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EDITION
61

December 2024 –
the customer magazine of
Knorr-Bremse Rail Vehicle Systems



KNORR-BREMSE

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Member of the Management Board,
Knorr-Bremse Systeme für
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Dear Reader,

Over the last 35 years, rail has played a key role in bringing Europe together, both socially and economically. Today, it takes passengers just two and a half hours to travel by train from Budapest to Vienna, and perhaps five hours from Berlin to Warsaw. Data from Eurostat, the European Union's statistical office, shows that cross-border freight transportation now accounts for half of all the rail freight traffic in the EU.

Poland is a particularly busy market at the moment. Starting last year, the country is aiming to spend over EUR 20 billion on its rail system by 2030, as prescribed by Poland's new KPK national rail program (Krajowy Program Kolejowy). In this issue, we find out where the country is heading and discover how Knorr-Bremse is helping to achieve the planned capacity improvements (Spotlight, pages 18 to 27). Our interview with Jacek Biłás starts on page 20: As Managing Director of Knorr-Bremse Poland, he knows the Polish market better than anyone else, having spent his entire professional career in the rail industry.

As ever, we have dedicated a section in this issue to our social projects. For some years now, the Safe Hub concept developed by aid organization AMANDLA Social Enterprises has been gaining traction in South Africa. The Safe Hub infrastructure acts as a safe haven for young people and their families in particular. But the hubs also deliver striking benefits to communities in the surrounding townships – and this explains why Knorr-Bremse Global Care has entered into a long-term partnership with AMANDLA. You can read about the special qualities that prompted the United Nations Office on Sport for Development and Peace to recognize this concept as a global "best-practice" model of youth development on pages 14 to 17.

I wish you and your families a relaxing, enjoyable holiday season and a very successful start to the New Year!













Warm regards,
Dr. Peter Radina




DR. PETER RADINA,
Member of the Management Board, Knorr-Bremse
Systeme für Schienenfahrzeuge GmbH

Innovative technologies and systems competence from a single source

Knorr-Bremse Rail Vehicle Systems offers an impressive variety of customized solutions for braking and onboard systems.

 Braking Systems	 Entrance Systems	 Climate Control Systems	 Power Electrics	 Computing & Communication	 Digital Solutions	 Lifecycle Management
 Wiper / Wash Systems	 Driver Assistance	 Sanitary Systems	 Coupling Systems	 Signaling Systems		

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Exploring the diversity of rail



Driving trains in a locomotive simulator – enjoying concerts on station platforms – touring construction sites – attending job speed dating events and train-based recruitment fairs – visiting model railroad exhibitions – riding trains at museums... Over the weekend of September 21-22, the whole of Germany took the opportunity to celebrate Rail Day as part of European Mobility Week, with more than 300 events happening across the country. The series of events was coordinated by Germany's Pro-Rail Alliance, and of course Knorr-Bremse was also involved, opening the doors of the company's historic Berlin plant to the general public. Among the sights to see was Knorr-Bremse's CT² (Computerized Train Console for Training) braking system demonstrator. The state-of-the-art demonstrator – which does not require the presence of a rail vehicle – clearly explains and illustrates the many complex, interacting functions in modern braking systems.

Dr. Peter Radina (Member of the Management Board of Knorr-Bremse Rail Vehicle Systems) was there to welcome the crowds of visitors – and to greet Susanne Henckel (State Secretary at the German Federal Ministry of Transport and Digital Infrastructure), Sarah Stark (Managing Director of the German Rail Industry Association) and Judith Völker (Traffic Policy Officer for Germany, Deutsche Bahn AG). "Today, I'm looking forward to taking a look behind the scenes at the leading supplier of cutting-edge braking systems," said Ms. Henckel. "Train speeds continue to climb, so the demand for high-tech braking solutions is steadily growing as the world's rail systems strive to meet increasingly stringent safety standards."

Cora Hentrich-Henne joins management team



In autumn, the senior management team at Knorr-Bremse Rail Vehicle Systems was bolstered by a highly qualified new member: Cora Hentrich-Henne. The industrial engineer last worked for Alstom in Paris as Procurement Director Europe, responsible for all sourcing and procurement activities in the European region.

Cora Hentrich-Henne brings many years of rail industry experience to the table. Before joining Knorr-Bremse, she worked for French rolling stock manufacturer Alstom for over 13 years, starting in procurement at the group's head office in Paris and then moving to their Salzgitter manufacturing facility in 2013 as Director Supply Chain. In 2017, she was appointed Managing Director and Chair of the Board of Directors of Alstom Switzerland, and worked in this position for six and a half years. Prior to joining Alstom, Cora Hentrich-Henne worked for EADS (now Airbus Defence and Space), where she held various positions in purchasing and procurement.

DB Cargo orders up to 650,000 LL brake blocks

Following the largest-ever DB Cargo invitation to tender for the supply of "whisper brakes" for freight cars, Knorr-Bremse was awarded a contract covering a total of 650,000 LL brake blocks. By continuing the strategic partnership between the two companies, DB Cargo has secured a continuous supply of LL brake blocks for another four years.

To date, Knorr-Bremse has supplied Europe's largest transportation and logistics company with some 1.7 million LL blocks, used to retrofit and operate around 63,000 freight cars. This has already made a significant contribution to low-noise freight transportation – LL blocks are between 8 dB(A) and 10 dB(A) quieter than old cast-iron brake blocks. To the human ear, a 10 dB(A) difference is equivalent to reducing the noise by 50 percent.

Knorr-Bremse manufactures the LL brake blocks at its Pamplona plant in Spain, delivering them directly to the DB Cargo workshops in Germany responsible for fitting them to freight cars. Just like a full-line supplier, Knorr-Bremse can now supply customers with application-specific "pairings" of friction materials for brake pads, brake blocks and brake discs optimized for nearly every type of train and almost all global rail standards.



Acquisition of Alstom Signaling North America finalized

By focusing on CCS (Control, Command and Signaling) technologies, Knorr-Bremse is aiming to establish itself as a new Tier 1 systems and platform partner in the rail market. In September, the company announced the successful acquisition of the entire rail signaling business of Alstom Signaling North America – including a team of around 800 employees working in six locations. With the new Signaling business unit, Knorr-Bremse is planning to substantially enhance and globalize rail signaling technology by introducing new and digital solutions. The new business unit will also take over the company's existing European signaling business.

"In the rail industry, safety and capacity largely depend on braking systems and signaling technology. This is why it makes sense to con-

sider these elements as an integrated whole," explains Dr. Nicolas Lange, Knorr-Bremse AG's Executive Board member with global responsibility for the Rail division. "The ongoing progress of digitalization and networking makes the signaling sector very interesting for our customers – and as a result, for us too." Lange emphasizes that: "We have no intention of competing with our customers. But we do intend to become a Tier 1 platform partner in the signaling technology market by offering products, systems and services that will benefit established manufacturers." In its last financial year, Alstom Signaling North America generated revenues of around EUR 300 million.

In tune with the times



At the end of September, InnoTrans 2024 welcomed some 170,000 guests from 133 different countries. With all exhibition halls, outdoor exhibition areas and demonstration areas fully booked, attendance figures – and the proportion of international visitors – once again exceeded the highest pre-Covid levels. In short, Berlin was perfectly in tune with the global demand for sustainable mobility.

Knorr-Bremse at InnoTrans 2024

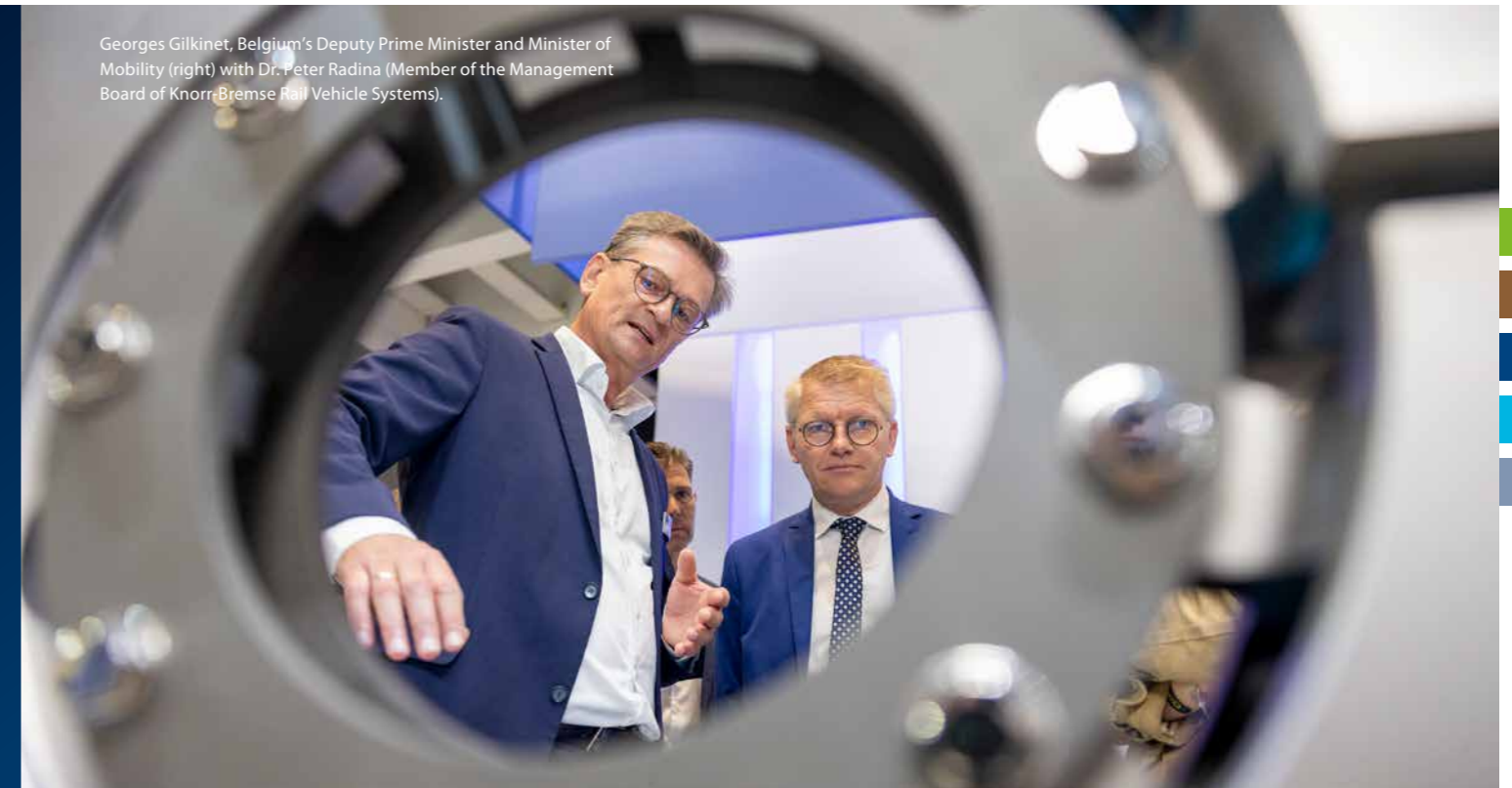
How will we humans stay mobile in the future? And how will we succeed in shifting as much freight transportation as possible to rail – the most sustainable solution? With its products, systems and solutions, Knorr-Bremse is optimizing ecological footprints, dynamizing traffic flow, synchronizing operations and maintenance, and raising travel comfort to new heights. Braking systems are just the start! Acting as an onboard control center, Knorr-Bremse's digital solutions interlink, interweave and interconnect smart products, functions and services by following a sophisticated "Data2Action" approach. For highlights of the Group's central presence at the trade fair, read on.



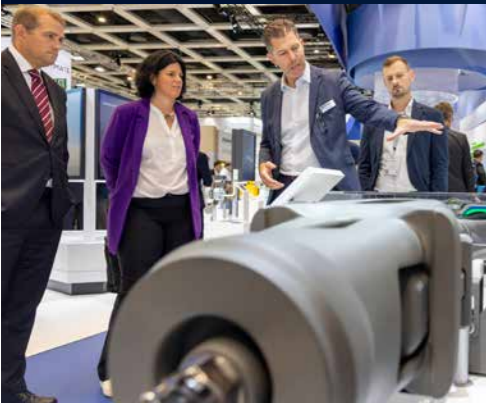
Hosting customers, partners and politicians

“We support our customers by helping them revolutionize the transportation of people and freight.”

Dr. Nicolas Lange, Member of the Executive Board of Knorr-Bremse AG with global responsibility for the Rail division



Georges Gilkinet, Belgium’s Deputy Prime Minister and Minister of Mobility (right) with Dr. Peter Radina (Member of the Management Board of Knorr-Bremse Rail Vehicle Systems).



Carina Konrad, Member of the German Federal Parliament, joins Martin Ertl (Vice President Innovation and Portfolio Management) at Knorr-Bremse’s Digital Automatic Coupler (DAC) exhibit



Daniela Gerd tom Markotten (left), Deutsche Bahn AG’s Board Member for Digitalization and Technology, with Jasmin Bigdon (center), CTO at Deutsche Bahn AG



A warm welcome to the Kawasaki delegation, pictured here with Dr. Jonathan Paddison (Member of the Management Board of Knorr-Bremse Asia Pacific; left) and Executive Board member Dr. Nicolas Lange (2nd from left)



Markus Bernsteiner (center), Group CEO of Stadler Rail



Richard Lutz, CEO of Deutsche Bahn AG (center), viewing one of the two “Evolution of Braking” exhibits with Executive Board member Dr. Nicolas Lange (right)



Michael Peter (right), CEO of Siemens Mobility GmbH



Berlin’s Governing Mayor Kai Wegner (right) puts his questions to Executive Board member Dr. Nicolas Lange (2nd from left).



Technical discussion between Roland Busch, CEO of Siemens AG (left), Knorr-Bremse AG Executive Board member Dr. Nicolas Lange and Supervisory Board Chair Dr. Reinhard Ploss (center).



Peter Spuhler (right), President of the Board of Directors of Stadler Rail AG



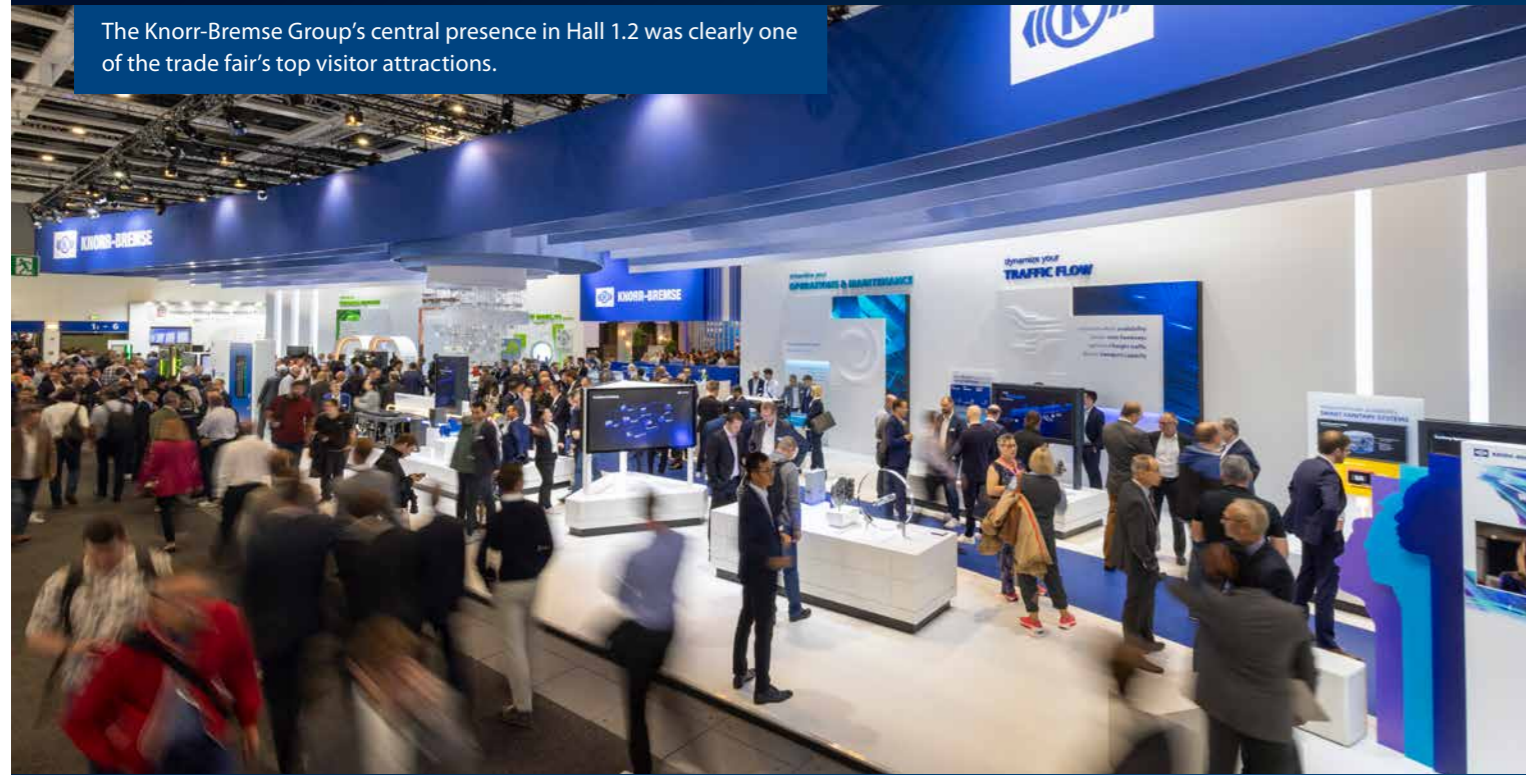
Udo Schiefner (left), Chair of the German Federal Parliament’s Committee on Transport and Digital Infrastructure, visits Knorr-Bremse’s booth at the trade fair.



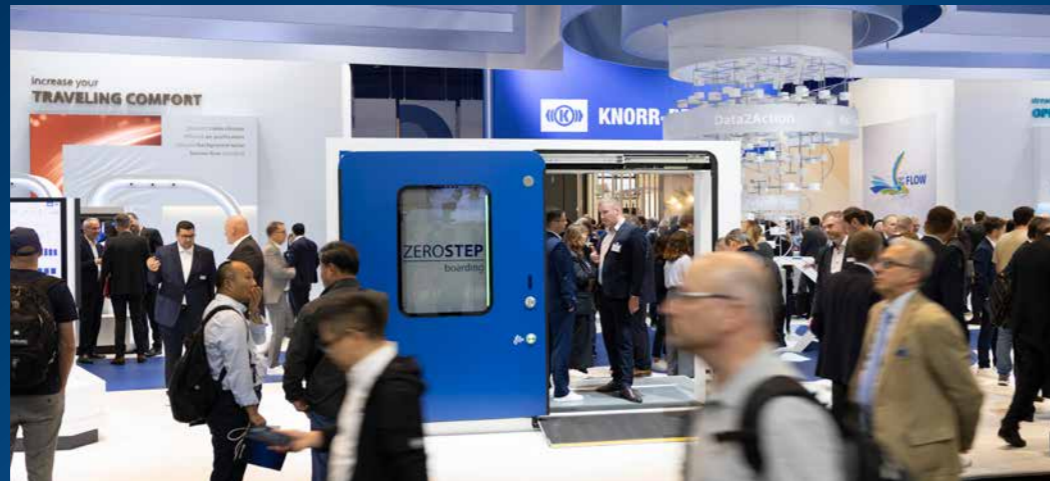
Executive Board member Dr. Nicolas Lange (5th from left) welcomes Dr. Volker Wissing (3rd from left), Germany’s Federal Minister of Transport, Susanne Henckel, State Secretary at the German Federal Ministry of Transport and Digital Infrastructure (6th from left), and Sigrid Nikutta (7th from left), Member of the Management Board of Deutsche Bahn AG.

Raising the curtain on Knorr-Bremse's systems, products and solutions!

The Knorr-Bremse Group's central presence in Hall 1.2 was clearly one of the trade fair's top visitor attractions.



The innovative ZeroStepBoarding entrance system for high-speed trains: The maximum height of the "doorstep" for passengers is just 9 mm – less than half an inch. Unlike other barrier-free solutions, ZeroStepBoarding works without any additional actuators or active elements such as hinged sealing flaps or platform lifts.



The two Evolution of Braking exhibits demonstrated how trains will brake in the future: either conventionally (using compressed air), or hydraulically – or, very soon, without any compressed air at all.



An optimized braking system relies on perfect friction pairing. And this is why Knorr-Bremse offers application-specific pairing of friction materials for brake pads and discs, optimized for every type of train and all global rail standards.



Ecological Footprint, Traffic Flow, Lifecycle Management and Traveling Comfort – these top priorities for manufacturers and operators are what drive Knorr-Bremse's systematic development of advanced technologies.

Much more than just a product showcase: InnoTrans has built a reputation as a global forum where customers and suppliers can meet and share ideas.



In addition to the DAC as the key enabler, Knorr-Bremse's "Future Rail Freight Transportation" concept also includes automatic train composition detection (train inauguration) and automated brake testing.



Central feature: Knorr-Bremse's Data2Action exhibit, showing how the company translates data into real-world solutions that improve reliability, punctuality and efficiency.



Marc Llistosella (CEO of Knorr-Bremse AG) talks to Dr. Thomas Anton (Vice President Brake Control).



Visitors interested in a career could talk directly to HR experts at the trade fair booth.

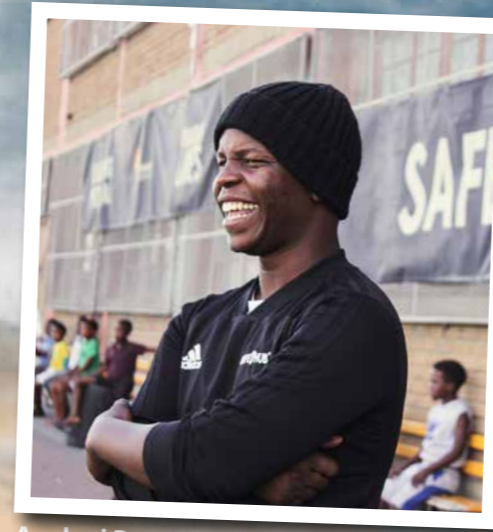


Sustain, Enhance, Accelerate – the three principles on which solutions customized by Knorr-Bremse RailServices are based. The tailor-made results optimize customers' processes and improve the environmental footprint of their fleets.

Here, every- one's a winner

To scale the Safe Hub model worldwide, Knorr-Bremse Global Care e.V. has partnered with AMANDLA Social Enterprises to set up Safe-Hub Global gGmbH. The first project kicked off in South Africa in 2007.





Anelani Bungane



Kids are playing soccer on the sports field, doing homework in the Youth Café, or discovering the world as they surf the web in the computer room – not to mention the training academy, movement room, psychosocial support center and space for social enterprises. A Safe Hub like the one in Khayelitsha on the outskirts of Cape Town acts as a safe haven for young people, their families and communities in the surrounding townships. To provide the Safe Hubs with sustainable financial backing, the partnership is also developing economic models that should help them to remain financially independent. This support for local business processes is creating jobs, strengthening the regional economy and providing a long-term structure for the Safe Hubs that will help to keep them economically independent over the long term.

First launched in 2007, there are now 11 Safe Hub projects in South Africa and 13 projects worldwide. Each

project touches between 1,500 and 5,000 young people directly, and between 7,500 and 25,000 people in the surrounding communities. To date, the organization has concluded around 180 collaboration partnerships, created more than 1,300 jobs and registered almost 400,000 “activity check-ins” (weekly training courses during which the young people also touch base with Safe Hub staff).

Breaking the vicious circle of structural marginalization

“The Safe Hub concept certainly won us over,” says Julia Thiele-Schürhoff, Chair of Knorr-Bremse Global Care e.V. “Children and young people from marginalized families with few opportunities for education or personal development are often trapped in a vicious circle – it’s very difficult to break out and make something of yourself. Our strategic partnership is enabling us to tackle social problems at the root and give these young people long-term prospects.”

The institution behind the strategic partnership is Safe-Hub Global gGmbH. Global Care is backing the strategic partnership because of its high impact, efficient use of resources, and sustainable model.

From PlayMaker to Centre Manager

Just what that impact looks like is reflected in Anelani Bungane’s life story. As a teenager, he joined the Safe Hub in Khayelitsha back in 2013. He was one of the first people to graduate from the PlayMaker training program. The program is a 12-month training course for local coaches, preparing participants for an apprenticeship or job. For Bungane, the Safe Hub concept has become a career path – in 2022, he was appointed Senior Programme Manager in Khayelitsha. The following year, he moved to the Safe Hub in Cape Town’s Gugulethu-Manenberg district, where he is now Centre Manager.

But other career paths are also open to Safe Hub graduates: Knorr-Bremse South Africa systematically recruits young talent from Safe Hub programs, for example to serve in-house apprenticeships.

From South Africa to the northern hemisphere: Berlin and Philadelphia

Much can be learned about global scaling from the Safe Hubs that have already been established – the concept behind them has been recognized by the United Nations Office on Sport for Development and Peace as a global best-practice model for youth development. The latest Safe Hub projects have found a home in Germany, Côte d’Ivoire, India and the USA. As in South Africa, Knorr-Bremse companies are close neighbors (with the exception of Côte d’Ivoire), giving Knorr-Bremse employees a chance to get involved. First, to foster their awareness of social engagement, and second, to bring their entrepreneurial mindset to bear on social projects and so boost the Safe Hub program’s effectiveness and impact.



www.safe-hub.org

Poland's rail industry is booming

The Polish rail market has seen over two decades of steady modernization. The freight sector in particular has grown faster than anticipated by many rail experts. But even 20 years after the country's accession to the European Union (EU), there is still a burning need for more infrastructural development.



Poland's huge rail expansion program is signed and sealed: Starting last year, more than EUR 20 billion is due to be pumped into the country's railroad system, as set out in Poland's new national rail plan, Krajowy Program Kolejowy (KPK). Around half of this amount will come from EU funding.

For the project to expand the link between the Warsaw East and Warsaw West stations alone, KPK has earmarked an impressive EUR 1.7 billion. As from 2029, the number of trains passing through this bottleneck will almost double. The plan also includes laying or refurbishing at least 4,230 kilometers of track. One of the largest high-profile projects is the construction of a new line to Zakopane. In addition, Poland intends to lay some 275 kilometers of new, high-speed track supporting speeds of at least 160 kilometers per hour. And soon, thanks to numerous bridge-building projects, trains will no longer have to slow down for safety reasons as they approach the country's many level crossings.

The large "voivodeship" (province) of Warmińsko-Mazurskie in particular is already benefiting from new rail routes through the Baltic countries, running all the way to Helsinki in Finland via the port of Tallinn. An amount of almost EUR 900 million has been earmarked for the new "Rail Baltica". As recently as September, Poland and Ukraine signed an agreement covering one of the undertaking's subprojects, involving the construction of a standard-gauge connection between the Estonian capital in the north and Kiev in the south. This should happen in the very near future.

Leading the market for rail vehicle braking systems in Poland: Knorr-Bremse

Twenty-five years ago, Knorr-Bremse took the big decision to set up in Poland by founding Knorr-

Bremse Poland, making the company one of the very first to bring Western rail vehicle technology into the country. The company's first project was also a highly prestigious one: to equip Warsaw's new metro vehicles with braking systems.

Since then, Knorr-Bremse has risen to become the market leader for braking systems in Poland. Almost 1,000 PKP Intercity railcars are now fitted with Knorr-Bremse components. The same applies to almost 500 PESA Swing LRVs, including those exported to neighboring countries. Naturally Knorr-Bremse is committed to further increasing its presence in this emerging market. Most recently, the company opened a new production and service facility in Rzeszów so that it can respond to Polish customers even faster than before.





“The company was in the right place at just the right time”

An interview with Jacek Biłtas

Jacek Biłtas has been Managing Director of Knorr-Bremse Poland since 2004. This year, the company is celebrating its 25th anniversary. Biłtas has spent his entire career working in Poland’s rail industry. We take a look at this exciting rail transportation market.

Mr. Biłtas, what was the situation in Poland 25 years ago, when Knorr-Bremse Poland was first set up?

Back then, we Poles were living through exciting but also fraught times – the first few years after the fall of the Iron Curtain weren’t always easy. But once the EU accession negotiations started in 1997, our prospects became increasingly rosy: Very soon, our country would become a fully-fledged member of the European Union! This created a really positive atmosphere, which also affected the rail vehicle industry.

During this optimistic period, Knorr-Bremse Poland opened for business in Kraków in the fall of 1999. What was the company producing at this point?

The company was in the right place at just the right time. We immediately entered the market with a super-prestigious project, supplying braking equipment for the new Metropolis railcars destined for the Warsaw metro system. For a brand-new operation, it was obviously a huge challenge to accelerate to top speed from standing. But at the same time, it also allowed us to show what we were capable of – top quality and reliable delivery. We were the newcomer bringing Western rail vehicle technology into the country, and Polish manufacturers benefited from our expertise. Not just because it allowed them to build better vehicles which cost less over their lifecycles, but also because Knorr-Bremse’s international experience proved invaluable when it came to getting their new vehicles approved for export projects. At the same time, we set up new maintenance structures, because the contract for the Metropolis braking equipment also included a long-term service agreement.

Why did it make such good sense to enter the Polish market at that point?

During the Communist era, the only work the government ever did on the country’s rail infrastructure were the bare essentials. And then, during the 1990s, other things – quite understandably – took precedence over the rail network. But little by little, politicians started to take the decisions needed to clear the investment backlog. They tackled the task of expanding the major transit routes, especially those running through Poznan and Warsaw. Lots of lines were electrified and upgraded to support higher speeds – on many of them, the previous speed limit was just 80 km/h...

... and now Poland’s state rail operator Polskie Koleje Państwowe (PKP) has been running high-speed trains since 2014...

... exactly – so just last year, the government gave the go-ahead to purchase more than 100 new Pendolino multiple units, capable of running at speeds of up to 250 km/h. During test runs, the train actually acceler-

ated to as much as 291 km/h – the highest speed ever recorded on Polish rail tracks!

So far, we’ve talked a lot about passenger rail. But Poland’s rail freight sector is even more impressive.

That’s right. Around 79,000 freight cars are running on our rail network. Poland is the second-largest freight market in Europe, after Germany but before France. Of the 62 billion ton-kilometers traveled in 2022, international freight transportation accounted for 31 percent. And at 22 percent, rail freight’s “modal share” is significantly higher than the European average of 18 percent. We’re expecting this share to increase, primarily as a result of several construction projects on the Baltic coast, where ports are building new freight terminals.

It almost sounds as if you’ve achieved all you could possibly want.

Well, as far as Knorr-Bremse Poland is concerned, we’re quite close to reaching this desirable state of affairs! We’re now firmly established in the marketplace, and our braking systems enjoy a market share of over 90 percent. We’re supplying our customers with almost everything which the Knorr-Bremse portfolio has to offer. It’s also become clear that the Polish market is very open to digital solutions. Our employees speak the same language as our Polish customers and are thoroughly familiar with the local culture and customs. And we’re still growing: Just last fall, we opened a new production and service facility in Rzeszów. This means we can respond to our Polish customers even faster than before.

What are your hopes for the Polish market as a whole?

The investments made in Poland’s rail network over the last few years have been the right ones, and they’re highly visible. But it’s really important not to lose momentum. Poland’s inter-regional roads in particular are in very good condition, putting rail transportation at a disadvantage. That’s why I’d like to see us making faster progress in upgrading lines for higher-speed trains. In the freight sector in particular, we’re still lagging well behind the average speeds found across the rest of Europe.

After earning degrees from the Faculty of Transportation and Electrical Engineering at Cracow University of Technology and the University of Foreign Trade and International Finance in Warsaw, Jacek Biłtas began his career managing a locomotive depot for Polish State Railways (PKP). After working in various positions for two Polish railcar manufacturers and then for Alstom, he joined Knorr-Bremse Poland in 2004 as Managing Director.

Major upgrades for classic passenger trains



Poland's fleet of (currently) more than 2,000 PKP Intercity trains is undergoing a process of continuous renovation. Knorr-Bremse RailServices is heavily involved – thanks to the expertise of a dedicated team of engineers.

When Grzegorz Trzepla boards a Polish Intercity train, he can experience the successful outcome of the work of many Knorr-Bremse employees. "There are very few lines between any two of the larger Polish cities on which PKP Intercity trains don't run," explains Knorr-Bremse Poland's Director of RailServices. And very few Intercity trains run by Poland's state rail operator (PKP Intercity S.A.) serve their routes without Knorr-Bremse subsystems on board.

Comprehensive modernization of the entire intercity fleet

The fleet currently comprises more than 2,000 railcars – a number expected to grow to around 2,500 by the end of

the decade. PKP is in the middle of an investment program worth PLN 27.1 billion (around EUR 6.3 billion). In addition to purchasing new vehicles, the operator has earmarked large sums of money for the comprehensive modernization of older passenger cars.

Strictly speaking, this modernization program has been ongoing for the last 15 years or more. "On average, the state rail operator likes to modernize around 100 Intercity passenger cars every year," explains Trzepla. "We're talking about full, all-round modernization – often the coach body is the only part that remains unchanged."

Modern climate control systems are retrofitted; advanced entrance systems replace heavy manual doors; worn, elderly seats are replaced by comfortable, ergonomic models. Very soon, 230-volt power sockets, USB ports and individual lighting will be available for every seat, plus at least one Wi-Fi router in every passenger car. Integrated, closed-loop sanitary systems replace the old, open ones. PKP is also implementing new designs for family and bicycle compartments, as well as restaurant cars. In short, Trzepla is traveling in what is essentially a new vehicle.

RailServices: a dedicated engineering team for modernization projects

What makes this particular modernization project stand out? "Each passenger coach modernization project is a new 'journey' for us, because different carbuilders and different types of rail coaches require us to prepare a solution dedicated to a given project," explains the RailServices Director.

Sometimes, for example, the team finds ingenious ways to install modern brake control systems on vehicles using existing bogies. And at other times, on another type of railcar, they must replace the entire bogie. "PKP Intercity also brings extensive technical expertise to the table; they're very good at assessing the solutions we propose for each vehicle type."

Brakes, HVAC, doors, sanitary systems – or another system from the Knorr-Bremse portfolio: The dedicated engineering team can draw on the Group's expertise for the necessary support, depending on the challenges encountered in the latest batch of rail vehicles. "This means we can ensure our customer always benefits from the experience we've already gained from other modernization projects. And, of course, we work very closely with the respective railcar manufacturer's engineering team during the implementation phase."

Dragon on rails!

Dragon and Griffin locomotives manufactured by Newag are an increasingly common sight on Poland's railroads – and will soon appear in other countries.



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During the Cold War, most of Poland's heavy-duty locomotives were purchased from manufacturers in what was then the Soviet Union – in particular the Brjansk Machine-Building Plant in Russia and Lugansk Locomotive Works in Ukraine. But the SM42 series was produced by Polish manufacturer Fablok, which built a total of 1,856 units. After the turn of the millennium, Newag used the old series as the basis for several new locomotive types: the Newag 311, Newag 6Dg and Newag 15D/16D.

In 2008, the manufacturer announced that it was developing a modern, six-axle, heavy-duty locomotive. This represented a significant milestone in the history of the country's rail industry – the new locomotive was the first model for many decades to be developed entirely in Poland in this vehicle segment.

Customized braking systems based on state-of-the-art Knorr-Bremse products

By October of the following year, Newag was ready to showcase the prototype of the new Dragon electric loco-

motive at TRAKO, Poland's largest rail industry trade fair. In 2011, the locomotive went into series production at the manufacturer's Gliwice plant.

A little later, the company started producing a four-axle variant for passenger trains. Newag christened the Dragon's baby sister "Griffin". This was the first Polish multi-system locomotive capable of running on 3 kV DC networks as well as 15 kV and 25 kV AC networks. The fastest variant is designed to travel at speeds of up to 200 km/h. Indeed, Griffin is capable of pulling a 2,400-ton train up a 7‰ incline at a steady 80 km/h.

"We were involved in both projects right from the start, developing and supplying braking systems. Now we also supply components for the power electronics and fans for traction motors," explains Lech Bąk, Engineering Director at Knorr-Bremse Poland. To date, Newag has developed several variants of both locomotives. Operators ordering Dragon models can, for example, choose a more powerful "Max Load" option to increase the vehicle's tractive force from 410 kN to 450 kN, while the "Dual Power" option adds an additional diesel module to the locomotive, for last-mile operation on non-electrified lines.

"We supply tailor-made braking systems for each variant – always assembled from the very latest products and components in the Knorr-Bremse portfolio," says Bąk. In the case of the Newag locomotives, for example, this includes enhanced brake panels and new distributor valves, and more recently, state-of-the-art brake calipers and compressors as these have become available. "Without our local presence in Poland, developing and integrating these advanced technologies would have been much more complicated," emphasizes Bąk. "They're all based on intensive exchanges between manufacturer and supplier, during which we discuss evaluations, preliminary designs and possible solutions in minute detail."

Interoperable locs ideal for use in other countries

To date, Knorr-Bremse has delivered or is preparing to



deliver (sub)systems for more than 120 Dragon and Griffin locomotives. And almost as many locomotives have already been ordered from Newag by various operators.

The most recent orders in particular are the result of the manufacturer's smart approach: The Griffin E4MSUa multi-system model is designed to be suitable for homologation in Germany, Austria, the Czech Republic, Slovakia and Hungary. So in the not-too-distant future, the interoperable Griffin should also become a familiar sight in a number of neighboring countries.

Impuls inspires in red and white



Depending on configuration, Newag's Impuls EMU platform is suitable for both local and long-distance rail transit. But the multiple-unit family also played a key role in the development of Deceleration Control, part of Knorr-Bremse's RBD (Reproducible Braking Distance) program.

The first Impuls train was also the longest – the electric, six-car EMU has a length of 113.60 meters and a 922-person capacity, including 218 seated passengers. The train went into operation on Warsaw's Fast City Rail (SKM) network in 2012, sporting a red and white livery inspired by Poland's national flag. The network's S1 line starts in Pruszków in the capital's southwest and runs through the city center before crossing the Vistula and then curving southeast toward Otwock.

Newag went on to build eight more multiple units in the same 35WE configuration for SKM Warsaw. The trains were the first of hundreds ordered over the next few years by Poland's voivodships (provinces) and rail operators for their regional networks.

Newag installs FlexControl in newer vehicles

In terms of size, Newag's 37WE configuration is at the other end of the scale. This modest, two-car EMU carries 265 passengers and is just over 42 meters long, making it suitable for even the shortest provincial platforms. Most of the Impuls multiple units delivered to date have been three-car, four-car and five-car variants – apart from the different lengths, the interior fittings of the passenger compartments are also configurable. Depending on route profiles, the trains are not just suitable for use on local, commuter or suburban networks, but also for long-distance transit.

Knorr-Bremse has now equipped more than 300 Impuls trains – representing a total of 1,170 railcars – with braking and TCMS systems. "More than 150 trains have also been fitted with Merak HVAC systems," adds Knorr-Bremse's Polish project manager Lukasz Kowalski. As a rule, Newag installs the latest products from the Knorr-Bremse portfolio in its trains: "So to start with, we supplied our modular brake panel with the EP Compact brake control unit, but now Newag is fitting its latest vehicles with our state-of-the-art FlexControl unit."

Impuls trains also played a key role in RBD development projects

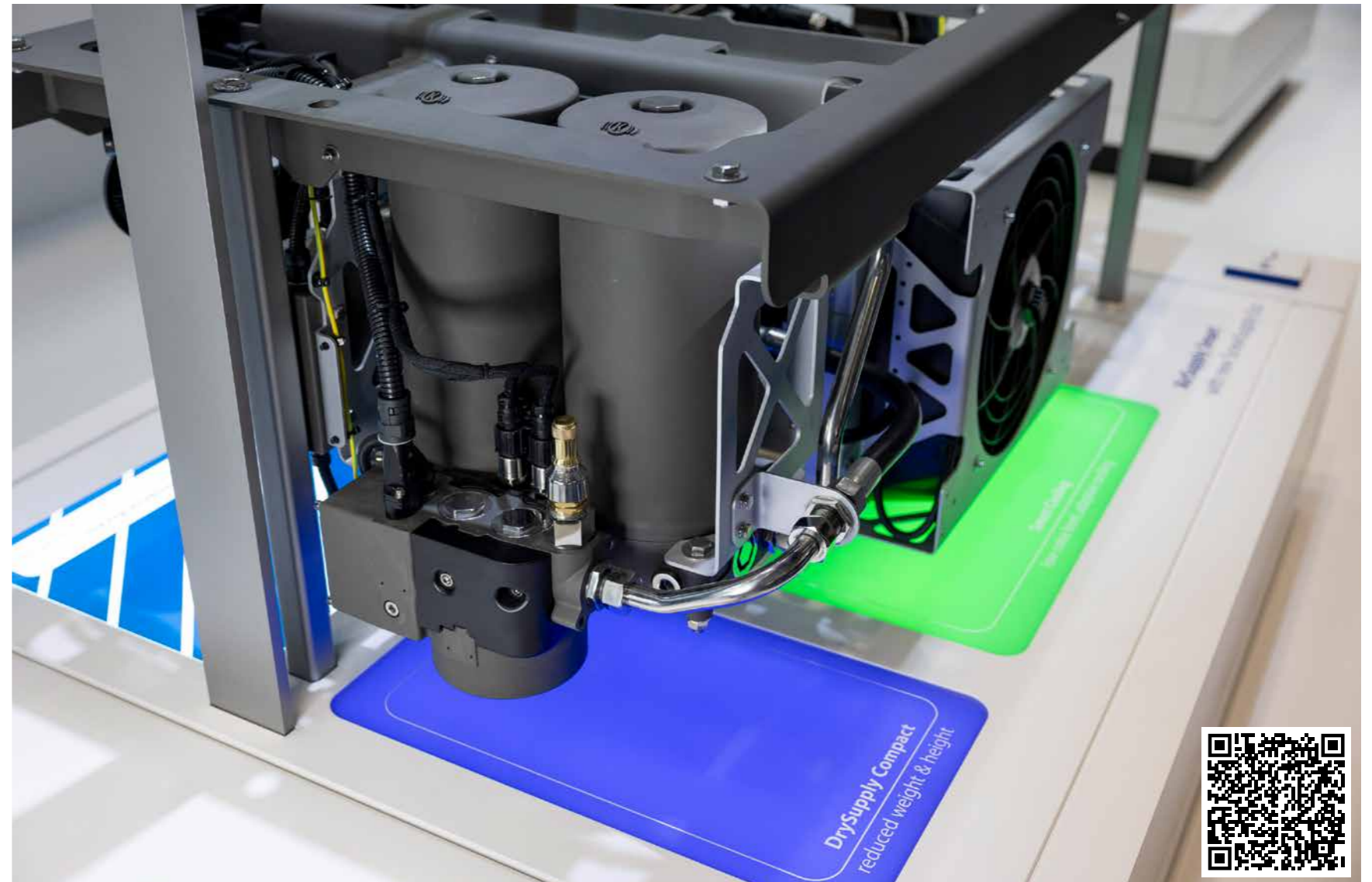
As it happens, cutting-edge technologies are an important feature of the collaborative relationship between Knorr-Bremse and Newag. During the development of the new Deceleration Control function for Knorr-Bremse's Reproducible Braking Distance (RBD) program, the manufacturer made an almost brand-new Impuls 31WE EMU available to the team.

Knorr-Bremse was allowed to take the train – equipped with an additional control rack for the Deceleration Control function, as well as an extensive sensor array – to a test track near Żmigród. There, the development team was able to show that the new function was capable of significantly reducing braking distance variance quite independently of the vehicle's brake pads. And the Knorr-Bremse program trialing the use of Deceleration Control for emergency brakes, which was based on the UIC/TSI approval process, also relied on an Impuls multiple unit – this time a type 36WEa.



More functionality takes up less space

As a product family designed to be entirely modular, the new generation of DrySupply Compact air dryers is optimized for ease of maintenance. Combined with AirSupply Smart, the dryers offer a cold-start function.



DrySupply Compact



"In braking systems, moisture can cause major problems – up to and including braking system malfunctions," explains Nicholas Zimmermann, Product Manager Air Supply. "Over time, moisture can cause metal components to corrode. At low temperatures, it can freeze and damage hoses, for example, as it expands." This is why air is passed through an adsorption (desiccant) dryer before compressors force it into a braking system's reservoirs.

Modular design and repositioning of bracket, piston valve and dryer towers cuts height by 20 percent, saving space

A few weeks ago, Knorr-Bremse launched its new generation of DrySupply Compact air dryers on the market. "We've further developed key parts of a product that was already well established in the industry. In particular, we focused on saving space and increasing

availability, as well as reducing lifecycle costs and total cost of ownership (TCO)," continues Zimmermann. The DrySupply Compact comes in multiple versions – XS, S, M and L – with flow rates ranging from 70 to 2,400 l/min.

The development team managed to shave 20 percent off the height by coming up with a new, modular design and optimizing the layout of bracket, piston valve and dryer towers. The cold-start function, available as an option with AirSupply Smart, is designed to cope with temperatures as low as -40° Celsius, and improves availability by speeding up the preheating process. Thanks to the sensor system's digital interface and

compatibility with integrated condition monitoring, the new generation of air dryers is primed for an all-digital operating environment.

Pitstop concept extends intervals between services

One of the key factors in reducing lifecycle costs: "Maintenance is based on a pitstop concept. By making 'life-limiting' components easy to access and including a continuous condition monitoring option, we can extend the intervals between overhauls," explains Zimmermann. The modular design and associated standardization also mean fewer spare parts are needed, further reducing the cost to operators as well as the time spent on in-house product maintenance.

Smart control system for next-generation train toilets

Essential for passenger comfort, indispensable for operational stability – sanitary systems play an important role aboard trains. The MLC 2.0 control and connection unit from the Knorr-Bremse subsidiary Evac is setting new standards for real-time connectivity with operators' cloud services.



Neatly installed between the sanitary system's paneling and the passenger car's external shell, the small, space-efficient gray box with its many inputs and outputs is essentially invisible. The MLC 2.0 control and connection unit – or more accurately, what it does – only becomes visible elsewhere, on the vehicle operator's monitors, where it displays the relevant sanitary system's key operating data in real time, including for example the number of operating cycles, voltage in the electrical circuit, underpressure in the vacuum system and reservoir fill level.

Using the knowledge advantage to optimize operational processes

"Our next-generation control system is the perfect match for next-generation train toilets," says Aiko Püschel, Director Sales & Business Development at Evac. "Until now, technicians had to wait till the train was stationary before carrying out time-consuming, in-person checks. Now all this labor-intensive work has been replaced by a few mouse clicks on a remote terminal – a genuine Data2Action use case."

Above all, remote condition monitoring helps to keep operational processes flowing. "Sometimes, an entire train is prevented from leaving on time because technicians are still looking for whatever

caused a sanitary system's warning indicator to light up," explains Püschel. The new, digital approach gives operators a major knowledge advantage.

This advantage can be exploited to optimize the total cost of system ownership. "Previously, the service lives of individual system components were expressed as simple time periods, and their maintenance intervals were calculated accordingly," continues Püschel. "But now, thanks to real-time data, operators can rethink their whole approach, making much better use of their sanitary systems' remaining service lives and precisely scheduling maintenance procedures so that

potentially critical situations are proactively resolved before they escalate."

Optimizing use of space in trains

Evac's compact system cleverly improves the way space is used on trains. Among the features of the "sliding" installation is a single common interface for electrical, pneumatic and hydraulic services, so that technicians can quickly remove and replace the unit during servicing. Other space-saving innovations include the tank assembly – combining intermediate and freshwater tanks for the first time – and the flexible positioning of the discharge outlet.

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