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DEAR READER,

In 1838, when the Berlin-Potsdam railroad first went into operation, pictures were painted of steam locomotives pulling little wagons behind them. What did people back then imagine the future of this transport mode might be? If they had gone to the Berlin Exhibition Center – not far from that original railroad track – this year, they would have been amazed at how the industry has developed since those early days. InnoTrans 2016 provided impressive proof of how innovative the rail sector can be! The biennial trade fair is also an important platform for the exchange of ideas between experts, decision-makers and development engineers – an exchange that is essential to secure the future of rail transport. This edition of our INFORMER offers a glimpse of what that future might be – and the central role that Knorr-Bremse plays as a driver of technological change.

In the case of the EcoTrain, a team of development partners including Knorr-Bremse succeeded in installing hybrid technology in a diesel train for the first time. The entire team is now waiting with bated breath for the test phase to start. Testing is already under way on the new 4th-generation entrance system developed by Knorr-Bremse subsidiary IFE: Since June of last year, DB Regio Halle/Saale has been trialing the system under real operating conditions. By contrast, the ‘iCOM Assist’ app is already in regular daily use by freight company DB Cargo. Installed in 300 locomotives since October, it has been helping engineers drive their locomotives more efficiently and with minimum wear and tear. We are using the opportunity to provide a more detailed description of the potential offered by this innovative iCOM platform.

Other topics covered in this edition include the new ESRA Evolution brake, for which Knorr-Bremse used proven components to create the basis for a modern electronic braking system, and the new freight car brake disc available from January, which will save operators 360 kilograms of weight per car. And, finally, we are proud to announce a major sales coup: Knorr-Bremse is to supply the brake control system for 800 Alstom ‘Prima’ double diesel-electric locomotives ordered by Indian Railways.

In the run-up to Christmas we should also spare a thought for those who are less fortunate than ourselves. Helping people in need has been the central mission of Knorr-Bremse Global Care for the last ten years. In a bid to further enhance its effectiveness, the organization has decided to focus its activities on certain selected countries and core issues. December is an appropriate time of year to take a look at this topic.

We wish you and your families a happy Christmas and a successful start to the New Year!

Best regards

Rolf Härdi

Member of the Executive Board,
Knorr-Bremse Systeme für Schienenfahrzeuge GmbH
CAPTURING THE ZEITGEIST

THE INNOTRANS TRADE FAIR – INTERNATIONAL SHOWCASE AND DRIVER OF INNOVATION IN THE RAIL SECTOR – broke all previous attendance records in 2016, attracting more than 144,000 visitors from 140 different countries. Knorr-Bremse was at the center of it all, exhibiting products and services that reflected the spirit of the times.

Klaus Deller, Member of the Executive Board of Knorr-Bremse AG responsible for the Rail Vehicle Systems division, expressed his satisfaction with this year’s event: “There was massive interest from industry specialists. Our booth was overrun by visitors, and we had many high-level discussions, signed various agreements – and received an award from Russian Railways.” On five booths covering a total of 800 square meters, Knorr-Bremse was able to display a large cross-section of its current product portfolio to distinguished visitors including Alexander Dobrindt, Federal Minister of Transport and Digital Infrastructure, and Dr. Rüdiger Grube, Chairman of the Executive Board of Deutsche Bahn AG.

FOCUS ON ‘CONNECTIVITY FOR RAILWAY TECHNOLOGY’

One leitmotif at the trade fair – and the Knorr-Bremse booths – was the theme of digitalization, the new megatrend in the rail sector. “Our slogan ‘Connected Systems’ was very much in line with the current trend in our industry towards digitalization and networked solutions for trains,” reported Frank Uder, Senior Director X-System Business Development. “Intelligent networking of subsystems paves the way for comprehensive new solutions from a single source that benefit vehicle manufacturers and operators in terms of time, technology and costs.” Carefully matched sub-system hardware and software, with standardized interfaces and pre-delivery testing, enable vehicle manufacturers to benefit from improved project planning, simplified homologation procedures and lower costs. Diagnostics can be carried out on the various sub-systems using a standard service tool, which means that commissioning and servicing are also significantly speeded up. The result is greater vehicle availability and lower operating costs. “All these aspects generated great interest among visitors to the exhibition,” said Uder. There is a similar trend towards digitalization in the service segment, with solutions for energy-saving and condition-based maintenance attracting particular interest.

AWARD FOR RUSSIAN KAB60 CONTROL VALVE

In addition to the latest brake control systems, bogie equipment and air supply units, recent developments from Knorr-Bremse’s subsidiaries also attracted great interest. One of these was the KAB60 control valve designed and manufactured by Russian subsidiary ‘Knorr-Bremse 1520’ to comply with the GOST standard and installed in the latest vehicles developed by Russian railroad company RZD. For its performance and contribution towards reducing life cycle costs, the company received a ‘Best in Quality, Components for Rolling Stock and Infrastructure’ award from RZD at an event staged on the occasion of InnoTrans.
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NEWS

SUPPORTING PEOPLE MORE EFFECTIVELY

THE CENTRAL AIMS OF KNORR-BREMSE GLOBAL CARE are to improve the situation of people in need and enable them to lead more independent lives. In order to improve its effectiveness, the organization has decided to focus on selected countries and two core themes.

By 2015 Global Care had spent €14.3 million on funding 194 projects involving over 625,000 people in 52 different countries of the world. “We are proud of these figures,” says Julia Thiele-Schürhoff, Chair of the Executive Board of Global Care. “But they are also an incentive to continue our work and achieve an even greater impact.” To mark its 10th anniversary, the organization therefore reviewed its activities to see how it could use the funding donated by the divisions of the Knorr-Bremse Group even more effectively. The final decision was to follow Knorr-Bremse’s corporate strategy of focusing on a small number of core areas. Since January 2016 the organization has been concentrating on selected countries, including all 30 countries in which the Knorr-Bremse Group operates sites. To these have been added a further ten focus countries in which the organization has been particularly active since its foundation in 2005: Cambodia, Colombia, Ethiopia, Ghana, Kenya, Myanmar, Peru, Sri Lanka, Tanzania and Ukraine.

Mario Beinert, Vice President CoC Air Supply at Knorr-Bremse Rail Vehicle Systems and a founding member of Global Care, explains the advantages of this change: “In countries where Knorr-Bremse has its own local structures, it is much easier to identify and understand local needs, select suitable aid projects and ensure their efficient implementation. More than anything else it is the dedication of our employees all over the globe that ensures that our aid projects are effective and have a lasting impact.” In future, around 70 percent of Global Care funding will go to projects in countries where there are Knorr-Bremse sites.

One example is the ‘Community Gardens’ project at Knorr-Bremse’s biggest European Rail production site in Budapest. Knorr-Bremse Global Care is funding a project launched by employees to grow crops on an area of land for the benefit of deprived people in a suburb of the city, residents of an adjoining old people’s home and children in a local kindergarten. As well as encouraging the socially disadvantaged to harvest food for their own use, the project also aims to build bridges between the generations and help people to help themselves.

As part of its new strategy, Global Care is also now focusing on certain key areas, and since 2013 has increasingly concentrated on WASH projects (water, sanitation and hygiene). A second core area is education – the key to finding a job and to improving one’s social status. This is why the organization funds projects ranging from kindergartens to vocational training. However, this restriction to specific fields and countries does not apply to emergency relief: In the wake of natural disasters, for instance, Global Care will continue to finance projects all over the world.

▲ Effective help in the neighborhood of Knorr-Bremse sites: Global Care is funding the ‘Community Gardens‘ project, in which company employees are involved. The food grown will go to a nearby kindergarten.
ECM CERTIFICATION – WAVE ONE ON TRACK AND CLOSE TO COMPLETION

In the future, any company wishing to provide freight car maintenance services in Europe will have to produce an Entity in Charge of Maintenance (ECm) certificate according to EU Regulation No. 445/2011.

ECM certification is intended to ensure that – in the interests of greater safety – certain predefined requirements and standards are adhered to when maintenance work is carried out on freight cars. Knorr-Bremse is currently auditing and certifying all its service sites in Europe in collaboration with Bureau Veritas. The process is taking place in three phases: The first will be completed by the end of the year. Beside the central processes in Munich, service centers in Berlin, Lund (Sweden) and Florence (Italy) were successfully audited. The first certificates have been officially issued. This will be followed shortly by Mödling (Austria). In 2017, audits will then be carried out at service sites in Melksham (UK), Niederhasli (Switzerland), Reims (France) and Budapest (Hungary), and finally, in 2018, the service centers in Kraków (Poland) and Getafe (Spain) will undergo the process.

UNITED WAGON COMPANY VISITS KNORR-BREMSE IN MUNICH

In mid-October, top managers from the United Wagon Company (UWC), one of Russia’s largest freight car manufacturers, paid a visit to Knorr-Bremse in Munich. Accompanied by Director for Strategy and Planning Alexey Sokolov and Director for Business Development Maxim Kuzemchenko, CEO Roman Savushkin toured Knorr-Bremse’s brand new Development Center, which opened its doors last summer. Its first-class infrastructure enables Knorr-Bremse engineers and technicians to develop and test pioneering system solutions for the next generation of rail and commercial vehicles.

The main purpose of the visit was to discuss future cooperation between the two companies. Knorr-Bremse has already received a major order from the UWC to supply KAB60 air distributor valves and AKB1 load brake valves. The advanced technical design of the valves, which were specially developed for the 1520 mm gauge market, offers several operational advantages, and they have already been installed in the latest generation of innovative UWC freight cars. With its St. Petersburg-based subsidiary ‘Knorr-Bremse 1520’, the company has achieved almost 100% localization of their production.

NEW FACILITY FOR KNORR-BREMSE FRANCE

Knorr-Bremse’s French subsidiary, Knorr-Bremse Systèmes Ferroviaires France, has a new plant: On October 6 of this year, a new facility in Tînqueux near Reims went into operation. The reason for its creation was a desire to improve processes and working conditions and create more space for maintenance of HVAC systems and doors. The sum of €7 million invested is indicative of the importance of the corporation within the Knorr-Bremse Group: The company employs some 145 people who work not only on site but also locally, with customers. Knorr-Bremse Systèmes Ferroviaires France is responsible not only for France but also for francophone Africa. Among guests at the official opening ceremony were the Vice President of the National Assembly, Catherine Vautrin, National Assembly member and Mayor of Reims Arnaud Robinet, Senator for the Department of Alpes Maritimes and President of FIF (French Railway Industry Association) Louis Nègre, and the Mayor of Tînqueux, Jean-Pierre Fortuné.
NEW LOCOMOTIVES FOR NEW ROUTES

AS PART OF A PROJECT TO SUBSTANTIALLY EXPAND RAIL FREIGHT TRANSPORTATION over the next decades, Indian Railways recently ordered 800 ‘Prima’ electric double locomotives from Alstom Transportation. The braking systems are being supplied by Knorr-Bremse.

DFC – Dedicated Freight Corridor – is the official name given to an ambitious rail infrastructure project that India intends to implement by the year 2019. It involves the creation of two new freight corridors across the country, each more than a thousand kilometers in length. The Eastern Corridor will link Ludhiana in the Punjab with Dankuni in West Bengal, around 1,839 km long. The Western Corridor, which will be around 1,499 km long, will run from the Jawaharlal Nehru Port in Mumbai to Tughlakabad in Delhi.

In the last quarter of 2015, against tough competition, Alstom won a contract from the Ministry of Railways, India, to supply 800 double-section electric freight locomotives and provide long-term maintenance services. The project includes setting up a production facility at Madhepura (Bihar State), India, and two maintenance depots in Saharanpur (Uttar Pradesh State) and Nagpur (Maharashtra State). Delivery of the locomotives will run from 2018.

The locomotives, which will be called WAG12, are based on Alstom’s Prima double electric locomotive platform and are similar to the KZ8A and HXD2 (DJ4) locomotives that are already successfully in operation in Kazakhstan and China. These locomotives will be faster, heavier and safer, with engines producing 9,000 kW (12,000 hp) of power, enough to pull trains weighing a total of 6,000 tons at a speed of 100 km/h (upgradable to 120 km/h) compared to the WAG9 locomotives with
4,500 kW (6,000 hp) produced by IR. Knorr-Bremse’s role is to bring these heavy trains safely to a halt from such speeds. Knorr-Bremse will supply complete braking systems for the locomotives, i.e. brake control module, air supply and treatment unit and bogie brake equipment. As usual, these have been tailored to local requirements and the special conditions in the Indian rail market. Since 2012 the CCBII-IR braking system, which is a specific UIC adaptation for Indian Railways (IR) by Knorr-Bremse, has been braking most of the new-build electric and diesel locomotives operated by IR. The first deliveries from Knorr-Bremse are slated for mid-2017 and will continue for a period of 11 years in all. The package also includes responsibility for servicing the Knorr-Bremse systems for a minimum of 13 years for 250 double locomotives. Knorr-Bremse’s facility in Palwal in the north-western state of Haryana will enable the company to meet the high localization requirements of the Indian market and will generate a large proportion of the added value related to the order.

LOYALTY BONUS
“Basically I am still working with the same people as back then.” Statements such as this – from Guido Schober of the Sales department at Knorr-Bremse Rail Vehicle Systems, Munich – sum up the company on the Indian subcontinent. Nearly twenty years have passed since ‘back then’ and the company recently changed its location. "Though the new site is 30 kilometers away from the old one, most of my colleagues moved with the company," reports A. P. Garg, Managing Director of Knorr-Bremse India. Such loyalty, he says, brings clear benefits when it comes to handling long-term projects. “Everyone really knows what they are doing and is familiar with the local situation.” The relocation had become necessary in 2013, as the Indian rail market was rapidly expanding and the old plant had reached the limits of its capacity. The new site has 26,000 square meters of office and factory space, where Knorr-Bremse works closely with certified regional suppliers to manufacture brake control, bogie brake equipment, compressors and air dryers, mainly for the Indian market.

Environmental considerations were a priority for the new site. Built according to “Green Building” standards, the facility has an extremely effective air conditioning system which, combined with high-quality insulation, has significantly cut CO₂ emissions with zero discharge to the atmosphere. Recycling of process water has also reduced water consumption. “You won’t find many factories built to such high environmental standards,” says Mr. Garg.
OPERATING ON A NEW LEVEL
THE INCREASING COMPLEXITY OF TRAINS REQUIRES A NEW GENERATION OF BRAKE CONTROL SYSTEMS. That is why Knorr-Bremse has developed ESRA Evolution – a new platform for state-of-the-art brake electronics.

It looks like the switchboard of a control center, which – strictly speaking – is what it is. On several screens you can see dozens of colored displays and numbers. Next to them stands a full-size set of brake control hardware with interconnecting cables. When Josef Schmucker, Project Manager for Electronic Brake Control Platforms at Knorr-Bremse Rail Vehicle Systems, pulls the link to one of the two central intelligence devices (CIDs), the displays immediately start to flicker and change. The electronic communication path, which up till now has been displayed in green, suddenly turns dark red, and at the same time another green channel lights up. The train’s second CID has taken over.

“Redundancy is a central element in ESRA Evolution,” explains Schmucker. “The focus throughout is on maintaining the control system’s functionality.”

SCALABLE SYSTEM ARCHITECTURE FOR RAPID PROJECT IMPLEMENTATION
There were good reasons why Knorr-Bremse started further developing the ESRA system. Writing brake control software is a complex task. In the past, the programmers used to create separate control software for every rail vehicle project, manually modifying the programs for the individual modules. It was a time-consuming
process – and also an expensive one. The new ESRA Evolution has considerably simplified the task.

The backbone is provided by systems architecture that is initially identical for all rail vehicle applications: The main computer configures the communication links between the individual components, regulates braking functions throughout the train and monitors their operation. The individual functions of the braking system, for example the volume of sand that the sanding system delivers per second between the rail and the track, is controlled by distributed local application devices (LADs). In this way, it has been possible to create scalable architecture on the basis of tried-and-tested SIL2-certified components.

Scalability is based on a project environment that enables the development engineers to start by visually configuring the individual modules. The components in the train are no longer individually programmed – they receive their standard software centrally. The engineers can parameterize them relatively easily and rapidly adapt their function. This project-specific software is then bundled on the new brake control CIDs.

**MINIMAL DOWNTIMES THANKS TO CENTRAL SERVICE INTERFACE**

“...This approach enables us to respond rapidly, even to complex parameter changes by the customer. Tasks that in the past took weeks, can now usually be carried out within the space of a day,” explains Schmucker. Comprehensive automatic test sequences have massively reduced the amount of time required for approval. Furthermore, ESRA Evolution standardizes communication between the individual Knorr-Bremse components. This means that company sites around the world can add their own modules.

The principle of standardization has also been applied to the field of servicing. The web-based service terminal enables the local workshop to read off the status of the system for an entire train segment via a single central interface. This minimizes downtimes and maximizes train availability.
REAL-LIFE TESTING

THE NEW 4TH GENERATION IFE ENTRANCE SYSTEM is smaller and lighter – but also considerably more powerful – than its predecessor. The first systems have been undergoing testing by Deutsche Bahn under real-life operating conditions.

“Since June 2015 we have been trialing four of the new generation of IFE entrance systems under normal day-to-day operating conditions in a double-deck train, and they have performed superbly. There have been no faults at all, and no outages,” reports Carsten Kretzschmar, specialist engineer for entrance systems and interior equipment at Deutsche Bahn AG. “We are, of course, pleased. But from a technical point of view it would have been better if we had had an opportunity to run through our fault management procedures.” The twinkle in his eye betrays the fact that the complaint is not to be taken seriously – to the relief of the IFE engineers.

Knorr-Bremse’s Austrian subsidiary invested considerable resources in developing the new system. The engineers had to further develop existing core components and convert detailed designs into reality. Then
came the heart of the system – the E4 drive, which operates the doors using virtually play-free toothed racks that require no maintenance whatsoever during their entire operating life.
The new linear guidance system has made it possible to design an ultra-compact door system that is 20 percent lighter and has 40 percent fewer components. New materials and optimized door profiles have also improved the sound insulation of the door leaves by a factor of three or four over comparable products. And the considerably reduced thermal transfer factor also prevents the formation of condensation. In a nutshell: ‘Generation 4’ is lighter and smaller than its predecessors, but also considerably more powerful.

**THOROUGH TESTING ENSURES SMOOTH RUNNING**
These qualities emerged well before the system was put on the market. The testing regime at the IFE validation center in Kematen, Austria significantly exceeds the parameters encountered under normal operating conditions – ensuring that products have sufficient safety margins when they go into service.
But the ultimate test for any entrance system comes when it is confronted with real passengers, which explains why Deutsche Bahn is trying out four of the new systems in day-to-day passenger operations on a double-deck train belonging to DB Regio Halle/Saale. The approach is in line with the company’s procurement and technology strategy, which aims to ensure a high level of product maturity in order to minimize the risk of later system failure. Rail vehicle components and systems have to fully demonstrate their suitability before they are put into regular operation. There is a good reason for this: Even minor defects in entrance systems can result in considerable timetable delays. Defects frequently trigger a chain reaction that has a knock-on effect for subsequent trains. And that, of course, has a negative impact on passenger satisfaction levels.
During the testing phase the entrance systems are being inspected every four weeks at the DB depot in Magdeburg. Two Knorr-Bremse RailServices technicians have been deployed there to work on a jointly developed testing schedule containing a list of 60 different points to be checked. Detailed long-term monitoring and documentation ensures that any changes in the entrance systems’ performance are identified. By the time testing is finished, the ‘Generation 4’ entrance systems will have achieved the highest DB maturity rating of 9.
KEEPING COOL

NEWLY-DESIGNED COOLING FINS reduce the weight of a classic axle-mounted freight car brake disc by some 360 kilograms per car – enabling operators to increase their payloads.

Nowadays, weighbridges are regularly used to check the weight of freight cars during or after loading. As soon as the display shows 90 tons, loading has to cease, as that is the maximum permissible weight for European freight cars – usually 22.5 tons per axle. “The lighter a freight car, the bigger the payload it can carry – so considerable sums of money are at stake,” explains Dr. Marc-Gregory Elstorpff, chief engineer for bogie equipment at Knorr-Bremse Systeme für Schienenfahrzeuge GmbH.

The latest axle-mounted brake disc has a lot going for it: “It is 60 millimeters thinner and 45 kilograms lighter than traditional products,” says Elstorpff. “On a four-axle freight car, that adds up to 360 kilos – and if you calculate the weight saving for an entire train, you’re talking about several tons.” There is another advantage, too: If the containers are not completely full, the overall train is lighter and requires less energy for acceleration and braking.
**FIRST DELIVERIES ALREADY IN JANUARY**

The design engineers started by looking at the new brake disc’s ventilation channels. To put it simply: These are shorter and narrower than on predecessor models – but there are also more of them. The surface area is more or less the same, which means that the channels can disperse enough heat to the surrounding atmosphere during braking. A classic validation process was applied to the new design, starting with numerical flow mechanics, the finite element method (FEM) and solidification simulation. It also goes without saying that the castability has been proofed.

The first of these discs are going to be delivered for two projects in January and comply with current TSI regulations. During continuous braking at 40 kW, they reached temperatures of up to 450° Celsius. After one emergency brake application from 120 km/h, a temperature of 210° Celsius was measured and 315° Celsius after subsequent emergency braking. These temperatures are slightly higher than those for classic, wider freight car discs, but are still well below the official limits for both discs and pads.

▼ WBN bogie with lightweight freight car brake disc on display at InnoTrans 2016 in Berlin.
The Erzgebirgsbahn is a 217-kilometer regional network linking the towns of Chemnitz, Zwickau and Johanngeorgenstadt. The Desiro VT 642 multiple units operating on the line call in at no fewer than 70 stations, and this high frequency of halts means that the network is ideally suited for the EcoTrain project: The more often a train starts and stops, the greater the fuel savings that can be achieved by switching to a hybrid drive system. But such a system first had to be developed for diesel multiple units. A number of development partners came together to examine the options, with no fewer than eight different hybridization concepts undergoing scrutiny as part of a collaborative project with the Fraunhofer Institute in Dresden and the technical universities of Dresden and Chemnitz. Once the decision had been made in favor of a serial hybrid drive system based on a diesel-electric concept, the engineers turned their minds to developing a new lithium-ion storage system. Replacing the existing engine with a diesel-electric one complete with the necessary energy storage had significant implications. A new bogie even had to be designed, as the vehicle’s mass had increased considerably and an additional axle-mounted disc brake with caliper unit had to be added. With the help of RailServices Engineering, Knorr-Bremse replaced the old MRP braking

GREEN BRAKING

IN THE CASE OF THE CHEMNITZ ERZGEBIRGSBAHN, AN ‘ECOTRAIN’ POWERED BY A HYBRID DIESEL ENGINE will shortly be trialed. Knorr-Bremse is supplying the brake control system for this innovative project.

1 Energy management
   In order to achieve extra energy savings, the vehicle control unit is connected to the control units for the hybrid motor and energy management system.

2 Bogie
   For the time being, at least, the extensive modifications required for the hybrid drive system mean an increase in overall weight. The bogie was therefore redesigned in order to provide flexibility during the trial.

3 Drive and energy storage
   A new energy storage system benefits from modern Li-ion batteries that can be charged not only by braking but also via external sources such as an overhead power line.

4 Drive and energy storage
   The existing engine was replaced with a diesel-electric drive system that both cuts fuel consumption and reduces engine running hours.

5 Braking system
   Knorr-Bremse has developed a new control unit for the dynamic braking system that is extremely efficient at recovering energy during braking.
system with modern ESRA technology and optimized the braking characteristics for energy-saving train operation. The company was also responsible for supplying the new oil-free air supply system and a sanding unit that complied with current TSI sand volume requirements.

Fuel savings and reduced noise emissions

In the EcoTrain, the role of a classic retarder is replaced by the electric braking system. “We wanted to maximize the amount of energy we actually recover,” says Achim Steckert, project manager at Knorr-Bremse Systeme für Schienenfahrzeuge GmbH. The process of re-engineering the brake control system was based partly on the original vehicle documentation but also had to ensure smooth communication with those systems that remained unchanged. “For instance, we needed to ensure that the vehicle bus didn’t even ‘notice’ that anything had changed.” It was an additional challenge for the engineers. “The new brake control system had to be compatible with the existing vehicle and its interfaces.”

In operation, the system stores excess braking energy in batteries housed on the vehicle roof as well as drawing power from the overhead line. When appropriate, the train management system switches from diesel electric to purely electric drive. It makes sense for this to happen mainly when the train is entering or leaving a station, as it then operates much more quietly.

The hybrid technology can deliver fuel savings of up to 30 percent. But the current trial phase is about much more than testing what is technologically feasible. “Our aim is to install the new technology in 14 Desiro VT 642 vehicles operated by the Erzgebirgsbahn,” say Claus Werner and Sören Claus, the two managers of the Innovation Projects department at DB Regio’s subsidiary RegioNetze. If the prototype proves effective, there is clearly a future for this technology: Some 600 Desiro VT 642 multiple units are in operation throughout Europe, around 400 of them in Germany.
**MUST-HAVE TOOL FOR FLEET OPERATORS**

PREVENTIVE DIAGNOSTICS, EFFICIENT LOW-WEAR OPERATION AND REAL-TIME INFORMATION ON ENERGY CONSUMPTION: iCOM and its Apps are enjoying increasing popularity as an innovative platform for digital rail operations.

In the 1990s, a trend towards condition-based maintenance started in the aerospace industry, followed in 2000 by the energy sector and heavy industry and finally, in 2010, by the automotive sector. “In three or four years it will also be the standard approach in many trains,” predicts Dirk Seckler, Knorr-Bremse RailServices Sales Director. The background to this is the fact that – even in new trains – systems and components are often sent to the workshop after a short period in service as part of a routine maintenance cycle. As often as not the technicians then replace them, whether or not they are still capable of functioning. The iCOM Monitor App puts an end to this potentially wasteful practice: Whatever the vehicle platform, it keeps an eye on the exact condition of the sub-systems, setting the scene for a shift from reactive to proactive maintenance that can reduce operating costs by an average of 20%.

The application’s algorithms are designed to enable customers to access all the important condition-related data via a monitor in the back office. But in addition to status reports, iCOM Monitor also comes up with specific maintenance recommendations that can be tailored to customers’ individual requirements.

**PAVING THE WAY FOR SPECIFIC, CUSTOMIZED CONCEPTS**

iCOM Monitor is already being piloted under regular operating conditions, supplying data about the hydraulic braking system of a light rail vehicle in service with the Berlin city transport operator Berliner Verkehrsbetriebe (BVG). Since last summer the App has also been undergoing testing in regional double-decker coaches operated by DB Regio. iCOM Monitor is helping to optimize maintenance of the IFE entrance systems installed in the trains by drawing on information from on-board sensors installed in various systems – for example for measuring opening and closing duration, temperature and tilt. And the system will also shortly be installed by Dutch operator NedTrain to monitor the condition of the oil-free compressors in its regional trains. iCOM Monitor is only one of three applications available on the platform. Another is iCOM Meter, which measures and records energy consumption in real time; and the third is the driver information system iCOM Assist. So the same platform can offer ad-
ditional potential savings. Using an online database containing information on the train’s configuration, route and timetable, and also drawing on information about its current speed and location as pinpointed by GPS, iCOM Assist calculates recommendations for the driver. These might involve, for example, reducing traction and allowing the train to coast to the next scheduled stop, finally bringing it to a halt using the mechanical brake. By acting on the recommendations, which he receives on a tablet, the driver can save energy, improve punctuality, and reduce wear and tear of materials. The application has already been retrofitted to 300 locomotives operated by DB Cargo AG, where it has been generating savings and reducing CO₂ emissions – day by day.
... AND RELAXED AT HIGH SPEED THANKS TO BRAKING TECHNOLOGY FROM KNORR-BREMSE. Latest-generation trains, running at high speeds and in extreme conditions, need latest-generation braking systems to deliver precise, effective brake control when required. The latest compact, environmentally-friendly solutions from Knorr-Bremse are designed to deliver continuous operational reliability. | www.knorr-bremse.com |