

# InnoTrans 2022 Report



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FOCUS ON

RAILWAY TECHNOLOGY

## Meeting the challenge

Components and systems must comply with ever more diverse and challenging requirements. It is here that the industry is demonstrating its power of innovation and is equipping railways for the future.

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## Ambitious tunnel project

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## Great international interest – InnoTrans Podcast in serial production by September 2022

As of 1 June, podcast guest Cornelius Weitzmann will become Chairman of the Board of Voith Turbo and a member of the Corporate Board of Management of the Voith Group.

Photo: Voith Turbo Global Communications

Since February the InnoTrans Preview has been enriched by a new format: the InnoTrans Podcast combines the latest news directly from the organiser team with global insights into current and future trends in mobility. The monthly podcast offers the InnoTrans community a perfect foretaste of the innovations to be showcased at InnoTrans 2022. The first episode already made it into the Apple Business Podcast Charts in five countries. After the success of the first season, InnoTrans decided to continue the podcast until InnoTrans 2022.

### Expanding personal contact

The idea for the new audio format arose from the strong desire of exhibitors and trade visitors of the world's leading trade fair for transport technology to exchange their views more intensively despite the COVID 19 pandemic.

"We have received plenty of positive feedback for our InnoTrans Preview. As organisers, we are always looking for new ways to actively participate in facilitating a global industry exchange."

The InnoTrans Podcast is creating a special relationship between InnoTrans and its community in this respect. "Listeners receive our news, such as the commissioning of our new streaming studio, directly from us. This creates a personal, direct and uncomplicated way of communicating," says Kerstin Schulz, Director of InnoTrans.

### International interest is growing

The first episode of the InnoTrans podcast celebrated its premiere at the

beginning of February. At the start, Dr. Ben Möbius, Managing Director of the Railway Industry Association in Germany, spoke about the effects of the pandemic in relation to the emission-free mobility of tomorrow.

Further to associations such as VDB or Swissrail, the first exhibitors such as Siemens Mobility or Voith Turbo are already taking advantage of the opportunity to exchange information with the InnoTrans community via the podcast.

### COMMENT

## Back on track: On rails into the future

Andre Rodenbeck, VDB President (German Railway Association)



Photo: VDB

In September 2022 InnoTrans will open its doors again to provide insights into the future of mobility. And sustainable transport concepts are more relevant than ever, despite – or perhaps because of – the current pandemic. Because Berlin and Brussels are relying on climate-friendly growth for the upswing out of the crisis. Investments in sustainable rail technology have a double effect: they strengthen climate-friendly industries worldwide and significantly reduce emissions in the transport sector. Investments in green innovations – from research to application – are the key to a Green Re-Start. And they offer the opportunity for disruptive new rail transport. The game changer here is digitisation: Rail 4.0 makes it possible to transport more people and goods even more comfortably and quickly on existing lines. Good for the climate, good for customers, good for the economy.

Tomorrow's mobility must be geared to its customers – not the other way around. Because only the best offers are convincing. Mobility on demand is the future: from door to door, intermodal, barrier-free, safe.

Modern trams bring passengers to their destination flexibly, without traffic jams or the search for a parking space. Autonomous metros increase frequency: less waiting time, more free seats, higher punctuality. And they save around 30 percent energy in the process. Low-emission regional trains seamlessly connect rural areas to cities. High-speed trains connect metropolises as fast as aeroplanes. This is how rail mobility could be – if investments are made now in digital technologies and forward-looking climate industries.

## Amtrak's hope

On 20 January 2021, the 46th President of the United States of America was sworn in: Joseph (Joe) Robinette Biden, Jr – also known as Amtrak Joe.

His nickname dates back to the years from 1973 to 2009 during which he was a Democratic senator for the State of Delaware and commuted daily between his home in Wilmington and his official residence in Washington D.C. He undertook this round trip by Amtrak an estimated 7,000 times – on some

days several times. He has never made a secret of his passion for train travel, and as early as 2009 he emphasised the importance of rail transport for the environment in a magazine article, "Support for Amtrak must be strong – not because it is a cherished American institution, which it is – but because it

is a powerful and indispensable way to carry us all into a leaner, cleaner, greener 21st century." The re-entry into the Paris Agreement on Climate Change on the day of his inauguration and the appointment of Peter Paul Montgomery Buttigieg as Secretary of Transportation are matching his climate-friendly statement. The latter is considered a supporter of climate protection measures such as a CO<sub>2</sub> tax. His appointment was also welcomed by Amtrak's CEO Bill Flynn, "His commitment to invest in infrastructure and climate initiatives will create jobs, help the nation recover from the pandemic, and provide for a more sustainable transportation system in America."



Biden's proposed infrastructure package amounts to about 2 trillion US dollars, of which about 600 billion US dollars are earmarked for transport infrastructure.

Photo: Adam Schultz, Official White House photo

The Virtual Market Place offers many options to network internationally and learn about the current state of the industry.

Photo: Messe Berlin

## A global digital market place which brings together interested parties, buyers and sellers in one place

In March 2020, the business world was suddenly supposed to be digitised very quickly. Within a very short time, numerous new platforms sprouted from the ground and tried to convince the industry and business

world that they were suitable virtual trading places. With the Virtual Market Place\* (VMP), InnoTrans had brought such an interactive, virtual market platform into digital life as early as 2002.

As a digital representation of InnoTrans, it networks the global players in the industry and brings them into contact with each other beyond the duration of the trade fair – around the clock. Exhibitors can present

their products and services here to a much larger target group of international trade visitors and, by means of an optimal connection to their own online presence, control and coordinate their new offers.

Alberto Mazzola

Photo: CER

The year 2021 has started for the Community of European Railway and Infrastructure Companies (CER) with the arrival of the new Executive Direc-

tor Alberto Mazzola, who was unanimously elected by the CER General Assembly already in September 2020. He joined Ferrovie dello Stato Italiane

(FS) in 2002, where he held various positions. His last position was Head of International Government Affairs in Brussels, dealing with international affairs and European legislation, market regulation and technical standards. Prior to joining FS, he worked in the global business unit of Leonardo Finmeccanica (1988 - 2002). From 2015 to September 2020, Mazzola was Vice-President of the Transport, Energy and Service of General Interest Section and President of the International Trade Agreements Follow up Committee of the European Economic and Social Committee. Alberto Mazzola holds a Master's degree in Business Administration and graduated as a doctor cum laude in nuclear engineering.

## Expertise in European issues

Over the years, he has become an outstanding expert not only on EU policy but also on the European railway business. As CER's Executive Director, he will strongly represent the European rail sector at the European institutions and position rail as the backbone of the EU's sustainable and smart mobility strategy, amidst the opportunities offered by the 2021 - 2027 Multiannual Financial Framework together with the EU's COVID-19 recovery package. The first months of 2021 have already shown that COVID 19 is dominating the scene across Europe, and rail transport will not be spared. In the immediate future, Alberto Mazzola will therefore also focus on the current COVID 19 challenges and will be working hard with the members to win back the confidence of the customers. The year 2021, which has been declared the "European Year of Rail" by the EU, should also highlight the great potential of railways to achieve the European climate objectives. This requires a leader who can guide the association through these challenges and who can show the many advantages that rail can offer as an employer and provider of sustainable mobility services.

## One platform - a thousand possibilities

When searching for a specific product, the VMP supports the interested party and creates an overview of all relevant suppliers. Numerous filter options lead to more than 2,000 products, which are presented using texts, photos and videos and are constantly updated. If a user finds an interesting product, he or she can contact the exhibitor directly. This offers both trade visitors and international companies the ultimate opportunity to establish new business contacts and then intensify them live at InnoTrans 2022. Those who want to spend the time until the world's leading trade fair for transport technology in a productive way can make use of the extensive range of on-demand webinars and product information offered by exhibitors.

## The VMP picks you up before you have arrived

The VMP offers trade visitors the opportunity to find out about the portfolio of exhibitors even before InnoTrans. From spring 2022 InnoTrans visitors will be able to compile their personal tour of the trade fair online using the Virtual Market Place\* trade fair planner and then retrieve it on all mobile devices or synchronise it with the InnoTrans app. Entries which have been recorded in the trade fair planner can be individually managed: Notes can be added, e-mails sent, appointment requests sent and confirmed appointments exported to their calendar.

## INTERVIEW WITH ...

### EVA KREIENKAMP

Chairwoman of Berlin BVG



Eva Kreienkamp

Photo: BVG/Oliver Lang

**InnoTrans Report:**  
**Ms Kreienkamp, on 1 October 2020 you took up your new role as chairwoman of the BVG board, right in the middle of the Corona period. As a result, passenger numbers have dropped massively; people seem not only to rely more on home offices but also more on individual transport. To what extent has the virus changed your short- and medium-term plans at BVG?**

**Eva Kreienkamp:** The pandemic is a challenge for all of us. Despite signifi-

## Mobility revolution is a central task

Since 1 October 2020, Eva Kreienkamp has been chairwoman of the board of Berliner Verkehrsbetriebe (BVG), Germany's largest public transport operator. Kreienkamp holds a degree in mathematics. Before she was appointed to Berlin, she spent five years at Mainzer Verkehrsgesellschaft, where she held various posts, such as responsibility for the "Mainzer Mobilität 2030" concept and managing director of CityBahn GmbH. For many years Eva Kreienkamp has been committed to more diversity within companies. She is a founding member of the association "FidAR - Frauen in die Aufsichtsräte" (Women into board positions).

cantly lower demand, we are running the full programme so that our bus and rail passengers can remain as far apart from each other as possible. The people of Berlin highly appreciate that they can rely on us even in these times. I am therefore convinced that passenger numbers will also increase significantly again when the pandemic eases, if we offer the quality that people expect from us. But it also means that we have to adjust certain factors. Working conditions, but also leisure behaviour will change permanently. We have to react to this - with tailor-made offers and ticket types. We are already having very constructive discussions about this with our partners of the public transport association. As far as longer-term plans are concerned, many of them have long since been set on a course for growth, and rightly so. Because - and despite Corona, we must not forget this - climate change is an issue that will keep us occupied much longer and more intensively. The mobility revolution is one of our central tasks. Attractive and intelligently networked local transport services are the key to a liveable future, especially for the metropolitan areas. As BVG, we are committed to playing an active role in shaping this future. For this, we need a

modern vehicle fleet as well as an efficient infrastructure and - last but not least - many well-trained and motivated colleagues who want to share this journey with us.

**Not only the mobility revolution, but also digitisation and the steady growth of cities, some of which are in the centre of enormous metropolitan regions - all of this also affects Berlin. What challenges for BVG will this bring about in the next decade?**

**Eva Kreienkamp:** Transport companies have always been thinking ahead in long time frames. With courage and foresight, our forefathers created a local transport system for Berlin from which we still benefit today. It is our duty to leave future generations a legacy of a system which is tailor-made for the challenges and opportunities of tomorrow. This is why we are now starting the procurement process to consistently modernise our fleets well into the 2030s. And this is why new tram routes are already being planned and built in Berlin, and underground lines may also soon be planned and built again. In ten years, our underground and tram networks will to a large extent be equipped with new vehicles, and our buses will

be electric. There will be new routes and lines. And - this is something which is particularly close to my heart - BVG will be far more digital. With our Jelbi platform, we are already showing the possibilities which digitisation offers for networked mobility. We want to continue on this path and will do so - in transport services, but also in sales and passenger information.

**You were previously at Mainzer Verkehrsgesellschaft. What is the biggest difference to BVG, apart from the size and the presence of underground trains, and how does it show?**

**Eva Kreienkamp:** Actually, there are rather more similarities. Every transport company lives first and foremost thanks to the people who serve their passengers around the clock with passion and know-how to provide them with the best possible services on road and rail. To be at the head of such a strong team is a privilege. The biggest difference between Mainz and Berlin is certainly the public perception. BVG is, after all, the largest local transport company in Germany. And this inevitably makes us a heavyweight whose actions are much more under public scrutiny than elsewhere.

S-Bahn Berlin

Photo: C. Müller

The Berlin S-Bahn, the heart of the capital's transport system with 16 lines, 168 stations and 340 kilometres

of track, is about to re-award two partial lots. The submission deadline for the North-South and Stadtbahn (city

railway) lots was 11 February. Companies could apply for the supply/maintenance of vehicles as well as

for the operation of both partial networks.

## Well-known names in the procedure

Applications were possible for the four individual lots, for a total of four further lot combinations and also for overall performance (all lots). The future contracts for operation will last for 15 years, while the contracts for maintenance will last for 30 years, which is intended to ensure the quality of the vehicles over their entire service life. Siemens, Stadler and Alstom (formerly Bombardier) have applied as manufacturers. On the operator side, bids have been submitted by Deutsche Bahn, Transdev Regio Ost, Die Länderbahn (DLB)/Netinera and MTR from Hong Kong. In addition to the individual offers, there are also at least two overall offers: Siemens and Stadler have joined forces with S-Bahn Berlin GmbH, Alstom is coop-

## NEWS

### Thiele: Family foundation being set up



Heinz Hermann Thiele  
Photo: Knorr-Bremse

The family of Heinz Hermann Thiele, who died at the end of February 2021, will remain the main shareholder of both railway engineering manufacturer Vossloh and Knorr-Bremse through a family foundation. To this effect, Thiele had laid down the exact provisions in his will. Accordingly, Thiele's Vossloh shares held via KB Holding GmbH will initially pass to his wife Nadia before their transfer to the family foundation by virtue of his will. This foundation is to be established by the end of the year.

"Heinz Hermann Thiele's wish was to secure his life's work in the long term," explained the chartered accountant and fiscal advisor Robin Brühmüller, who has been appointed as executor of the will. "This is exactly what is being implemented through the establishment of the family foundation." Thiele's daughter Julia Thiele-Schürhoff will keep the shares she holds through KB Holding. As a result, the Thiele family as a whole will continue to own 50.09 percent of Vossloh AG shares. There is a similar procedure for Heinz Hermann Thiele's shares in Knorr-Bremse AG: Here, too, his shares held via KB Holding will first go to his wife Nadia Thiele and then, as provided for in the will, be transferred to the family foundation. The Thiele family holds 59 percent of Knorr-Bremse. The boards of both companies expressed relief at the forward-looking arrangements for the succession of their deceased main shareholder.

erating with Transdev Regio Ost. All participants have submitted bids for both partial networks.

## Applicants from Hong Kong

With MTR, the application of a large non-European operator has also been received. MTR operates almost all rail transport in China's Hong Kong Special Administrative Region, but is also active in Australia (Sydney and Melbourne), for example. In Europe, MTR is established as MTR Europe, and besides the London Elizabeth Line, the company operates regional passenger transport services in Sweden (Stockholm) as well as long-distance trains on the Stockholm-Gothenburg route. In a next step, the qualified applicants will be invited to submit indicative bids before the final decision on the award is expected to be reached in October 2022. Operations are then scheduled to start in 2027.

## FOCUS ON

## RAILWAY TECHNOLOGY

# Multifunctional and compatible

It is technology which drives any successful railway operation and it continues to be at the heart of it. Nowadays, systems and components mostly offer more than just one function; they are often compatible with other systems or applications for the widest possible range of application. In the *European Year of Rail*, the industry shows that it is prepared for the challenges of the future.

## On the right track



The Railtrailer is proving its strength in daily use.

Photo: AMT Rail Road BV

Rail excavators, dumpers or other commercial vehicles: the construction of road-rail vehicles requires a high degree of flexibility and knowledge from their manufacturers. Built for a wide range of applications, these vehicles not only have to comply with EN 15954, but of course also with all the laws and regulations applicable in the respective country.

AMT Rail Road BV, a company of the AMT Group, manufactures and supplies unique vehicles from the Netherlands for daily use on and around the tracks. These can be used on various track gauges,

including rack railways. All machines are developed together with the customers and built according to their specifications and requirements. As a standard, the road-rail vehicles are equipped with

fail-safe brakes and have a variety of other options, such as fully integrated and intuitive RCI (Rated Capacity Indicator) systems, cameras, tracking systems and fire warning systems.

### Railtrailer – the base model with many equipment options

For the base model AMT Railtrailer, just as for its other vehicles, AMT offers the possibility of adapting the modular system of the trailer with various options such as containers, frame fastening or ballast distribution systems to exactly suit the planned application. This makes the AMT Rail Road's equipment compatible for both current and future operations and ensures a better return on investment.

With a continuous focus on safety, all rail vehicles are tested under real conditions at the production site: on a 300-metre-long track system for braking tests and a ramp for gradient tests up to 250 permille.

With the AMT Railroad Configurator, the vehicles can be configured online to fully meet individual requirements. A written quotation is made available within only four hours after completion of the configuration.

### Environmentally friendly operation

With this modular system, the overall number of machines required is reduced, furthermore, the AMT vehicles are equipped with low-emission engines which run on hydrogen or electricity. This is not only an important benefit for the environment, but also for the people working on the track and nearby. Low pollution and noise levels ensure healthier workplaces.

## NEWS

### Project: Standards for hydrogen applications

The German Centre for Rail Traffic Research at the Federal Railway Authority has awarded a new development contract: TÜV Rheinland Intertraffic GmbH is to develop a standard for hydrogen applications in rail vehicles. Regulatory and technical specifications are required to ensure the fundamental safety of hydrogen vehicles. To date, the authorities have relied on technical regulations and standards from the automotive industry for the approval process of hydrogen fuel cell vehicles when assessing conformity. Dedicated technical regulations and standards are now to be drawn up for the approval of hydrogen-powered rail vehicles. This should facilitate the use of hydrogen and fuel cell technologies, simplify the approval process and thus promote and sustainably strengthen the use of alternative traction systems in rail transport. The project comprises two work packages. First, all relevant national and international regulations and standards applicable to hydrogen vehicles and fuel cell systems will be reviewed. This will include an analysis of their application to the rail vehicle sector and their evaluation. In a second step, a draft for a railway-specific standard to facilitate the implementation of hydrogen and fuel cell technologies will be developed. The project will last twelve months.

### ECx for more comfort on conventional lines

The ECx for Deutsche Bahn is based on the lightweight Talgo 230 platform and is intended for conventional long-distance transport as well as international connections. In the tender concluded in 2019, Talgo was awarded a major framework agreement for the delivery of up to 100 train units. As part of this agreement, DB immediately placed a firm order for 23 multiple units worth 550 million Euros. These are currently in the final stages of technical development, with delivery and commissioning scheduled for 2023.

## Safe display systems for ECx

Centralp, a French specialist in embedded systems, is supplying its K-Vision DMI (Driver Machine Interface) to the Spanish rolling stock manufacturer Talgo. It is intended for use in the new ECx for Deutsche Bahn AG (DB).



Photo: Centralp

### Versatile operating displays

For more than two decades, Lyon-based Centralp has been producing embedded systems for future-oriented railway applications. The driver's

cab displays of the K-Vision series are available in different versions for various applications (TCMS, CCTV or even ETCS, CBTC). In the ECx, the K-Vision DMI is dedicated to the display and management of the TCMS

(Train Communication and Management System) user interface. It also provides a SIL2 display, with or without redundancy. The K-Vision Extended SIL2 is immediately operational, easily customisable and available in sizes

from 8 to 15 inches. The specifications of EN 50155 and EN 50121 are met.

To date, Centralp has delivered around 45,000 DMIs worldwide, meeting the requirements of renowned industrial and railway operators.



## For tomorrow's signalling systems

Exemplary application of the ALTPRO system

Graphic: ALTPRO d.o.o.

At InnoTrans 2022, the Zagreb, Croatia-based company ALTPRO d.o.o. will present its new solutions in the fields of train detection and INDUSI-based train protection systems. With this, ALTPRO aims at strengthening its name in the industry.

ALTPRO will present two new flagship products in the train detection and protection market segment: ALTPRO's new axle counter concept constitutes a new generation of a modular, scalable and network-based axle counting system for railways, trams, metros and other applications. The new INDUSI-based train protection solution for the i60 and PZB90 configurations is designed to offer operators a high degree of flexibility and cost efficiency, while retaining the well-known and appreciated benefits of INDUSI ATP

(Automatic Train Protection), which is widely used worldwide.

### Axle counters as a proven solution

Axle counters are indispensable systems today and they are governed by strict requirements. For their production, both international regulations and national legislation, as well as the implementation of the most advanced technologies, are indispensable. ALTPRO's new axle counter is the

product of the company's many years of experience and its comprehensive knowledge. It has a number of future-proof features such as self-optimisation, IoT, user-friendly interfaces – such as monitoring diagnostics via a cloud-based solution – predictive maintenance and automatic project configuration functions, as well as an exceptional immunity to all sorts of environmental conditions.

This product provides the infrastructure undertaking with trouble-free management of the diagnosis system as well as with reliable operations.

### Modern INDUSI train protection not just for mainline railways

INDUSI train protection systems are long-standing and have been widely used, especially in Europe. They have been attractive to users for many years due to their combination of cost-efficiency, reliability and simplicity, and they have also persuaded first-time users. ALTPRO's new solution not only gives the system a modern look.

It is now possible to add new features without compromising the original benefits, making it possible to use the system in applications other than regular mainline operations, for example in metro networks. The development has taken into account the challenges faced by both infrastructure undertakings and railway operators. Thanks to a large number of state-of-the-art updates (including CAN communication and cloud-based diagnostics), this INDUSI system will continue to perform well in the future.

## Health protection in local transport

The surface coating can simply be sprayed on.  
Photo: Hübner Group

Protecting passengers from viruses and bacteria has become increasingly important in local transport. For transport companies, this is also a question of manpower resources and increases in costs, not least because the number of passengers has been falling since the beginning of the Corona pandemic.

The HÜBNER Group has concluded a cooperation agreement with AIRDAL and will distribute the antiviral surface protection product of the same name in the mobility sector. As a leading supplier to the mobility industry, HÜBNER is now offering the antiviral surface coating for all urban and regional public transport equipment. The product prevents viruses or bacteria from surviving on surfaces such as on grab rails, in seating, boarding and gangway areas and in the driver's cabin.

Surfaces which have been treated do not require cleaning and disinfection as often – while providing the same level of protection against infection. Independent tests have shown that the quantity of micro-organisms on the surfaces is reduced by approx. 99.9 percent after only a short period of application.

### Cost savings for users

The invisible surface protection, which does not adversely affect the materials, remains on surfaces for up to twelve months. The application is very simple: After pre-cleaning, AIRDAL is applied to the surfaces to be treated. Thus, only two persons can disinfect a complete vehicle within a short time. Additional chemical disinfection is no longer necessary, only cleaning should be carried out at the usual intervals.

### Physical effect

The effect of the coating is purely physical. After application, an ultra-thin protective film of amorphous glass is formed: it contains very tiny spikes that destroy the cell walls of viruses and bacteria. This eliminates disease-causing pathogens and prevents them from spreading further.

Ad

## We are on Track!

### Electronic control for rail vehicles



**TLM-10**  
For high speed Ethernet connections via train couplings and existing cabling

**High-speed data transmission via existing cabling**

- Data security with 128 Bit AES
- Max. data transfer 950 Mbit/s
- Voltage range from 24 V up to 110 V
- Type test acc. EN50155
- Compliant to EN45545
- Temperature range -40 °C to + 75 °C
- Transmission method G.HN
- Dynamic line management to optimize frequency usage
- Frequency range up to 200 MHz using OFDM with 4096 QAM





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## DC/DC converter in compact design: one for all

The HFBC60-W/Ks for chassis installation offers an ultra-wide input voltage range from 14.4 volts DC to 154 volts DC with a power rating of 60 watts. This means that the DC/DC converter covers all international on-board voltages for rail vehicles (24 volts, 36 volts, 72 volts, 96 volts and 110 volts), including the tolerance range of +/- 40 percent required by EN 50155, with just one device. Companies operating throughout Europe can thus cost-effectively carry out the qualification of assemblies by using a single converter.

The "plug-and-play" concept has proven successful and enables an easy implementation in many applications. Typical applications for the HFBC60-W/Ks include fan controls, displays in passenger information systems, box PCs, locomotive driver cab displays, door opening systems, actuators for wheel flange lubrication systems, energy meters/tracking tools in trains and other applications which must be highly sturdy. The international standard EN 50155:2017 regarding damp heat, temperature, shock and vibration is of course fulfilled; the railway-specific criteria of EMC according to EN 50121-3-2:2016, such as surge, burst and ESD, are completely complied with without additional components. Immunity to interference



Compact DC/DC converter HFBC60-W/Ks  
Photo: Autronic Steuer- und Regeltechnik GmbH

and emitted interference via the cables and housing are within the limits of the criterion and class A. In addition, the converter has an integrated power failure bridging of 10 milliseconds (class S2) over the entire temperature and input range, which makes the compact converter (113 mm x 46 mm

x 35 mm) unique. The power supply can be operated in the temperature range from -40 degrees Celsius up to 85 degrees Celsius - according to class OT4, ST1+ST2 - without derating. Available output voltages are 5 volts, 12 volts or 24 volts. Other output voltages or modifications to the unit can be made on request.

integrated as standard. The converter can be started via the enable signal. The reverse polarity protection is solved passively, but there is a new version with active reverse polarity protection. The converter is idle-proof and permanently short-circuit-proof, the output voltage can be adjusted by +7 percent and -10 percent by means of resistors, in order to compensate for losses via the lines, for example. The combination of booster and active clamp at the optimised operating point achieves a high efficiency of approximately 91 percent. Heat is dissipated via the lateral mounting surface. Available output voltages are 5 volts, 12 volts or 24 volts. Other output voltages or modifications to the unit can be made on request.



Example of a Protec bioreactor for internal installation  
Photo: Protec Rail

## Bioreactor – the future on board

The idea is frightening: a long train journey, the passenger has to give in to his or her needs, but the toilet is closed. Thanks to appropriate systems, these times will hopefully soon be over. Today, there are low-maintenance closed toilet systems which discharge only purified water onto the tracks at the end of the process.

Conventional train toilets have collection tanks which have to be emptied every three days at the latest. This requires the appropriate disposal stations which enable emptying at short intervals. Nowadays, however, a modern vehicle fleet needs closed toilets and at the same time a network-wide disposal concept. With bioreactors, Protec Rail offers a sustainable and ecological toilet system which, with disposal intervals of two to six months, guarantees significantly higher availability than conventional train toilets. Each bioreactor consists of three main elements: a solid reactor, a liquid reactor and a

hygienic treatment unit. After passing through this process, the water, which has been completely purified without chemicals, is automatically discharged onto the tracks - and this only when the train is in motion. The solid residues are compostable, but can also be disposed of via the sewage system without hesitation. By cleaning the waste water while the train is in motion, the operators have the greatest possible flexibility in the scheduling and availability of their vehicles, as they can operate their trains largely independently of disposal stations. The seating capacity in the trains remains unchanged, the Protec bioreactor can

be installed inside a conventional toilet module or in a horizontally aligned underfloor arrangement. Compared to conventional collection tank systems, the decision in favour of Protec Rail bioreactors initially results in higher acquisition costs, but due to the long disposal intervals, this results in significantly lower annual operating costs (break-even after three to four years). In addition, there are lower infrastructure costs: the number and equipment of the disposal stations to be installed are considerably lower, which means that their subsequent operation is also more economical.

### NEWS

#### TRB continues to cooperate with Hitachi



Composite doors for Hitachi  
Photo: TRB Lightweight Structures Ltd.

TRB Lightweight Structures Ltd. has been active for about 40 years in the field of lightweight composite materials, including for the railway industry. The company has now announced a new project as part of its long-standing partnership with Hitachi. It includes the manufacture of toilet panels, partitions and doors, as well as modified storage units for bicycles and large items of luggage for 23 new trains due to enter service in the UK by 2022. Since its founding in 1954, TRB has invested in its people and has a team of over 130 experts in the fields of design, engineering, manufacturing and quality assurance. TRB's cross-functional teams work closely with clients to overcome the challenges of reducing weight while improving performance, safety and durability.

### NEWS

#### For a safer and more comfortable passenger experience



This is what trains in Lombardy could look like.  
Graphic: Alstom

The on-board solutions of Teleste Corporation from Turku, Finland, have been developed continuously over the years in close cooperation with vehicle manufacturers and infrastructure undertakings. The sophisticated systems are now in use in around 2000 rail vehicles in more than 20 countries.

#### Soon also in Italy

The Teleste on-board solutions will now also be installed in Alstom's Coradia Stream trains. The parties have reached an agreement with Ferrovienord, the infrastructure undertaking in Lombardy, Italy, to use the Teleste solution in 31 Coradia Stream trains. With an option for a further 30 trains, the deliveries now agreed will start later this year. Teleste's deployment in the Coradia Stream trains includes Passenger Information Systems (PIS), on-board video surveillance, intercommunication and public address systems, as well as the latest generation of full-colour RGB LED information displays, which provide excellent visibility for passenger information and other content such as advertising. The open architecture of the on-board systems ensures interoperability with all other systems. Commands can also be received from an external source via the Railway API. All of Teleste's on-board solutions are designed for easier, safer and more enjoyable travel and support seamless integration and management of systems even as part of larger public transport infrastructures. "We are pleased to partner with Alstom and their Coradia Stream train platform to further advance smooth and safe public mobility in Italy. Having been deployed on several public transport networks in the country, we are confident that our solution will provide passengers in Lombardy with a pleasant travel experience while meeting the requirements of the railway operator," said Jarkko Vehkala, Head of the Rolling Stock Manufacturers business segment at Teleste.

## Fehmarn Belt: Under-Sea Tunnel Construction



Special element with basement

Photo: Femern A/S

Construction on this large project has begun: The Fehmarn Belt tunnel aims to close a gap in the Northern European rail network and will shorten the connection between the major cities of Hamburg and Copenhagen. The civil engineering work under the Baltic Sea will be the largest of its kind in the world.

It will take trains a mere seven minutes to cross the 18-kilometre-long tunnel, connecting Puttgarden on the German island of Fehmarn and Rødby on the Danish island of Lolland. Travelling between Hamburg and Copen-

hagen is anticipated to take less than three hours thanks to this link under the Baltic Sea. Until now, trains on this route have had to cross the Baltic Sea by ferry or take detours across the mainland.

The four-tube structure will be provided with two tubes for cars and two single-track electrified tubes for passenger and freight trains. There will be a Train Control Centre (TCC) in Copenhagen to monitor railway traffic.

The tunnel will be approved for speeds up to 200 kilometres per hour. It will be equipped with a derailment protection system and emergency escape paths. Emergency exits will also be provided every 110 metres. The Fehmarn Belt tunnel will be the longest immersed tunnel for rail and road traffic in the world. The individual tunnel elements will be manufactured and sealed to make them watertight in a specially built factory in Rødbyhavn, Denmark. From a working harbour to be newly

erected the elements will then be towed to their appropriate location, lowered one after the other into a trench on the seabed and connected to each other on-site. The Fehmarnbelt Tunnel will consist of 79 elements, each 217 metres long and weighing 73,000 tonnes. In addition, a total of ten special elements will be installed at intervals of about two kilometres, equipped with a basement for operating and maintenance equipment. The sea trench is to be up to 60 metres wide and 16 metres deep; the deepest point will reach 30 metres below the water surface.

Denmark is in charge of planning, building and maintaining the tunnel and will finance the Euro 7.1 billion (as of 2015) project with support from the EU's "Connecting Europe Facility" fund. Germany will finance its own road and rail hinterland connections.

According to the current planning, the project is set to be completed in 2029. On the Danish side, construction of the working port has been underway since mid-2020, and work on the production facility for the tunnel elements already began in early 2021. To this end the state-owned Danish project company Femern A/S has signed contracts with two construction consortia: the FLC consortium is responsible for the immersed tunnel, the production of the elements as well as the tunnel portals. Members are, among others, Vinci (France), Waiss & Freytag, Max Bögl (Germany) and CFE (Belgium). The Dutch consortium FBC is responsible for the excavation and construction of the working port. Other contract packages which have not yet been awarded include the mechanical installations such as ventilation, lighting or safety systems.

## Sydney Metro: Record-breaking project in Australia



Tunnel breakthrough with a Herrenknecht TBM under Sydney Harbour

Photo: Sydney Metros

Australia's first metro network is developing in Sydney. The first line of the "Sydney Metro" went into operation only about two years ago, but work is already underway on an extension through the city centre. In total, more than 30 kilometres of double tunnels have already been constructed for this project.

Big plans for Sydney: In three years, the Australian metropolis will have a 66-kilometre long driverless metro system with 31 stations. From 2024,

the existing suburban railway network will be complemented and up to 40,000 passengers per hour will benefit from better connections from the suburbs

to the business districts, the city centre and the harbour. The construction of the metro is taking place in two phases: The first is the 36-kilometre "North

West Line" (NW Line), which runs from Tallawong eastwards to Chatwood station north of the inner city. It will be followed by the "City & South West Line" (CSW Line), which will run southwards under the harbour basin, the inner city and the central business district and then continue westwards via Sydney Central Station to Bankstown.

Tunnelling work which started in 2018 has been completed for the approximately 30-kilometre CSW Line, with an existing line to be connected on the westernmost section. In the inner city area, 15.5 kilometres of twin tunnels were excavated, using five tunnel boring machines (TBMs) from German manufacturer Herrenknecht. Two double shield TBMs, each with a drill head diameter of about seven metres, worked their way from the northern edge of Sydney Harbour northwards to Chatwood, while two others drilled their way from the south towards the southern edge of the harbour basin. The fifth TBM, equipped with a mix shield, drilled the one-kilometre long connecting tubes between the tunnels under the harbour basin, where the tubes run up to

35 metres below the seabed and almost 70 metres below the water surface. The Australian joint venture Systems Connect, consisting of UGL and CPB Contractors, was entrusted with the project under a 1.38 billion Australian dollar contract. Work is currently underway on equipping the tunnel and on building the stations.

The NW Line has already been in operation since May 2019, and the 22 Alstom-Metropolis trains which are operating there carried around 20 million passengers in the first year after launch, according to the New South Wales state government. Around 28 kilometres of the line run underground, with 15 kilometres of double tunnels bored between Bella Vista and Epping. Four 120-metre long and 900-tonne double shield TBMs bored a total of 30 kilometres of tunnel in 16 months. A consortium consisting of the companies Thiess, John Holland (both Australia) and Dragados (Spain) was responsible for the tunnel work. The tunnelling works for this section started in September 2014; the contract for the drilling and construction works at stations on the line had a volume of 1.15 billion Australian dollars.

# Harsco Rail: ETCS to equip maintenance machines

Harsco Rail, a Harsco Corporation company, is equipping a total of four of its maintenance machines for use in the UK with ETCS Level 2 on-board devices. The multipurpose stoneblower machines will be used by

Network Rail as part of a three-year maintenance contract. They intrude the ballast by blowing it in between the tracks in order to restore the correct track geometry. This process is said to keep the track position stable

for an up to three times longer time than what can be achieved with conventional tamping methods. Equipped with ETCS Level 2 on-board devices from Thales, the heavy machines, which travel at up to 60 miles per hour, can easily switch between ETCS Level 2 equipped lines and others using the UK's national train protection system, TPWS/AWS.



## The master of the tracks

Has lived through a lot in more than 20 years - siding manager Klaus Seipold.

Photo: Messe Berlin

## A look behind the scenes of the outdoor track and display areas

It is always an absolute highlight of every visit to InnoTrans to see the outdoor track and display areas. On 3,500 running metres of tracks, trade visitors can admire mobility innovations from all over the world throughout each day of the trade fair. But behind this globally unique attraction is someone who is affectionately known in InnoTrans circles as the "railway siding manager" and who also has a private affinity with the beauties on the tracks. For him, it involves a lot of hard work and precise planning.

For more than 20 years, railway siding manager Klaus Seipold has been moving the vehicles on the tracks which mean the world.

**?** *How long does it take before the trains are finally on the track?*

**Klaus Seipold:** Well in advance of the event, we coordinate the delivery of the exhibits with the exhibitors, our contract freight forwarders and DB Cargo as the railway undertaking. Many of the exhibits come from very

far away, so it can easily take some exhibitors two to three months to get them to Berlin on time. Three days are planned for the train deliveries to InnoTrans itself. On the first day, Tracks 6 – 11 in car park P18 will be equipped, on the second day the tracks in the yard area and on the third day Tracks 1 – 5. In addition, the last set-up day of InnoTrans is planned as a time reserve. Before the trains arrive, a further three days are planned for the delivery and unloading of ex-

hibits, which will be delivered by road and positioned on the open-air tracks or on temporarily installed tracks by means of huge cranes or ramps.

**?** *In the course of your time at InnoTrans, you have experienced quite a lot when it comes to equipping the track area. What do you remember most?*

**Klaus Seipold:** An Asian exhibitor did not allow his almost 100-tonne locomotive to be moved by shunting locomotives. It had to be moved by hand with muscle power, and everyone involved had to wear white cloth gloves. Such care by our exhibitors for their exhibits happens quite often. On one occasion, a locomotive from the Czech Republic was delivered to the exhibition grounds by a heavy goods vehicle five days before InnoTrans. The manufacturer's technician stayed in the locomotive during the entire assembly period and never let the exhibit out of his sight. But sometimes the reverse is also true: once we were expecting a freight wagon to be delivered by train from the Wustermark collection station, but it simply never arrived. It seemed to have literally disappeared into thin air. Its whereabouts remained unknown even days later. A few weeks after InnoTrans, it was found on a siding in Hanover. It had been left there while being transported to the collection station and was simply forgotten. Every InnoTrans brings new exciting stories. I am very much looking forward to the one at InnoTrans 2022.



## Exhibition grounds InnoTrans 2022



- Railway Technology
- Interiors incl. Travel Catering & Comfort Services
- Railway Infrastructure
- Tunnel Construction
- Public Transport incl. Mobility+ / Mobility+ Corner
- Outdoor Display
- Bus Display
- Opening Ceremony
- InnoTrans Convention
- Speakers' Corner
- InnoTrans Campus
- Business Lounge (Marshall-Haus)
- Press Center
- Restaurant
- FoodCourt

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