation by expanding intermodal transport systems in Germany and Europe.

Directory

Infrastructure

Track Management & Materials

Railway Depot Equipment

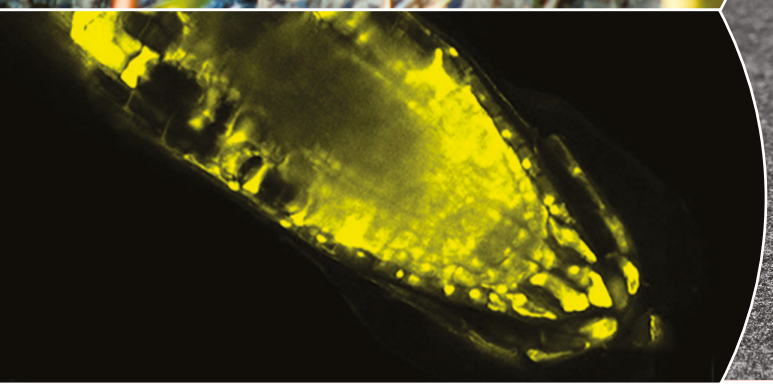
Inside:

- Geofabrics - Clearing the Route
- ROMILL - The New Way of Rail Treatment
- Emeg Group - Where Safety Always Comes First

CuTex

Copper Composite Root Barrier

Stop Japanese Knotweed in its tracks



The scientifically-proven root barrier for the rail industry

- Permeable – allows drainage with no pooling or flooding risk
- Safe – will not damage the environment, wildlife or contaminate water
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Geofabrics

Clearing the Route

CuTex Geocomposite – Safe and Effective Root Barrier Inhibition for Japanese Knotweed

The spread of invasive plants, like Japanese Knotweed, is a huge headache for the rail industry. Damage to infrastructure – like pipework, drains, ballast and cabling – and uncontrolled spread to neighbouring land can result in excessive costs for remediation, prosecution and compensation claims. Knotweed can also obscure railway signals and signs, making it a significant safety concern, too.

What is Japanese Knotweed?

Japanese Knotweed is considered to be the most aggressive of invasive plant species. Affecting a wide range of environments, it's often found colonising man-made habitats, such as roadsides, railways and brownfield land. Its main method of spreading is via rhizome fragments – these can be as small as a 1g in weight and still form a new knotweed colony, even after lying dormant.

Knotweed can be dispersed in water, through garden waste, fly-tipping and via machines at construction sites, establishing a colony from one rhizome that can extend up to seven metres with plants around two to three metres high. That means its excavation and prevention methods are a serious business. It's thought that eradicating all known knotweed in the UK would cost billions of pounds.

The Tried and Extensively Tested Solution to Invasive Plants

It's not illegal to have Japanese knotweed on your land, but legislation exists to prohibit its further spread. Once it has been removed from a site, action must be taken to prevent any rhizome fragments from re-growing.

There are a number of solutions on the market, from chemical treatments to plastic barriers. However, these can cause problems of their own. Plastic prevents water from draining freely, creating the risk of flooding. And chemicals can damage the ecosystem and have a detrimental effect on nutrients, other plants and wildlife. This is where CuTex comes in.

CuTex is a permeable geocomposite root barrier system consisting of a copper sheet mechanically encapsulated between two high-strength geotextiles. An innovative solution to the problem of invasive plants, it can provide direct protection from root intrusion to foundations and drains, landfill caps, roads, railways, dams and green roofs. So, what are its key benefits?

A Fully Permeable Barrier

Root barrier systems to prevent the spread of Japanese knotweed have traditionally involved the use of impermeable membranes. CuTex is unique in that it is fully permeable.

This offers major advantages over plastic barriers in a railway environment, which can prevent drainage, create waterlogging in the ballast and cause track flooding and damage to electrics. CuTex allows water to drain freely, protecting ballast from 'ponding'.

A Double-Edged Approach to Root Inhibition

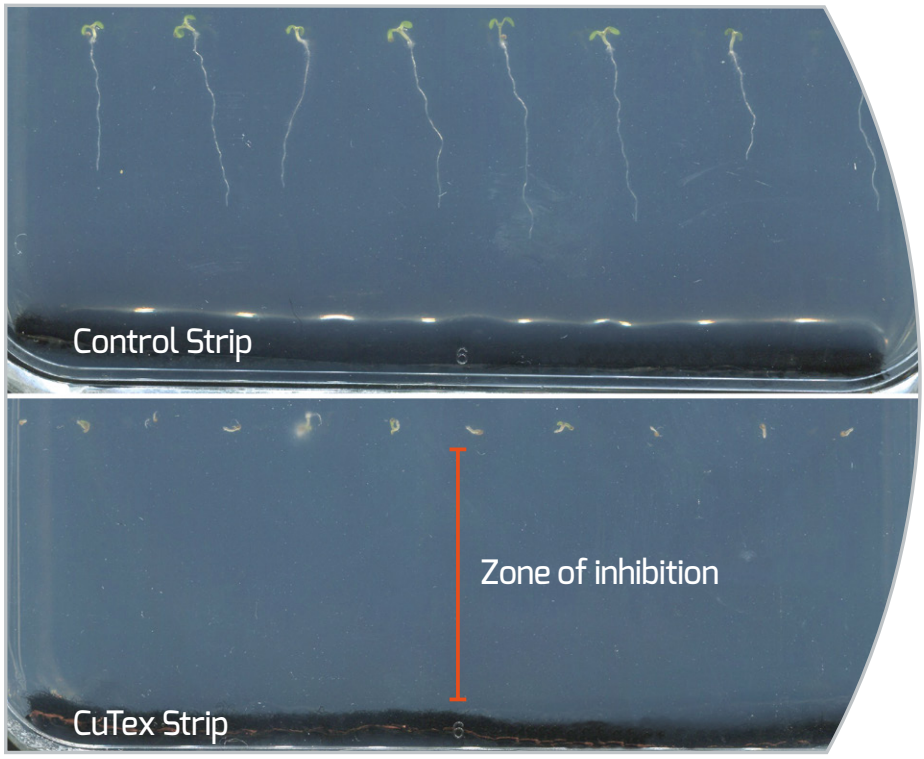
CuTex is a physical barrier to root growth. But more than that, it produces a reaction which acts as a chemical barrier, too.

The copper oxide ions released by the copper layer in CuTex create a 'zone of inhibition' which stops the spread of aggressive plants – with no detrimental effect on soil nutrients or other plants. This 'zone' becomes more effective over time.

Extensively and Independently Tested

Geofabrics has invested heavily in testing to evaluate the effectiveness of CuTex. The Centre for Plant Sciences at the University of Leeds independently assessed CuTex as a root barrier to Japanese knotweed and other invasive plants.

The research verified that CuTex inhibits root growth, is safe and that its effectiveness increases over time – providing the best possible solution on the market today.



A 'Future Proof' Root Barrier System for HS2

Washwood Heath in Birmingham is where HS2's fleet of state-of-the-art high-speed trains will be serviced and maintained once in operation. In preparation for HS2, excavation of Japanese knotweed took place on various dates through autumn and winter 2020, with the final excavations complete in early March 2021.

The areas cleared required a high-performance, permeable and horizontal root barrier that would halt the growth of knotweed once installed – also preventing 'ponding' issues in these areas. CuTex was installed in six separate areas, providing reassurance that Japanese knotweed was eradicated from the area, permanently, providing a clear environment for HS2.

Solving the Problem of Knotweed for Network Rail

Network Rail is faced with the problem of Japanese knotweed on much of its land, nationwide. Before the implications of knotweed were known, this plant was actually introduced to stabilise embankments. However, it soon took over and now threatens ballast, pipework, foundations of buildings, drains and electrics across the NR estate. In addition to the damage that it's causing to track and infrastructure, Network Rail has faced a huge number of claims from homeowners, whose properties back on to railway land, from where knotweed has spread.

With strict guidance in place, regarding the mapping and treating of knotweed, Network Rail has traditionally used pesticides and herbicides to treat the problem. CuTex, however, is a more effective solution that only has to be laid once, as opposed to repeated cycles with chemicals.

Andrew Leech, Commercial Director at Geofabrics explains:

"The investment we made in testing CuTex was vital as we wanted proof that CuTex was the best product available on the market. With verification from the University of Leeds backing our product, the rail industry can install CuTex safe in the knowledge that they are doing their utmost to address the problem of Japanese knotweed on their own land – as well as acting responsibly to prevent the spread to neighbouring land."

Get in Touch for More Details:

www.geofabrics.com
0113 202 5678
info@geofabrics.com

CuTex
Copper Composite Root Barrier

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Robel

The two-part ROMILL rail treatment system is Robel's first product for reprofiling rails © ROBEL

ROMILL – The New Way of Rail Treatment

In recent years, rail head milling has emerged as a vital process for reprofiling rails, reducing contact stresses and thereby tackling rolling-contact fatigue across the complete wheel/rail contact band.

With greater and faster material removal, milling can treat severe damage in one pass within minimal possession times. It is a spark-free and clean process making it ideal for the treatment of environmentally sensitive and high-risk areas like stations and tunnels.

ROMILL Rail Treatment System

In response to customer need, Robel launched its rail milling train ROMILL on to the international market, with the first machines now being tested in Japan.

Forming a collaboration with leading railhead treatment specialist Schweerbau International and Vogel & Ploetscher for state-of-the-art rail measuring equipment, Robel has delivered a vehicle system combining rail milling, polishing, measuring and recording. Furthermore, the group offers a worldwide support network to cover all training, commissioning and servicing needs.

A collaborating robot tightens and loosens the cutting inserts © ROBEL

ROMILL is a two-unit train consisting of a work and a supply unit. The work unit has a driving and working cab, milling unit, system control room and milling wheel maintenance room with a robotic exchange system. The supply unit consists of an engine room, the finish grinding unit, swarf container, measuring system and driving cab.

New Milling Technology

The milling system has two 1445mm diameter milling wheels and can remove between 0.3 to 2mm in one pass with an operational speed of up to 1200m/h. This allows rapid, one-pass removal of defects and reprofiling from gauge corner to the field side of the rail head, regardless of the track geometry.

The carbide cutting inserts are housed in eight individual segments which make up the complete milling wheel, thus facilitating easy handling. Depending on material removal and original rail damage, the tool life can treat up to 5000m of track, easily meeting the requirements of a standard shift. In addition to this, the cutting inserts can be repositioned between four and eight times before replacement, saving considerable time and cost.

Automation for Efficient, Ergonomic and Safe Work

The process of re-orientating or changing the cutting inserts is semi-automatic and requires just one operator. A robotic exchange system firstly removes and transfers the segments between the milling room and the maintenance service room. A second collaborating robot then assists with the tool changing process. The whole process is done within the safe, clean and well-lit confines of the service room in the milling train. No need to leave the train and work in difficult and dangerous conditions on the lineside.

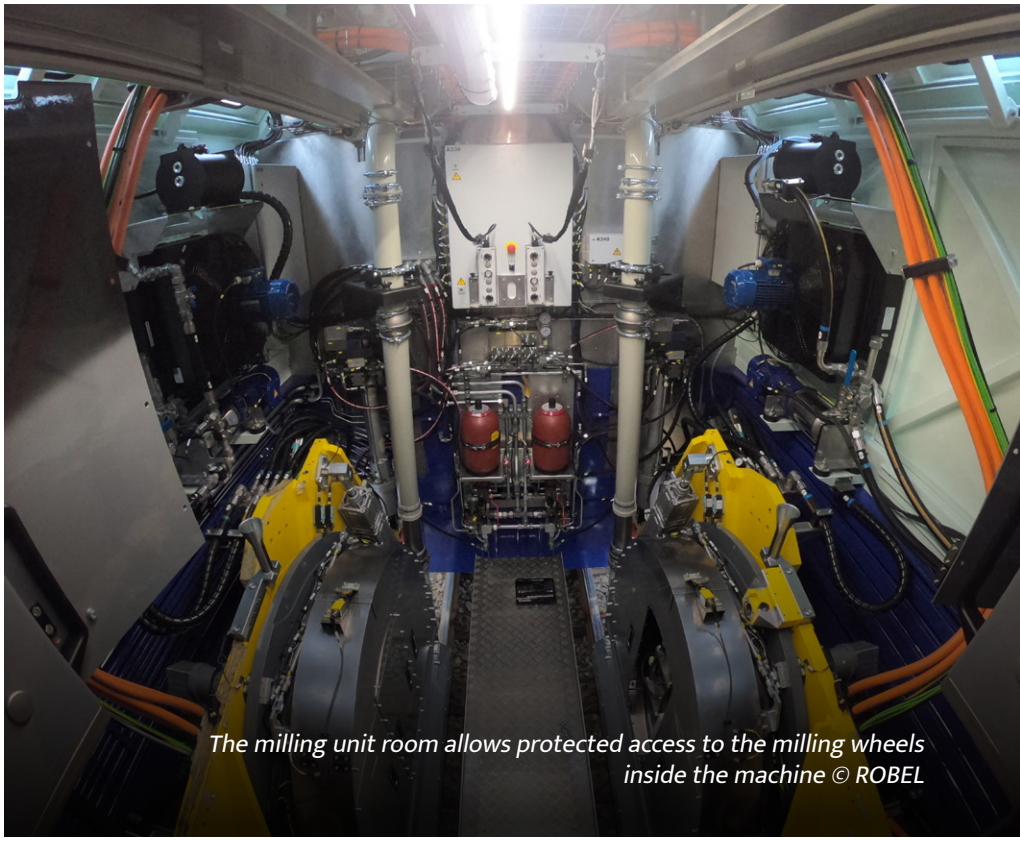
Similar to servicing, ROMILL is designed to operate with just one person doing all set up, milling and shutdown processes plus one person for measurement.

Top Surface Finishing

The supply unit houses the post-treatment oscillating grinding unit that operates at a maximum speed of 1200m/h, is spark-free and has minimal material removal of 0.02mm. The system can operate in dry or wet mode depending on operating conditions and temperature. A non-contact laser measuring system monitors the transverse profile for both pre and post treatment.

The Green Factor

Not only does ROMILL offer the technology to maximise work and


The milling unit room allows protected access to the milling wheels inside the machine © ROBEL

operator safety and efficiency; it also delivers significant environmental benefits. The milling head incorporates a sophisticated suction/blower system, gathering 99.5% of swarf and debris from the milling process, discharging all the waste material in a container on the train. With regards to noise pollution, the milling system fulfils the EU standard for noise level and normally requires only one pass, causing less disruption to lineside neighbours.


A blower and extraction system picks up the residues of the oscillating dry grinding process into the filtering system directly at the grindstone segment © ROBEL


The rail surface after one pass of the milling and finish units © ROBEL

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A TRADITION OF RAIL EXCELLENCE

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

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AN UNRIVALLED SAFETY RECORD

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Middle East RAIL

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Emeg Group

Where Safety Always Comes First

safeNet™ derailer lights © Emeg Group

Emeg is a company that prides itself on having experienced zero accidents in its entire 25-year trading history.

Its unrivalled safety record is largely due to Emeg Group's Nil-Accident Culture HSE platform (Have you got the NAC?), but a passion for service, quality and safety runs far deeper than that. In fact, safety has been embedded in Emeg's DNA since the company was founded back in 1997.

Managing Director, Richard Simmonite, said:

"We believe the strength of our company lies in the skills and expertise of its people, working in a diverse portfolio of engineering-based industries. Safety is viewed as a core, top-down business value and we are committed to ensuring the safety, health, wellbeing and welfare of everyone working for or on behalf of the Emeg Group, both here in the UK and overseas."

Operations Director, Carl Backhouse, added:

"Our NAC platform isn't just something that looks good on tenders, it's something that defines our business-as-usual activities across the entire group. Our safety vision has evolved into a charter that our employees and suppliers must commit to if they want to do business with us."

Emeg Group's Safety Commitment

- Safe behaviour is a requirement of working for Emeg Group
- We will ensure our people have the correct tools and equipment to carry out the work
- We will ensure our people have the skills and competency to carry out the work safely
- We will plan our work to ensure it can be done safely
- We will always take five minutes to identify any risks within the immediate work area and make sure they are controlled before starting
- We will stop work if it cannot be done safely
- We will always comply with the site and lifesaving rules
- We will use close calls to report unsafe behaviour and conditions
- We will not tolerate retribution for anyone reporting wrongdoing or suspected wrongdoing
- We will keep our working environment tidy and when the work is completed, ensure the site is left in a safe condition

As well as providing a wide range of depot products (including carriage wash machines, fuelling, fume extraction, controlled emission toilets, ventilation, shore supplies, etc.) plus design and maintenance services, Emeg Group is a leading supplier of depot protection systems (DPS) with its next-generation, intelligent DPS, safeNet™.

safeNet™ Depot Protection System

In essence, a depot protection system protects rail personnel from the dangers presented by trains in operation on a live depot by ensuring rail vehicle movements are controlled with no risk to staff.

Emeg's safeNet™ Depot Protection System incorporates industry-leading features, such as bespoke software programming, automatic derailers and wheelstops, intelligent PLC controllers (ROLOs) with or without HMIs, a PC head end (optional), individual data keys, train detection, visual and audible warning systems and a robust, reliable control network. As well as meeting and exceeding the safety integrity requirements of SIL 2, safeNet™ is also the world's first DPS system with integrated facial recognition technology.

Uniquely, Emeg's safeNet™ depot protection system can be configured to operate 100% in accordance with specific depot operating procedures and practices, assuming of course that those procedures will result in a safe solution.

One advantage of Emeg's safeNet™ depot protection system is that each system is designed, manufactured, installed and can be maintained by Emeg's own internal staff; no other system offers a full turnkey product and one-stop-shop service.

Emeg Group's DPS Pedigree

Emeg Group's core engineering staff have been pioneers in developing innovative DPS products for over 40 years, starting with the design and installation of the very first DPS at the newly built Norwich Crown Point depot in 1980.

New safeNet™ HMI control panel
© Emeg Group

Up to the early 1990s, all rail work in the UK was designed in-house by British Rail, although Emeg's engineers were seconded to the British Rail Board in the 1980s to assist with a complete overhaul of the design for depot protection systems. In fact, some of the drawings referenced in the current UK Network Rail depot protection standard were produced for the British Rail Board by Emeg's engineers.


safeNet™ by night © Emeg Group

Since British Rail (which ultimately became Network Rail) ceased all design activities, Emeg's in-house engineering and manufacturing team has designed, manufactured, installed, commissioned and maintained all Network Rail depot protection systems. An essential resource, Emeg is responsible for the provision and support of all aspects of Network Rail's depot protection systems. Maintaining high-quality standards, impeccable service delivery and rapid response via in-house capability is unique to Emeg.

During the installation of a next-gen depot protection system for Network Rail's Leeds Neville Hill Depot in 2019, Emeg's engineers discovered an interface problem with the automatic derailers that could be traced back to the original British Rail DPS design from the early 1990s. Unfortunately, *lifeguards*, which are installed on all rolling stock, had not been considered when the automatic derailers were originally designed so lifeguards could potentially defeat the automatic derailers with disastrous consequences.

Network Rail asked Emeg to undertake studies and to provide a solution that would be adopted throughout all UK depot protection systems. Emeg produced a revised automatic derailer design that was comprehensively tested with rolling stock lifeguards to ensure it was fully fit-for-purpose. Emeg's safeNet™ derailer system is coordinated with rolling stock lifeguards in such a way that it becomes impossible for a lifeguard to defeat the derailer. As a result, Emeg's revised automatic derailer received PADS approval and is the only automatic derailer that has Network Rail approval.

A Short History of Emeg's Depot Protection Systems

1980 – Norwich Crown Point

Depot protection system for the entire, newly built Norwich Crown Point rail depot. **This was the very first depot protection system**.

Emeg designed and installed a further 20 depot protection systems over the next 15 years, including DPSs at Wembley, Wimbledon and Plymouth, to name a few.

1995 – Manchester

Depot protection system and interlocking for Manchester International rail depot.

1996 – Heathrow Express

Depot protection system for Heathrow Express rail depot. From 1996 to the present day, Emeg has installed DPSs and manual / automatic derailer systems at more than 30 rail depots all over the UK, from Penzance to Newcastle and everywhere in between. This includes standard rail depots as well as international, heavy maintenance, reception sidings, Crossrail rolling stock assembly factories and metro facilities.

Recent projects include a return to Network Rail's Neville Hill TMD in Leeds to carry out a comprehensive upgrade of the diesel multiple unit (DMU) building and a new safeNetTM design and installation at the Howdon Satellite Depot, just outside of Newcastle, which serves the Tyne and Wear Metro operated by Nexus. Emeg Group were appointed by Buckingham Group Contracting Ltd (BGCL) as its preferred railway M&E engineering service provider for the project.

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

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

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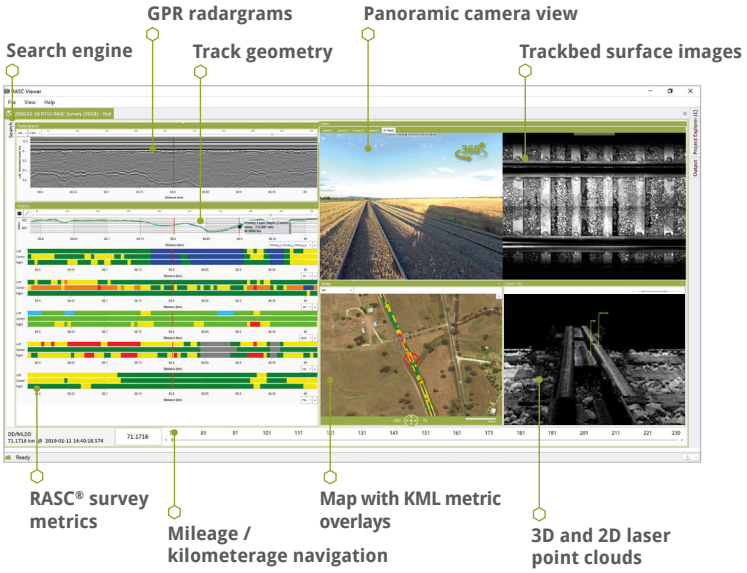

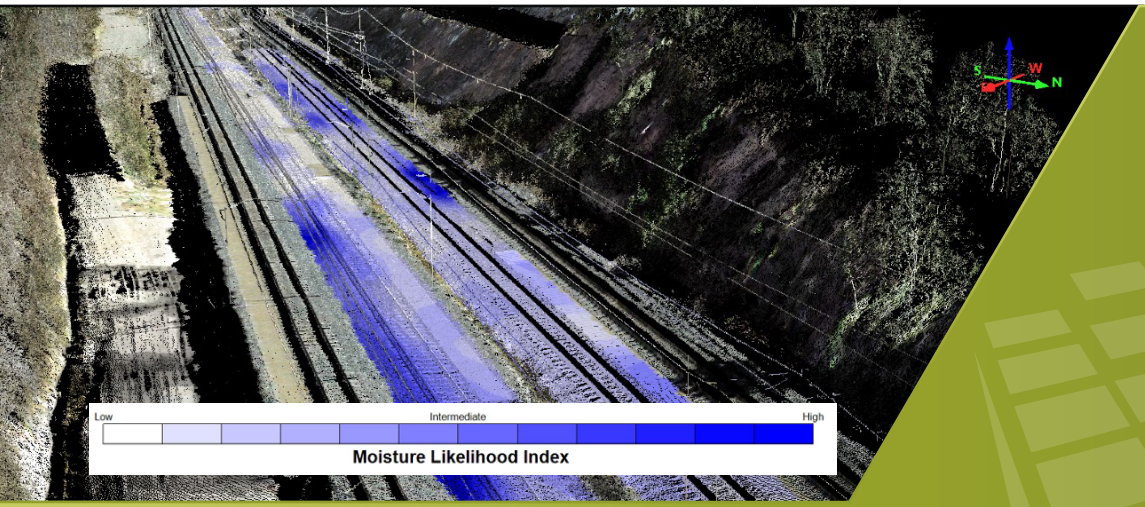

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OLYMPUS

Phased Array Instrumentation

For easy integration

Olympus offers a complete advanced phased array integration solution that meets the requirements of your most demanding customers. The solution includes the FOCUS PX, a powerful and scalable acquisition unit; FocusPC, a powerful data acquisition and analysis software program; and two software development kits (SDK), FocusControl and FocusData, to customize your software interface based on your application, and control FocusPC for a fully automated inspection solution.

Instrument

FOCUS PX

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FocusPC, FocusControl, and FocusData

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- Composite parts
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- Friction stir welds (FSW)

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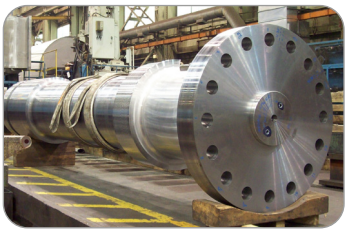
- Train wheel
- Train axle



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- Tube
- Bar

Oil and Gas

- Welds (including austenitic)
- Corrosion mapping

Olympus

Get Up to Speed with Railway Safety

– Advanced Phased Array Technology Enables Wheelset Inspection

DTEC GmbH is a supplier of NDT (non-destructive testing) equipment specialising in innovative, turnkey flaw detection solutions for railway wheelsets and train condition monitoring.

To enhance inspection services for railway safety, DTEC GmbH has combined Olympus' **advanced phased array ultrasonic testing** (PAUT) with machine vision to create intelligent automated wheel inspection systems (WIS). DTEC GmbH's automated inspection system solutions can perform:

- Wayside wheel inspection
- In-service wheel and axle inspection when wheelsets are on a train
- Routine wheel and axle maintenance phases on dismounted wheelsets

The WIS uses **Olympus' FOCUS PX** PAUT instrumentation to detect manufacturing flaws, defects, and fatigue cracks in high-speed train, locomotive, and rolling stock wheels and axles.

DTEC GmbH's Underfloor Wheelset Ultrasonic Testing System (UW-UT)

"The Olympus FOCUS PX makes our star product, the Underfloor Wheelset Ultrasonic Testing System (UW-UT, or UFPE in German), an excellent solution for modern railway maintenance depots. It enables the inspection of wheels for fatigue cracks without needing to remove the wheelset from the vehicle," says Dr Eric Peng, Chief Engineer at DTEC GmbH.

Overcoming the Challenges of Wheelset Inspection

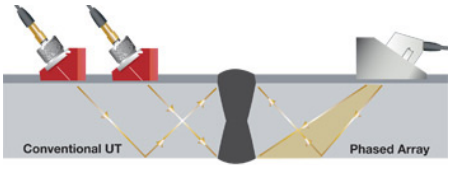
The wheelset components of trains are susceptible to rolling-contact

fatigue (RCF) due to consistent high loads and speeds. RCF can induce spalling (flaking) and shelling, causing the wheel rim to lose chunks of material leading to serious safety issues such as the potential for derailment.

Railway operators can use conventional ultrasonic testing (UT) to detect rail-wheel contact and cycling stress, limiting the 360-degree-circumferential flaw detection of wheels. Inconveniently, UT requires that wheelsets be removed from the vehicle to perform a proper inspection, which is inefficient.

DTEC GmbH needed an efficient, accurate, and reliable solution that would enable them to keep the wheels on the vehicle during the inspection process.

PAUT allows operators to do just that. In comparison to UT, PAUT offers the ability to steer, focus, and scan beams allowing the inspector to scan difficult-to-reach components, such as wheels in the undercarriage.



Phased array testing compared to conventional UT: The ability to test welds with multiple angles and depths from a single probe can increase the probability of detecting an anomaly

Though phased array probe technology may be more expensive, the greater flexibility and increased inspection efficiency that PAUT systems provide offset the cost.

Using Olympus' PAUT technology reduces the number of probes that DTEC GmbH's UW-UT system uses by half compared to conventional UT transducers. The compact probe carrying device also means it is compatible with many different wheel types.

FOCUS PX and FocusPC Software Deliver an Automated Solution for Wheelset Inspection

The FOCUS PX data acquisition unit is a conventional UT and phased array instrument that can automate inspections. With its sturdy casing, the unit requires no air intake, is scalable, easy to integrate, quick to program, and has been thoroughly tested in harsh production environments.

FOCUS PX software, FocusPC, offers powerful inspection features, advanced analysis tools, and fully customisable displays. Driving up to four FOCUS PX acquisition units in parallel, FocusPC software can combine data in a user-defined display. FocusPC can inspect without interrupting the inspection sequence thanks to the ample data file storage, flexible compression and digitising rates, and conditional A-scan saving.

Integrated Solutions: A System for Undercarriage Wheelset Ultrasonic Testing

DTEC GmbH's UW-UT (or UFPE) with an integrated Olympus FOCUS PX acquisition unit is a fully automatic ultrasonic wheel inspection system used during light maintenance. On the maintenance track, the UW-UT system automatically lifts and rotates each wheelset. At the same time, PA probes are placed on both wheels by twin robots – acquiring ultrasonic data and transferring it to the WIS software program before generating a report. The process from acquisition to review takes a total of two minutes.

Key features of DTEC GmbH's UW-UT system:

- Automatic positioning and inspection
- UT data acquisition: ≤1 min/ wheelset
- A/B-scan, bar chart, data analysis for wheel side view
- Flaw detection ability:
- Equivalent defect in wheel rim: ≥ 2 mm FBH
- Equivalent crack on wheel rim: 10 mm×3 mm
- Equivalent crack on wheel disk: 15 mm×3 mm
- Equivalent defect in wheel disk: ≥ 3 mm SDH

The Route to Results with PAUT Inspection and Data Management

Around 50 A-scans are simultaneously triggered for every 1mm rotation of the wheel tread in the UW-UT system, meaning inspection of a 920mm diameter wheelset generates around 30,000 A-scans. A data set of such magnitude requires a powerful instrument like the Olympus FOCUS PX unit to execute the data

UW-UT system on a calibration reference wheelset (left) and an on-vehicle wheelset inspection (right)

acquisition and transfer in real-time.

With such a large volume of data collected, DTEC GmbH set up specialised data management for its operators with automatic alerts, the option to apply manual confirmation, the ability to visualise defect details such as depth, location, and severity, and instant re-calculation each time a defect is manipulated.

The combination of Olympus' fully automated PAUT technology and robust data management in the DTEC GmbH UW-UT system has streamlined the inspection process. 130 UW-UT systems have been installed since 2009, successfully detecting wheel cracks that can be removed with a lathe and safely put back into service.

Smart Solutions for Safety

In addition, DTEC GmbH has developed the Dismounted Wheelset Ultrasonic Testing (DW-UT) system that also uses the Olympus FOCUS PX. This enables operators to easily assess wheel fatigue cracks in dismounted wheelsets which along with the WIS delivers a comprehensive wheelset inspection solution.

The innovative Olympus technology and instrumentation integrated into DTEC GmbH's wheelset inspection solutions enables them to successfully produce intelligent automated solutions to keep railways safer and smarter.

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AMBERG TECHNOLOGIES

Amberg TrackControl – The Seamless Monitoring of Your Railway Tracks

Amberg TrackControl is the ground-breaking solution for the monitoring of your railway tracks. Do you often face rain, fog and snow or are obstacles obstructing the line of sight for your geodetic monitoring system?

Regardless of the weather and sight conditions, TrackControl monitors all safety-relevant track parameters such as twist, vertical versine and settlement deformations once every minute.

The latest sensor generation of Amberg TrackControl is quickly installed thanks to flexible plug connections and innovative magnet fastening. It can be extended up to a total length of 340 meters.

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Amberg Technologies AG

Amberg TrackControl – Seamless Monitoring of Railway Tracks

Digital methods and instruments offer opportunities for innovation in both railway and tunnel applications.

TrackControl is a ground-breaking solution developed by Amberg that allows users to monitor railway tracks.

The latest sensor generation of Amberg TrackControl is even quicker to install thanks to flexible plug connections and innovative magnet fastening. The system monitors all safety-relevant track parameters such as twist, vertical versine and settlement deformations in one-minute intervals – regardless of the weather conditions.

When monitoring railway tracks, reliable data delivery is of the utmost priority. There is a particularly high need for safety at construction sites that cross under railway lines or are very close to populated areas. In the event of damage, major impairments to freight and passenger traffic can occur and human lives can be put at risk.

1.1. The Visual, Geodetic Way Versus the Digital, Geotechnical Approach

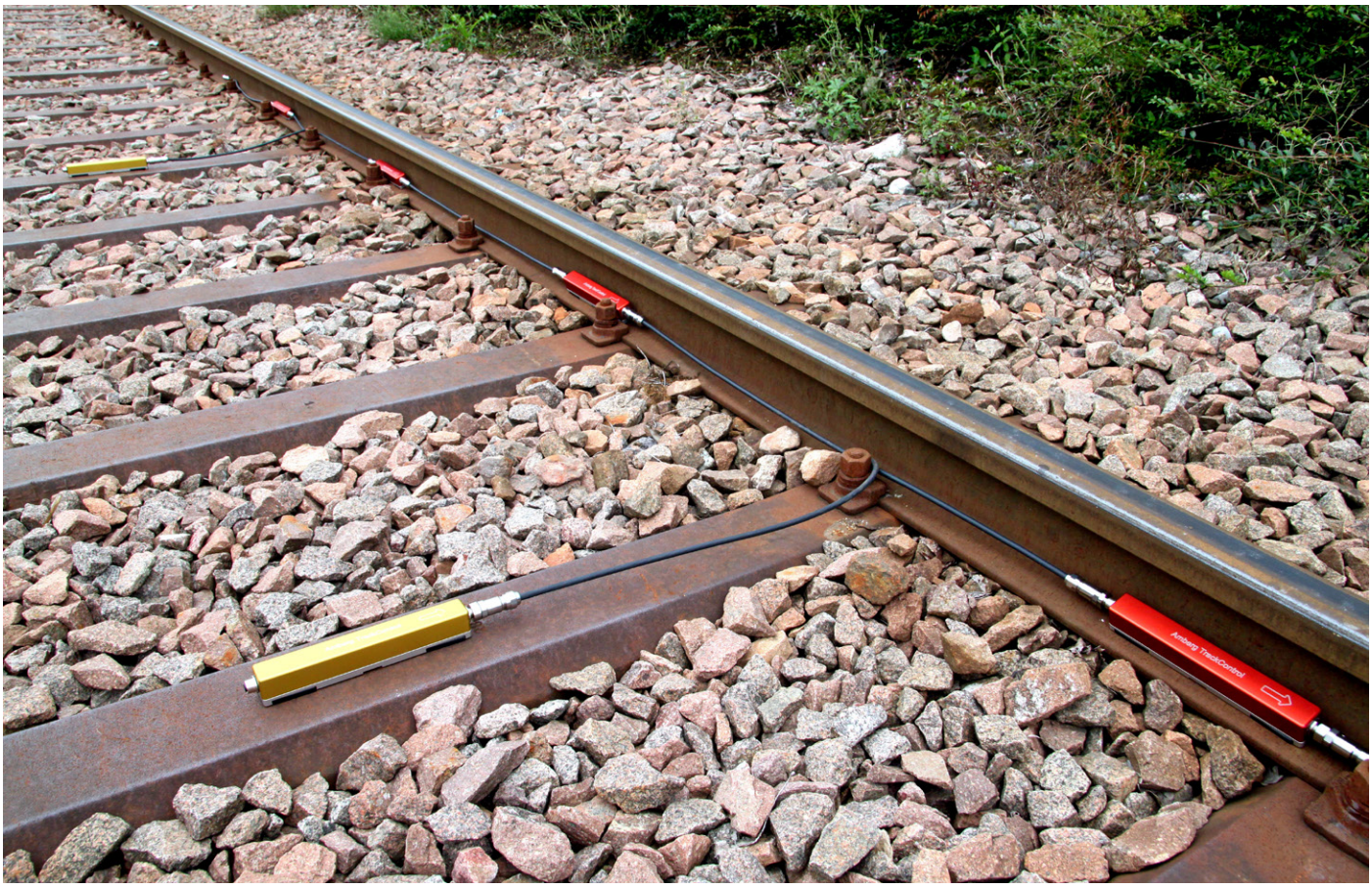
Because of this safety requirement, tracks are automatically monitored during the construction period. In the past, these tracks were monitored with geodetic – in other words sight-based – means. Depending on the hazard pattern, the measurements were either carried out periodically or via permanently installed monitoring systems. It was found that automatic monitoring systems with optical methods sometimes react unreliably and with delays to notifications about limit values being exceeded in the event of difficult meteorological conditions such as fog, rain or snow. Obstacles on the tracks, such as stationary trains, also impair data quality.

Amberg TrackControl uses a geotechnical approach. In order to guarantee safety and the normal operation of construction projects near tracks, Amberg has developed a system that is independent of atmospheric disturbances. Amberg TrackControl is the safe and reliable monitoring solution for railway systems. It monitors the safety-relevant track parameters such as superelevation, twist, vertical versine and settlement in a measuring interval of one minute. The main components of the geotechnical system are inclination sensors, which monitor deformations on tracks and catenary masts. Amberg TrackControl comprises 48 longitudinal and 12 transverse sensors per module as well as four optional two-axis sensors for the monitoring of mast inclinations. Each module can monitor one 56m track section. The basic module can be supplemented with five further modules at the same measuring station, which enables the monitoring of an approximately 340m long area.

The twist, the vertical versine and the settlement depression are then derived from the measured values. All calculations and tests for exceeding limit values are carried out on site at the measuring centre. The data is then evaluated on the Amberg GEOvis 4.0 web platform, from which visualisations can be created for the end customer.

1.2. The Problem Solver for Challenging Projects

Amberg TrackControl has already proven itself in practice, for example in a large tunnel project in Rastatt. In the south of Germany, this tunnel passes under the existing



Deutsche Bahn high-speed line at a flat angle over a length of approx. 500 metres. Due to this angle and the small overlap, this project posed special challenges in terms of passenger safety and rail operations. In order to meet these requirements, Amberg installed a second geotechnical system for Deutsche Bahn in addition to the geodetic monitoring system. Amberg TrackControl is predestined for such tasks. The security systems reliably sounded the alarm when the railway line was lowered on 12 August 2017, which enabled the line to be closed quickly and prevented material damage and injuries to persons.

Another project illustrates the versatile application possibilities of Amberg TrackControl. Under a track field at Ingolstadt railway station, a sewer tunnel was built for Ingolstadt's public utility company using press pipe jacking. 21 of the tracks to be passed under concerned the freight station, the main loading station of the Audi works in Ingolstadt. Eight tracks concerned the Munich-Berlin high-speed line. A permanent monitoring system with tachymeters was unsuitable due to the difficult visibility conditions with the many tracks and the trains parked on them. Amberg TrackControl proved to be the optimal solution in this case. In total, the station area was equipped with 550 sensors. The installation was completed in a very short time. Amberg TrackControl then delivered reliable results on cross slopes, twists and vertical versine. The alarm in the event of limit values being exceeded was forwarded directly to the dispatcher and the project management.

Amberg TrackControl is the innovative solution for track monitoring. The sophisticated sensor technology provides reliable data and is immune to weather influences. In addition, the system is quickly installed, even for large projects.

For further information, visit our **website**.

AMBERG TECHNOLOGIES

"Amberg TrackControl minimises risks in infrastructure projects. The advantages in comparison to geodetic systems are obvious and the reliability is remarkable. No matter the weather, Amberg TrackControl works like a Swiss watch."

Michael Buri, Head of Geoengineering Unit, Amberg Technologies AG

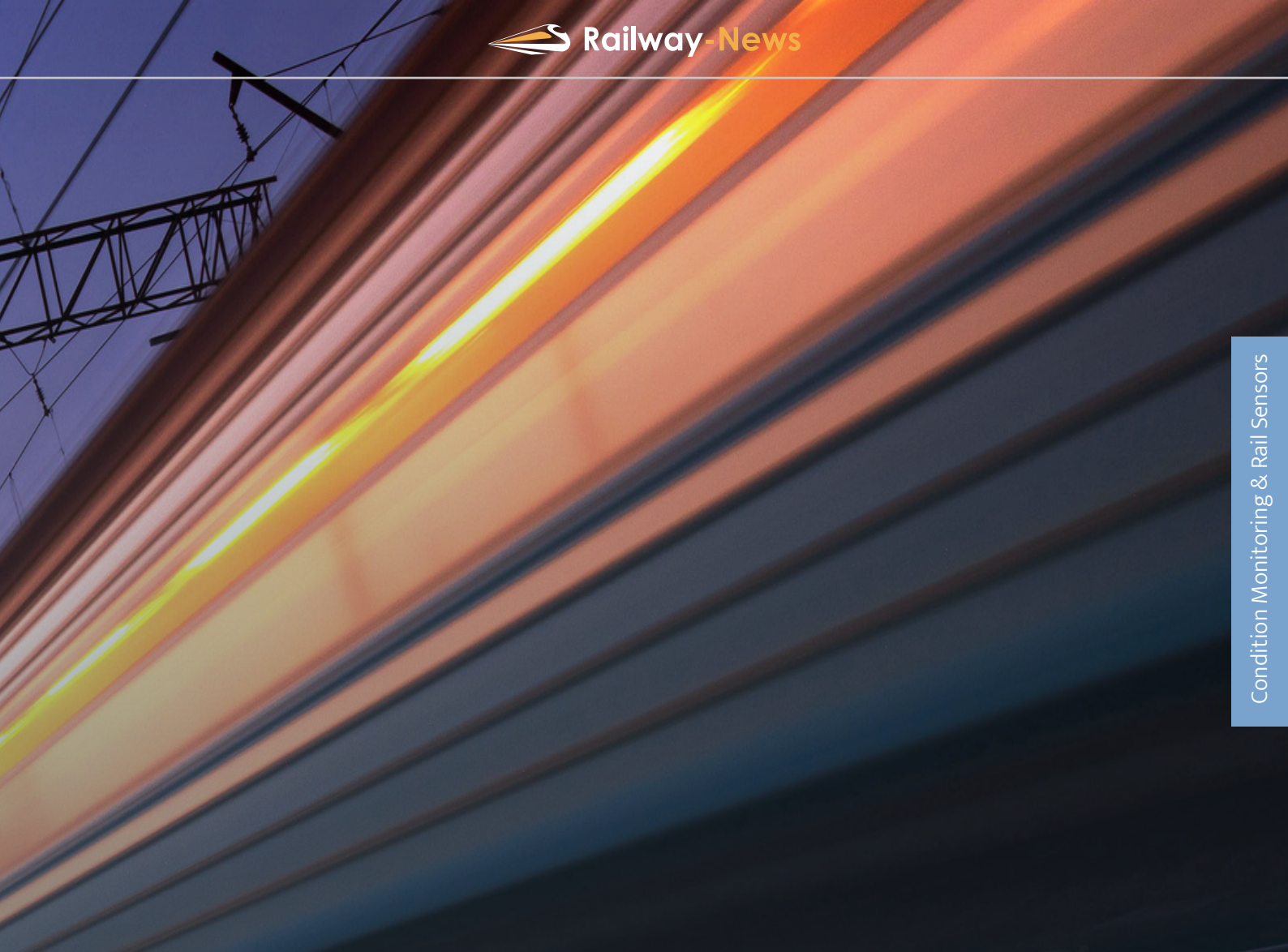
FREQUENTIS

All in Favour of Rail Track Safety Say AI

Is there a faster way to detect rail track anomalies and prevent delays? **Bettina Arendt**, Frequentis User Experience Expert, **Michael Kreilmeier** Mission Embedded, and **Prof. Axel Jantsch**, TU Wien, explore the use of artificial intelligence to keep passengers moving.

Railway travel has a positive impact on the environment, reducing road congestion and moving people and cargo in the most economical way; it is the essential engine that keeps urbanised society running while also tackling the climate crisis. But, to keep passengers moving, safety and reliability are crucial and only upheld through the careful maintenance of the track infrastructure. However, current maintenance methods consist of frequent surface checks by rail operator staff and precise but infrequent and cost-intensive monitoring with measuring vehicles.

Experts estimate yearly maintenance costs of about €50,000 [1] per track kilometre and assume that a decrease of at least 15 percent up to 55 percent can be achieved through improved maintenance methods [2]. This has been the driving force behind the solution proposed in a project



funded by the Austrian Research Promotion Agency (FFG). It will provide an excellent cost-benefit ratio, with the cost efficiency arising from low sensor costs, allowing numerous rail vehicles to be equipped with a state-of-the-art system to reach high-frequency monitoring, covering the entire railway network.

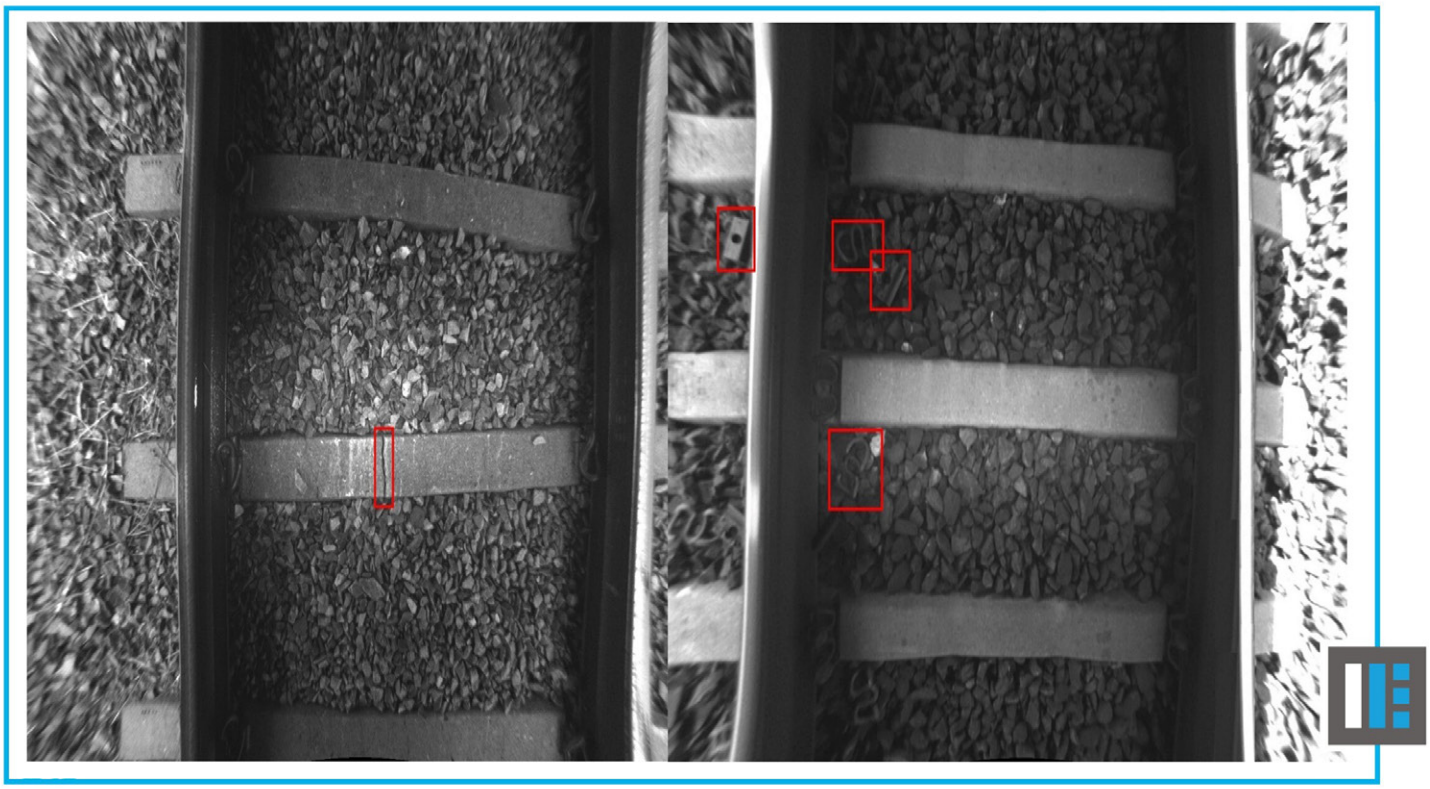
Intelligent Track Infrastructure Monitoring

The FFG is funding the HARMONY project (Human-Assisted Real-time MONitoring of infrastructure and obstacles from railwaY vehicles) to explore a more efficient and economical method for monitoring track infrastructure.

The project proposes the use of artificial intelligence (AI) to detect irregularities on railway tracks in addition to and in support of the precise but infrequent and often cost-intensive measuring vehicles. The ultimate goal is to increase the safety and reliability of railway transportation.

The project, run by Mission Embedded, Frequentis, and the Institute of Computer Technology at the Vienna University of Technology (TU Wien), will investigate the use of an innovative track monitoring system that uses sensors and AI to detect anomalies on the track infrastructure. The aim is to be responsive to any issues at an early stage to prevent significant damage and avoid potential accidents.

The FFG HARMONY project is focusing on an intelligent system to be mounted on regular trains that uses sensors to scan the track infrastructure during normal operation as well as AI to automatically detect and report anomalies on tracks, track beds, and switches. In this way, potential hazards such as track breaks, track damage, or vegetation growth are detected at an early stage. This also helps rail operators to make informed decisions on necessary maintenance work. In addition to intelligent sensor data processing on the moving train, the HARMONY project also addresses human factors to increase end-to-end system security and user acceptance. A key element here is the development of the new role of the remote analyst, supporting the decision-making process remotely.

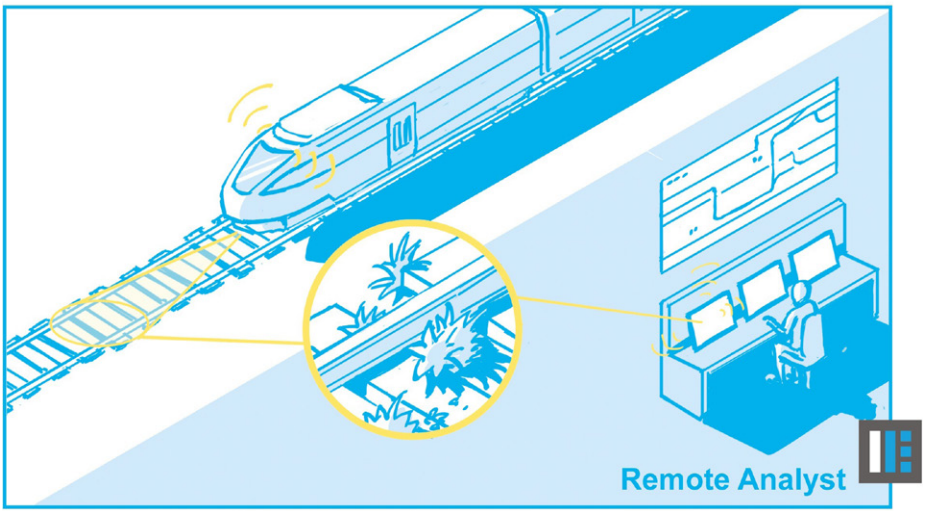


Informed decisions: Potential hazards such as track breaks, damage, or vegetation growth can be detected early

This new role is also relevant for AI applications in other areas where intelligent machines are used.

Disruptive Innovation

With the Austrian Federal Ministry for Climate Action (BMK) as a funding body, this research project can offer a customised high-tech solution made in Austria for rail operators from all over the world. Mission Embedded is one of the worldwide pioneers in the field of intelligent sensor and assistance systems for rail vehicles and has many years of experience and expertise in the areas of sensor integration, machine learning, automatic data processing, as well as safety and security for mission-critical applications. High-quality sensor data from several previous projects lay the foundation for the present project.



Human in the loop: The remote analyst supports the decision-making process

As consortium leader and expert for highly reliable software and hardware, Mission Embedded is mainly responsible for the technical development of the project. TU Wien contributes its long-standing research know-how, its extensive expertise in embedded systems, embedded machine learning, as well as sensor data analysis and makes an essential contribution to the technical development. Frequentis Control Room Consulting (CRC) contributes decades of experience in safety-critical environments with process analysis and information flow design and is responsible for maximising the end-to-end

security of the overall system. Frequentis CRC also addresses user-specific challenges including user acceptance, visualisation of multi-sensor data, and ultimately the role definition of the remote analyst, addressed by way of stakeholder analysis, information flow analysis, and human performance analysis, among others.

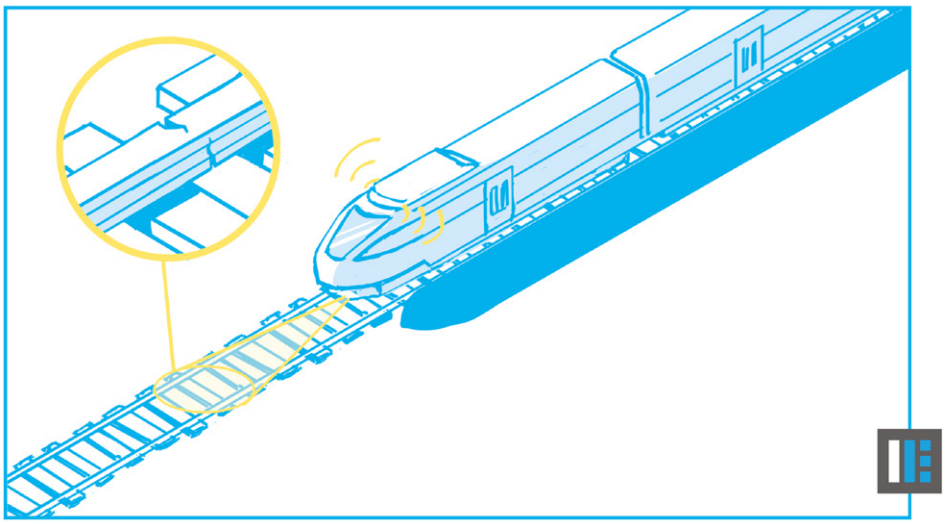
This research project is a great example of disruptive innovation (innovation that does not build on existing processes) through automation and artificial intelligence. To prepare for the transition in a significant but safe way, the current and future situation must be evaluated in depth. The results of this challenging research project will provide a solid basis for monitoring the track infrastructure more seamlessly and cost-effectively, enabling even safer and more reliable rail operations, ensuring an enjoyable journey experience for passengers to keep them returning.

[1] C. Esveld and C. Esveld, Modern railway track, Second., vol. 385. MRT-productions Zaltbommel, Netherlands, 2001.

[2] Jovanović, S., Božović, D., & Tomičić-Torlaković, M. (2014). Railway infrastructure condition-monitoring and analysis as a basis for maintenance management. Građevinar, 66(04.), 347-358.

About Frequentis

Frequentis is an international supplier of communication and information systems for control centres with safety-critical tasks, with solutions that leverage over 70 years of experience in safety-critical communications



Automatic reporting: Sensors mounted on regular trains will scan track infrastructure during normal operation

and applications. Such 'control centre solutions' are developed and marketed by Frequentis in the business sectors Air Traffic Management (civil and military air traffic control, air defence) and Public Safety & Transport (police, fire brigade, ambulance services, shipping, railways). The company also holds the number one market share in GSM-R dispatcher terminal positions; more than 8,000 units are currently deployed in customer control centres in over 25 countries.

About Mission Embedded

Mission Embedded is a member of the Frequentis Group, which develops and supplies highly reliable embedded systems for professional applications in safety-critical areas such as railway, special vehicles, industry, medical technology, and air traffic control. The high-quality tailor-made solutions enable customers to turn their innovation projects into reality within the shortest possible time. All phases of the product life cycle are covered – from conception and system design to production and maintenance.

About Institute for Computer Technology, TU Vienna

The Institute of Computer Technology (ICT-TUW) at the Faculty of Electrical Engineering and Information Technology at Vienna University of Technology focuses its research on embedded systems, systems on chip and software-intensive systems. The areas of embedded machine learning, sensor data analysis, safety and security, smart energy systems and requirements engineering represent important research activities, which are currently pursued in 30 externally funded projects with a total volume of about one million euros.

For more information visit:
www.frequentis.com/public-transport

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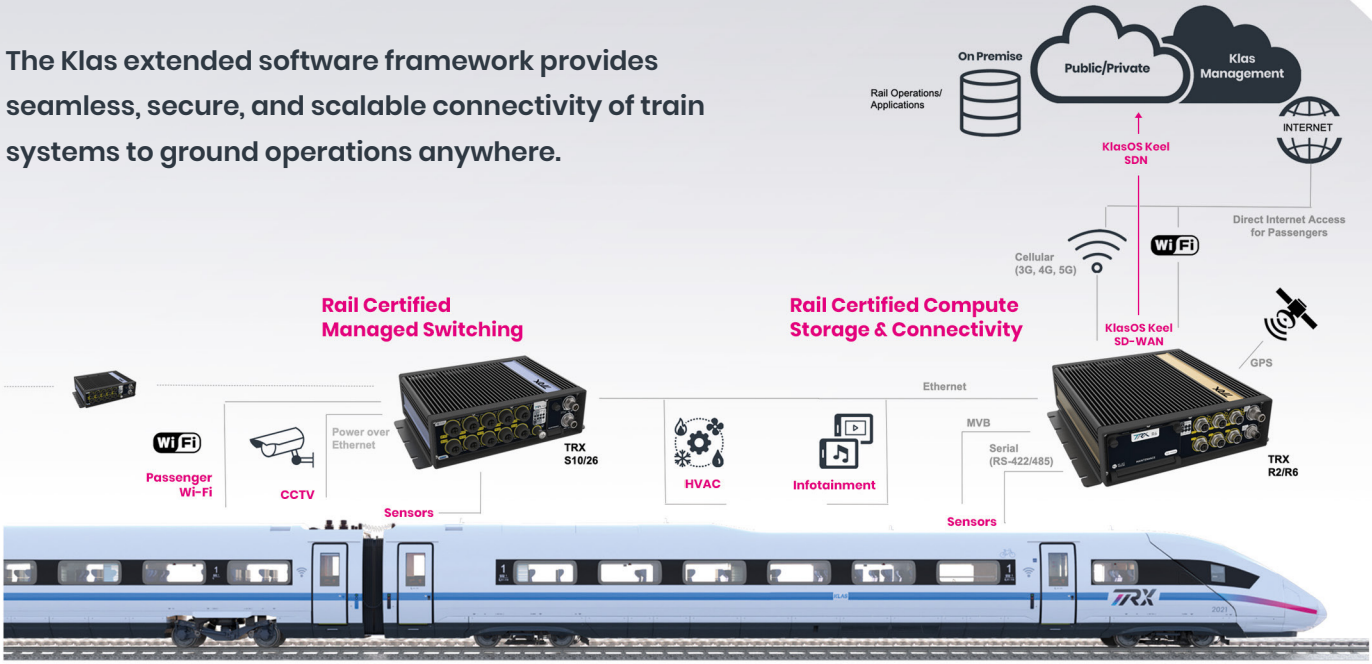

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KLAS

Share Holiday Experiences with Loved Ones at Home Straight Away

Travelling at a leisurely pace, the Matterhorn Gotthard Bahn (MGB) and the Gornergratbahn (GGB) meander through the alpine landscape between Zermatt – Visp/Brig-Andermatt-Disentis and from Andermatt to Göschenen.

They connect people and regions: the cantons of Valais, Uri and Grisons. The scenic spectacle passengers get to behold along around 144km of track and at an altitude of more than 3,300m is immense.

Towering mountains, pristine valleys, ice-grey glacial tongues – it is as if the train and the environment have merged into one. The trains make their way through 50 tunnels and rock sheds, across bizarre gorges and along cosy mountain lakes. Millions of passengers from all around the world take the Glacier Express from Zermatt to St. Moritz or admire the Matterhorn and the glacial mountain landscape from the Gornergrat ridge.

Continuous, Free Wifi

When there is so much beauty to admire, passengers want to be able to post and share their experiences and videos straight away and for that they need a fast internet connection. In order to prevent the many visitors from outside Switzerland from having to pay expensive roaming charges, Matterhorn Gotthard Bahn provides its passengers with continuous wifi. A passenger might travel from Visp to Zermatt, alight, and take the rack railway up to the Gornergrat ridge. This passenger will remain continuously connected to the free wifi via their smartphone – both in the trains and at the stations. There is no need to repeatedly register or accept terms and conditions, something that is tedious to do. The use of two modems with LTE Adv increases the bandwidth of passengers on board the trains to enable uninterrupted surfing.

To achieve this, both railways, the MGB and the GGB, are banking on technology by onway, the leading provider of uninterrupted wifi networks. Thanks to its intelligent roaming technology, devices are recognised after a one-time registration, so that they are automatically connected to the internet again at next use. This gives passengers a continuous surfing experience. In order to guarantee an uninterrupted internet reception in the mountains, onway uses several mobile providers simultaneously, bundling all available capacities to create a maximally performing train-land connection.

© BVZ Holding, Matterhorn Gotthard Bahn and Gornergrat Bahn

Vision: Swiss Public Wifi

onway's vision is an expansion of the continuous public wifi to further railways, such as SBB, Postauto, Jungfraubahn, RhB and others. In this vision, a passenger will arrive at Zurich Airport, log into the 'Swiss Public Wifi' and is then continuously connected all the way to the summits of the Jungfrau and the Matterhorn or all the way to Zermatt.

Passengers will be able to share their impressions of beautiful Switzerland everywhere directly, without a laborious login process.

www.onway.ch

Key Technical Data of onway's Integrated Communications System

- on3800 router in the trains with 2x LTE Adv, 2x Wifi, 1x GPS
- Aggregation of two mobile networks
- One-time registration by the customer on the landing page, then wifi is available at all hotspots (on the trains and at the stations)
- Exterior antennas with LTE Adv MiMo for optimal and best-possible reception in mountainous areas
- Interior antennas for the wifi reception of passengers' mobile devices
- VPN Gateways on the landside, to bundle the capacities of all mobile networks

Optimize Rail Communications

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

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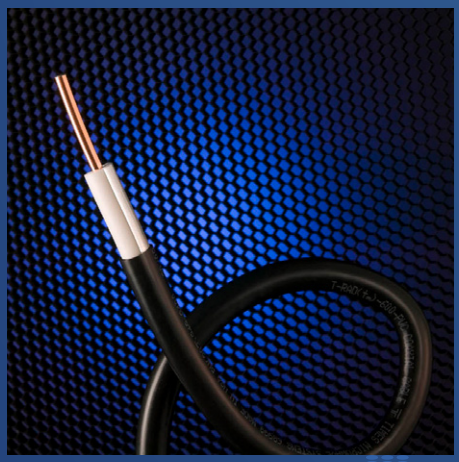

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Real-Time Traffic Planning for Railroads

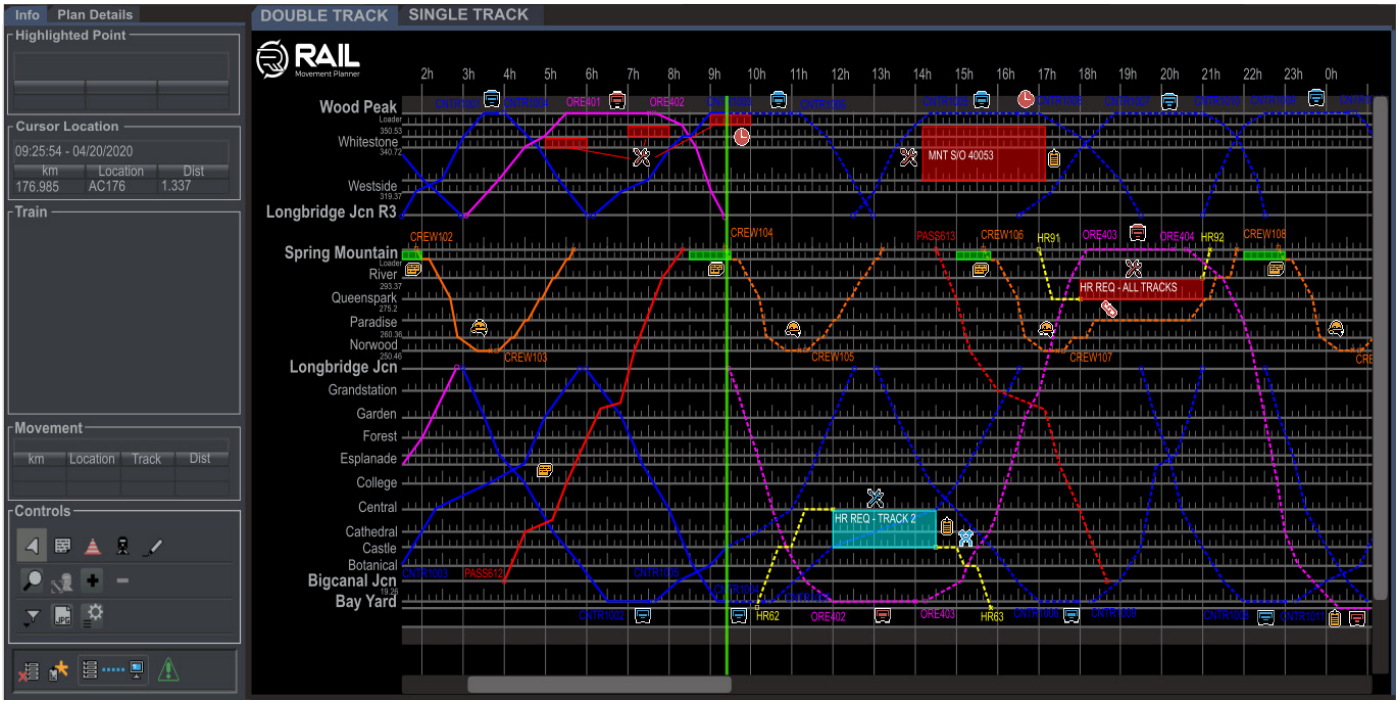
Rail Movement Planner™ (RMP) is the solution that will take your railroad to the next level!

Smart planning can solve disruption and prevent incidents – while enhancing productivity!

The Rail Movement Planner Company (Railmp) is present in various operations around the world, providing state-of-the-art real-time traffic planning solutions for railroad networks.

Empower your traffic controllers with the ultimate traffic planning solution! Better plans lead to increased throughput and smoother reactions to disruption. With **Rail Movement Planner™** your operations centre achieves more results by improving communication and allowing quick and easy planning for your railroad's needs.

Reduce conflicts between operation and maintenance windows, solve meet-and-pass scenarios automatically and test feasible traffic plans within seconds! No matter how complex your network or how specific are your operational rules, our solution integrates with your railroad's operations centre to devise highly efficient train scheduling in real time.



Our company was founded in 2015, with its headquarters located in Campinas, Brazil. Spearheaded by accomplished railroad professionals with over 20 years' experience in the business, the **Rail Movement Planner™** solution was developed by uniting such expertise to high-tech and specialised software developers.

RMP approaches railroad operations problems as a puzzle, putting powerful algorithms and heuristics to work to elaborate traffic plans and predict its impacts in the future. It solves complex network plans within a few seconds, meaning its dynamic and highly updateable plans can assist decision-making in real time.

On a daily basis, RMP helps traffic controllers by quickly devising train graphs containing effective traffic plans. Thus, traffic controllers get more time for analysis and critical decision-making processes, greatly improving working conditions when compared to controllers who are required to manually graph their traffic plans. Overall, a less pressured controller yields better results and makes better decisions.

Each instance of **Rail Movement Planner™** calculates up to 600 trains for 72 hours in the future **in less than 10 seconds**. **Try our free web demonstration** to assess what RMP can do for you.

With better traffic planning, your operation makes better use of its assets and improves its throughput and efficiency affecting the bottom line in a significant degree:

- Constant support to decision-making through operational scenario simulation in real time
- Better network regularity with expressive returns on energy efficiency and productivity
- Effective railroad traffic plans aligned to the business's demands and needs
- More effective automated plans allow lessened variance in decision-making, standardizing the planning process
- Through simulation and new operational data usage, investment scenarios can be evaluated before implementing new procedures and spending more capital
- From the massive amount of information processed by the solution, numerous training options emerge to foster productivity and detect best practices

Due to the Rail Movement Planner™ integration layer, which is based on service-oriented architecture (SOA), the solution supports any enterprise software integration patterns. It is also compliant with industry standards regarding security and usability.

By mediating the data with the WSO2 Enterprise Integrator middleware, RMP can enable several analyses and reports to be elaborated for training, auditing, and more. To read more about this, check out **our blog**.

Furthermore, we have improved our commissioning process to promote demonstrations and trials – even coming to the point of fully remote installations.

Such achievements mean that customers can see remarkably quickly how Rail Movement Planner™ can be fast, flexible, and easily installed at their operations centre using information from their own rail network. To know more about our implementation procedures, check out **our article**.

All that considered, this is how Rail Movement Planner™ can help your operation tap into its full potential: with smart planning and enhanced foresight, you can intensify asset usage and achieve more with less.

Learn more by visiting our **website** and **contact us**.