BRAKING NEWS

A SINGLE ALL-ENCOMPASSING SOLUTION
Knorr-Bremse Diagnostics combines diagnostic functions for trailers and trucks

START-UPS – THE INNOVATION PACE-SETTERS
Young companies give fresh boost to the transportation sector

UPGRADE FOR KNORR-BREMSE TRUCKSERVICES TECH-SUPPORT
Workshop expert service with a feel for customer needs

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KNORR-BREMSE

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Dear Reader,

ALEXANDER WAGNER,
Head of Aftermarket/TruckServices EMEA at Knorr-Bremse Commercial Vehicle Systems

Start-ups bring a breath of fresh air to the transportation sector and help to further improve processes, technologies and business models. Knorr-Bremse collaborates with start-ups on investigating the scope for highly automated driving, and since 2020 has been using its eCUBATOR innovation unit to carry out technology scouting. We have had considerable success with our efforts: The eCUBATOR has already passed a large number of projects on to the relevant Knorr-Bremse business units for industrial application. In our title story we present a number of exciting start-ups. In selecting them we have concentrated on ones that are focused on finding solutions to the industry's major challenges: Changes in drive systems, the lack of trained drivers, and the need to boost transportation efficiency

A major gain for Knorr-Bremse has been its acquisition of a majority share in Cojali. This has enabled us to offer all service providers one of the most efficient diagnostic systems for trucks and trailers under the Jaltest brand. Jaltest brings together the strengths of a multi-brand diagnostics specialist with specialized diagnostics for Knorr-Bremse systems. This makes them well-prepared for the future. For example, Jaltest is already capable of carrying out diagnostics on iTEBS® X – our latest generation of trailer EBS. We describe on page 4 just how the change can be achieved. If you and your colleagues have any questions about Jaltest or other service-related issues, our experts at Knorr-Bremse TruckServices TECH-Support will be glad to help. You can find out on page 7 how we have further improved our combination of telephone hotline, field service and training with a view to increasing the benefits for your colleagues and customers.

Finally, I would draw your attention to Knorr-Bremse's EconX® products – remanufactured spare parts that offer an attractive option for the economical repair of vehicles with a limited remaining service life. However, when it comes to core management - the returning of used parts for remanufacture - we require your assistance. You can find out on page 14 how to preserve the cores' quality.

I hope you enjoy reading this edition of Bremspunkt and gain important insights for your professional practice.

Alexander Wagner

A single all-encompassing solution

DIAGNOSTICS play a critical role in the repair and maintenance of modern vehicles, with their high electronic content.

Following its acquisition of a majority stake in Spanish diagnostics specialist Cojali, Knorr-Bremse is working on combining the functions of its existing diagnostic systems for trucks and trailers – NEO and ECUtalk - with the strengths of Cojali's multi-brand diagnostics system, Jaltest, to create a single software solution called Knorr-Bremse Diagnostics. Jaltest is already the only option for carrying out diagnostics on Knorr-Bremse's latest trailer electronic braking system, iTEBS® X.

The number of mechatronic parts in commercial vehicles is rapidly increasing, which means that service companies have a growing quantity of data available for analysis from each vehicle. The constantly expanding proportion of electronic systems means that diagnostics are now the most important workshop tool for the complex task of repairing a commercial vehicle. State-of-the-art diagnostic systems significantly contribute to the prevention of unplanned downtimes. Until recently, Knorr-Bremse relied on its own applications: NEO, for the diagnosis of Knorr-Bremse systems in trucks, and ECUtalk for testing trailers and semi-trailers equipped with a Knorr-Bremse Trailer EBS (TEBS). Knorr-Bremse's majority shareholding in Cojali now opens up additional opportunities.

"Multi-brand vehicle diagnostics are Cojali's speciality - the company is one of the leading international providers in this field," says Alexander Wagner, Head of Aftermarket/TruckServices EMEA at Knorr-Bremse Commercial Vehicle Systems. "Many years ago we recognized that data-driven solutions and connectivity are one of the key trends shaping the commercial vehicle industry. Now we are strengthening Knorr-Bremse's aftermarket offering by including in our portfolio a leading diagnostics provider with more than 20 years of experience," explains Wagner.

Cojali's Jaltest software covers all the requirements for diagnostics on commercial vehicles - from tractor units to trailers - regardless of the vehicle brand. "Jaltest now provides the basis of a complete solution for our customers, and especially for workshops, as it also includes the functions of our own, specialized diagnostic systems, combined with our manufacturer-specific expertise. Only this combination enables precise testing of Knorr- Bremse components," explains Simon Binar, Team Lead Digital Workshop Services & Tools. An initial result of the collaboration between Knorr-Bremse and Cojali is the fact that the latest generation of trailer EBS - iTEBS X - can only be tested by the Jaltest-based solution in conjunction with the Jaltest Link hardware.

The existing diagnostic solutions from Knorr-Bremse, NEO and ECUtalk, are expected to be merged into Knorr-Bremse Diagnostics from mid-year onwards and will be used only together with the Jaltest Link hardware, explains Simon Binar, who as project lead is coordinating the merge of the Jaltest and Knorr-Bremse diagnostic solutions. After this change, all Knorr-Bremse systems can be diagnosed with the Knorr-Bremse Diagnostics software, regardless of the vehicle type. "The switch to Knorr-Bremse Diagnostics thus offers all customers a standardized, future-proof diagnostic solution," explains Simon Binar.

The existing diagnostics solutions can continue to be used after this change, as long as the respective NEO and ECUtalk software licenses remain valid. The NEO and ECUtalk diagnostics functions are available as software add-ons for Jaltest installations and extend the functionality of Jaltest multi-brand diagnostics. It will also be possible to license a software version that exclusively covers Knorr- Bremse systems. In both cases, the user interface and user experience of Knorr-Bremse Diagnostics is based on that of Jaltest. Only the Jaltest Link hardware will then be used.

Simon Binar advises customers to switch to Knorr-Bremse Diagnostics in good time: "This will protect all customers for the future. The new diagnostics landscape offered by Knorr-Bremse reduces the variety of devices required for repair and maintenance and simplifies the cabling." In addition, Knorr- Bremse Diagnostics will provide additional guided work instructions alongside all the proven functions of the current individual systems. In contrast to the previous pricing model, the new diagnostics will be offered as an annual subscription that includes all regular software updates. This will ensure that the software is always up-to-date and, among other things, will facilitate greater vehicle repair efficiency by providing the latest repair hints.

To provide a smooth transition to using Knorr-Bremse Diagnostics, experts from Knorr-Bremse Commercial Vehicle Systems' TECH-Support TruckService are supporting all customers with the integration of the new diagnostic system and with updates to existing devices.

Acquisition with benefits

In November 2022, Knorr-Bremse acquired a majority stake in Spanish company Cojali S.L., a leading global developer and manufacturer of stationary and remote diagnostic systems for commercial and special vehicles. With its Jaltest brand, the company is a leading international provider of multi-brand diagnostic solutions for commercial vehicles. Jaltest supports diagnostics on around 200 commercial vehicle brands and 6,000 commercial vehicle models. More than 30,000 trucks are currently equipped with Jaltest telematics and can therefore be diagnosed remotely.

PROFESSIONAL TIP:
Switch to Knorr-Bremse diagnostics in good time.

The service community

In a bid to further improve the support offered to its customers, Knorr-Bremse TruckServices is upgrading the role of its TECH-Support workshop specialists. An exchange of information at expert level and across all regions boosts the practical relevance of the assistance provided.

"Every man for himself is no longer enough - now there is a widespread feeling of being part of a team," says Marc Eutin, head of TECHSupport TruckServices at Knorr-Bremse Commercial Vehicle Systems. The guidelines on how the workshop experts from technical service TECH Support should provide customers with advice and assistance in the event of a problem are no longer just decided centrally, but are developed during the course of a lively exchange within the Knorr-Bremse TruckServices service community.

THE COMPANY'S FIELD-SERVICE **is just one aspect of the comprehensive range on offer from TECH-Support.**

"The colleagues involved are spread across all regions in which TruckServices is active. They are the ones who maintain close contact with customers in their market, so that's why they know best what the needs of regional parts dealers, workshops and fleets are," explains service expert Eutin. The head of TECH-Support emphasizes that TruckServices needs this sort of grassroots feedback; "It helps us to work out how best to support our customers and offer them maximum value-added."

The TECH-Support of Knorr-Bremse TruckServices is based on three elements, the first two of which are the technical hotline and the field service, which provides on-the-spot assistance. Experience has shown that the Knorr-Bremse TruckServices "phone-a-friend" system can solve most problems remotely. But the contact person can decide from case to case whether it will be necessary for a service specialist to be sent out to provide on-the-spot help, for example to get a broken-down truck-trailer combination back on the road. Jaltest Advanced Tech Support (ATS) services are now also integrated into the technical hotline in the DACH countries (Germany, Austria, Switzerland) and gradually becoming available in other countries in the EMEA sales region. ATS provides Jaltest license holders with expert solutions for troubleshooting various faults that may be flagged up during a diagnostic process, as well as instructions and guidelines to help them with the repair.

The third element of TECH-Support is customer training, which is provided by Knorr-Bremse experts. "We use truck workshop specialists for the training courses – they speak the language of the participants," says Marc Eutin. The trainers provide the service staff with the necessary skills for servicing and maintaining Knorr-Bremse vehicle components, and prepare them for the introduction of new ones in the aftermarket. Their role is particularly important at present: Since this year, the TECH-Support experts have been training service employees in handling the latest generation of the Trailer-EBS – iTEBS® X – and preparing customers for the changeover from the individual NEO and ECUtalk diagnostic systems to Knorr-Bremse Diagnostics.

The TECH-Support division has also stepped up its training efforts with a view to providing customers with even better support. "PowerPoint sessions are a thing of the past. We now offer training as a package. E-learning courses prepare participants for the upcoming live training session and provide a uniform basic level of knowledge in advance so that this can be built on immediately during classroom training. We also rely on group work," explains Marc Eutin. This, he adds, increases the efficiency of the training. It is also crucial for the service staff to deepen their know-how through practical exercises, for example by applying vehicle diagnostics to the entire vehicle and solving complex tasks.

ABOVE: A SUPRA-REGIONAL EXCHANGE generates relevant practical information.

LEFT: THE TRAINING PROVIDED BY KNORR-BREMSE TRUCKSERVICES complements the technical hotline and field service.

The training and assistance provided by TECH-Support give Knorr-Bremse TruckServices customers important advantages: They benefit from their own customers' satisfaction when a vehicle is put back on the road as quickly as possible and starts generating income again. In addition, the profitability of workshop processes increases, as highly trained employees can carry out work faster and complete more jobs.

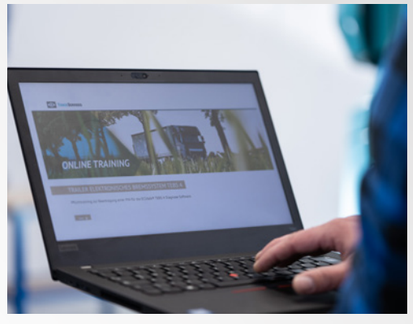
Facts & Figures

The Technical Hotline can be reached on 00800 1905 2222* or by email at support.de@knorr-bremse.com

*Monday to Friday between 08:00 and 17:00

Every year, the Technical Hotline handles 3,600 cases in the DACH region. Of these 50 are tackled on-the-spot by the field service

DACH training
Each year, 140 technical commercial vehicle training courses are held on site in the DACH region. Knorr-Bremse provides training for a total of 1,350 participants. Each year, customers book 550 e-learning sessions.



Knorr-Bremse wins Sales Professional Award

KNORR-BREMSE IAM SALES PROFESSIONALS
Bärbel Hedrich and Thomas Gaus received the customer satisfaction award.

Double victory for Knorr-Bremse: For the second time, the CARAT Group has honored Knorr-Bremse TruckServices with its Sales Professional Award for outstanding supply performance.

"Our cooperation with Knorr-Bremse has been extremely positive from the get-go. We value our exceptional relationship, which is based on mutual trust and respect and enables us to work closely together on finding solutions and overcoming challenges," said Axel Stark, Head of Category Management CV at CARAT, in recognition of Knorr-Bremse's achievement. In particular he praised the company's improvements in delivery conditions and handling processes, and especially its addition of EAN barcodes to its packaging. "These have made our workflows considerably easier," he explained. Knorr-Bremse's constant optimization of its range of products had also helped strengthen CARAT companies' confidence in them.

This was the second time Knorr-Bremse had won the Sales Professional Award, which CARAT presents to suppliers every year during its Commercial Vehicle Symposium. The award recognizes outstanding commitment, specialised expertise and strong customer orientation, amongst other things. "We are delighted to receive this honor, which demonstrates Knorr-Bremse's high standards of cooperation with all its customers and its determination to establish long-term, reliable supply relationships," said Bärbel Hedrich, Director IAM Sales DACH at Knorr-Bremse Commercial Vehicle Systems. "We are constantly optimizing the quality of our products, but straightforward, rapid processes are also crucial for ensuring customer satisfaction. The Sales Professional Award shows that Knorr-Bremse also delivers excellent performance in this respect," added Thomas Gaus, Sales Manager IAM DACH NORD at Knorr-Bremse TruckServices.

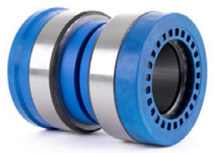
The CARAT Group, an association of independent automotive parts wholesalers in the independent aftermarket (IAM), is one of the largest such organizations in the German market, with more than 120 affiliated partners, and is also a member of the most important parts cooperation in Europe, thanks to its connection with ADI (Autodistribution International).

Wheel bearing range expanded

In conjunction with Fersa Bearings, Knorr-Bremse TruckServices recently launched a range of wheel bearings for the independent aftermarket. Customer demand is already high, and Knorr-Bremse is now adding numerous other types to the range.

Hub Wheel Truck (HWT)

COMPACT WHEEL TRUCK (CWT)



Kit Wheel Truck (KWT)

TAPERED ROLLER BEARING

UNIVERSAL PRESS TOOL KIT

WHEEL HUB ASSEMBLIES

KNORR-BREMSE is adding 125-part numbers to its wheel bearing range - from wheel bearing units to tapered roller bearings and the associated tools.

Knorr-Bremse TruckServices offers its customers efficient solutions for the entire spectrum of commercial vehicles. Since the end of 2022, these have included a range of wheel bearings for the independent aftermarket (IAM) which Knorr-Bremse has jointly developed with Fersa Bearings, a specialist in automotive bearing solutions. The Spanish company manufactures OEM-quality bearings that meet Knorr-Bremse's high standards.

In response to positive customer feedback, Knorr-Bremse is now adding various other types of tapered roller bearings for trucks and buses from Iveco, DAF, MAN, Daimler and Volvo as well as for BPW axles. This expansion brings its full range to a total of 125 part numbers. Tapered roller bearings for the Iveco, Mercedes-Benz and DAF brands, as well as wheel bearing units for DAF, MAN and Renault Trucks are also being added.

The full range of wheel bearings for trucks, buses and trailers thus includes tapered roller bearings, wheel bearing units (hub wheel) and compact wheel bearing units. It also covers wheel hub assemblies in which wheel bearing sets are already incorporated. Such integrated units reduce the risk of assembly errors, ensure optimum sealing, increase the service life of the components and offer a high degree of operational safety. They also reduce the number of tools and operations required for installation.

JOCHEN HAHN HAS A CLEAR GOAL FOR 2024: adding another championship trophy to his collection.

Gunning for the title

The 2024 truck racing season gets underway at the end of May. The teams will battle it out for coveted points over seven race weekends at circuits all over Europe. This year, Knorr-Bremse and Knorr-Bremse TruckServices will once again be sponsoring Team Hahn Racing and truck racing superstar Jochen Hahn.

First the hard work, then it's play time, or in this case race time. Preparations for the new season are still underway in the truck racing teams' workshops. The first milestone is pre-season testing in the Czech city of Most, before the season kicks off in Misano at the end of May. As usual, Team Hahn Racing took part in the mid-April event. Even a seasoned pro like Jochen Hahn is itching to get back in the driver's seat after the winter break. The goal for the 2024 season is clear: "Jochen wants to be challenging for the title this year", says team boss Diana Hahn. She adds that the team has made a few modifications to the truck over the winter break.

Even before the season opener, the team has already had cause for celebration. Being able to rely on strong partners is especially important in motorsport. "We're delighted to once again have our loyal sponsor Knorr-Bremse on board as we challenge for this year's European Truck Racing Championship", says Jochen Hahn.

The European Truck Racing Championship (ETRC) is also continuing its voluntary commitment to become more sustainable. The race trucks will once more be powered by renewable HVO fuel (hydrotreated vegetable oil, a paraffinic diesel derived from hydrogenated vegetable oils). This reduces the vehicle engine's carbon footprint by up to 90 percent. And Team Hahn Racing is continuing to work on another exciting project, the electric race truck that it unveiled last year. "We've completed the first phase of the project and are now working with all our partners to begin phase two." So everything looks set for a thrilling season for motorsport fans and tech geeks alike.

Goodyear FIA ETRC – 2024 Calendar

1 Misano, Italy
May 25-26

2 Slovakia Ring, Slovakia
June 8-9

3 Zolder, Belgium
June 22-23

4 Nürburgring, Germany
July 13-14

5 Most, Czech Republic
August 31-September 1

6 Le Mans, France
September 28-29

7 Jarama, Spain
October 5-6

Remanufacturing instead of scrapping

FROM OLD TO NEW:
Remanufactured EconX® products make an important contribution to greater sustainability.

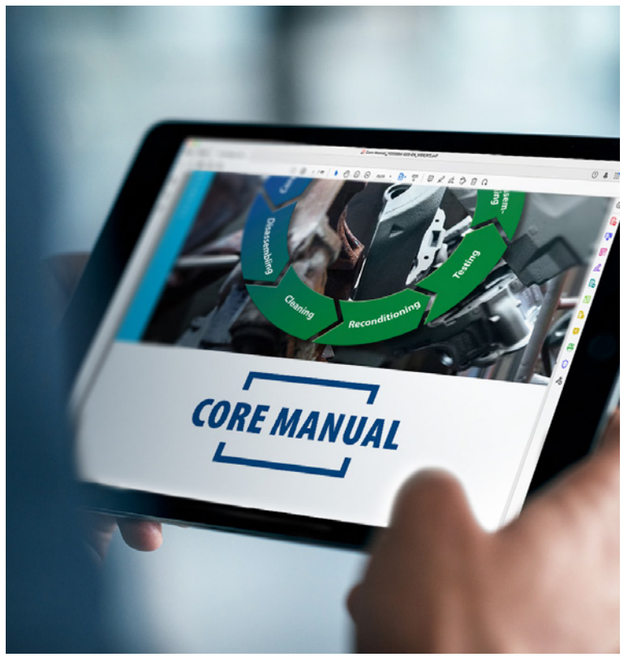
Knorr-Bremse has been producing the EconX® range at its Liberec facility since 2015. These industrially reconditioned used parts offer the same functionality and safety as new aftermarket products. The remanufacturing process can be made even more efficient by taking special care when returning used parts.

By remanufacturing used parts instead of scrapping them, Knorr-Bremse supports responsible use of natural resources. Remanufacturing saves energy and reduces CO_2 emissions and waste. Once reconditioned, the products remain in economic circulation. “Remanufacturing is an important means of cutting CO_2 emissions. Knorr-Bremse has been working for several years to optimize its products’ carbon footprint, not just while they are in use but also during their production”, explains Alexander Wagner, Vice President Aftermarket/TruckServices EMEA at Knorr-Bremse Commercial Vehicle Systems.

Wagner describes the key role of the Liberec remanufacturing facility in the Czech Republic. This is where Knorr-Bremse produces its EconX® range of remanufactured products that give used parts a new lease of life. "As well as reducing the carbon footprint of our production processes, remanufacturing allows us to offer attractively priced parts so that the cost of repairing a vehicle reflects its current market value. The EconX® range provides our customers with the same level of quality, functionality and safety as a brand new OE part", says Thomas Meyer, Director Reman and Resale EMEA. Patented cleaning and testing processes and state-of-the-art machinery ensure that the reconditioned spare parts meet OE product standards. Core management plays an especially important role in providing EconX® product quality.

"Core management is key to the high quality standards", explains head of core management, Vladimir Toman. A refund system ensures that used parts, known as "cores", are returned to Liberec. Dealers and service companies that buy a Knorr-Bremse disc brake, for example, pay a "used parts surcharge" that is refunded if the core is returned within a certain timeframe and meets the relevant quality requirements. Knorr-Bremse TruckServices has digitalized the entire process. All customers can now register for collection of cores by a logistics provider via the TruckServices customer portal, for example, and then tell the system they have a pallet of used parts waiting to be picked up.

INDUSTRIAL REMANUFACTURING involves complex cleaning processes and replacement of worn components.



KNORR-BREMSE TRUCKSERVICES OFFERS ADVICE on ensuring the quality of cores.

SPECIALLY-TRAINED COLLEAGUES check used parts for their suitability for remanufacturing.

In the core sorting center, specially trained workers check all the returned parts for corrosion, wear, damage, design condition and other signs of ageing. The materials from cores that no longer meet the required quality standard are recycled. "The remanufacturing rate could be even higher. It's really important for customers to follow the disassembly instructions. They can get these from our sales reps or download them from our customer portal", explains Vladimir Toman (see panel on p. XX). He stresses that while the remanufacturing process is completed at Knorr-Bremse's Liberec facility, it begins in the customer's workshop. "It makes a huge difference if the used parts are in good condition. This is key to optimizing the efficiency of the entire process and obtaining the refund of the used parts surcharge", he says. But parts are often damaged because they have not been properly handled after being removed from the vehicle.

Those that do meet the required quality standards are ready for remanufacturing. Each core is first disassembled into its component parts. They are all carefully cleaned, with any worn parts being rejected. Some components are reconditioned before reassembly. Defective electronic components must also be replaced, while software may need to be updated to the latest version. Reassembly follows similar processes to the production of new products – and in some cases is even carried out on the same assembly lines. Extensive end-of-line testing ensures that every EconX® part meets the required quality standard before being returned to the market in its distinctive blue packaging.

The meticulous remanufacturing process and exacting quality assurance system ensure that EconX® products have the same functionality as a new part in their second life. And customers can rest assured that there are no compromises on safety either. The only difference to a new product is a shorter remaining lifetime. Knorr-Bremse TruckServices EconX® products are also attrac-

tively priced. This makes them a good choice for servicing and repairing older commercial vehicles, as it means costs can be kept down in line with the vehicle's current market value. And they are also good for the environment. In 2023, Knorr-Bremse saved approximately 3,648 tons of CO2-equivalent through its remanufacturing business. That's the same amount of carbon that would be captured by a 333-hectare forest, roughly the size of New York's Central Park. Remanufacturing also allowed Knorr-Bremse to save 1,220 tons of material and reduce its primary energy consumption by 18,987 MWh. It would take 102,630 square meters or 14 soccer pitches of solar panels to generate that much power. "Every customer who returns cores to us is contributing to sustainable resource use and supporting efforts to build a net zero economy", concludes Vladimir Toman.

A KIND OF DEPOSIT SYSTEM helps bring used components back to the Liberec facility.

THE EconX® RANGE

The EconX® range now comprises over 1,000 products. It includes caliper units, EBS components, electronic air treatment units, compressors, oil separator cartridges and clutch actuators for trucks, buses and trailers. And the system is expanding – all the countries in western and central Europe and many in southeast Europe are now connected to it.

A STORAGE SYSTEM ENSURES that a maximum number of EconX® products is available to customers.

CORE RETURNS MADE EASY

Up2Date

- Technical hotline - Sweden, Finland, Denmark, Norway, Iceland (Y535352)
- Addition of the bearings offer (Y529695)
- Knorr-Bremse TruckServices Clutch Actuator (Y529427)
- NEO System Diagnostics – phase out (Y532055)
- Knorr-Bremse Diagnostics (Y531374)
- Trailer Diagnostics – iTEBS® X (Y531352)

The documents can be downloaded at

https://mytruckservices.knorr-bremse.com

Small but sophisticated

Knorr-Bremse's Aldersbach plant in Bavaria makes wheel speed sensors for trucks and trailers, producing millions of these successful products every year. By supplying them as single-source kits, Knorr-Bremse ensures that customers can install them easily, safely, and quickly. Although the delicate individual components call for a high-precision production process, the highly automated system takes just a few minutes to produce each batch of wheel speed sensors. The sensor is installed on the vehicle axle's magnet wheel. It uses changes in the magnetic field to measure the wheel speed, which it transmits to the brake control unit via a cable.

Step 1

Coil body production

1.

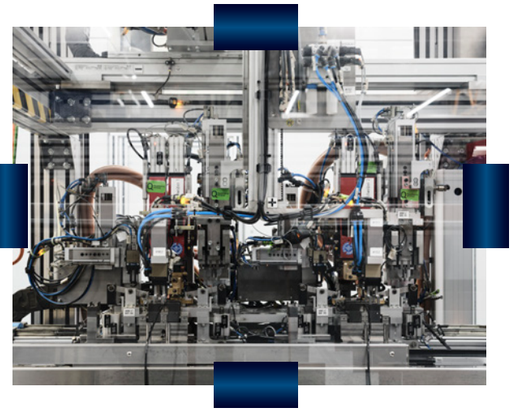
In the first part of the production line, base body, busbars, and winding wire are made into the five-centimeter-long coil body that forms the core of the wheel speed sensor. A conveyor belt feeds the individual components into the machine under the watchful eye of a production line worker. After positioning the busbars on the base body, the machine winds the winding wire around them countless times before spot-welding it in place. With a diameter of just a few micrometers, the copper wire is thinner than a human hair. The machine ensures that each coil is precisely aligned with the adjacent one and produces several coil bodies simultaneously. Finally, a metal cylinder is inserted into the coil body. This will be the magnet in the finished product, but it is only magnetized in the final step, as it would otherwise attract dirt particles during the production process. Each batch of coil bodies is encased in a protective plastic blister pack before leaving the machine.

THE PRODUCTION PROCESS combines the base body, busbars and wire for the coil bodies.

Step 2

Cable assembly

2.

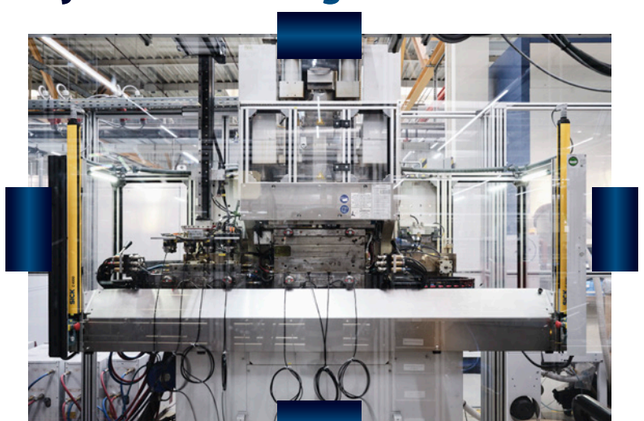


The coil body blister packs are brought to the second workstation manually. Once there, a production worker removes the individual components from the pack and places them in a workpiece holder. The worker also attaches cables for assembly in the machine which the holder then enters automatically. The machine strips the cables and prepares the cable ends for welding. In the vehicle, the signal voltage generated by the changes in the magnetic field caused by the rotation of the magnet wheel is sent to the brake control unit via these cables. Once the cables have been attached, a shuttle transfers the coil body to the injection molding machine.

Step 3

Injection molding

3.



The coil bodies enter the machine automatically and are placed in an injection mold where plastic is injected into the cavities in the workpiece. Since the coil bodies heat up to over 200 degrees Celsius during this step, they are left to cool for a few minutes before the final production step begins.

Step 4

Final assembly and testing

4.

Once cooled, the molded coil bodies have to be manually placed in another workpiece holder. The production line worker also connects the sensor head and cables to the machine so that it can test the wheel speed sensor's functionality at the end of this step. This machine, too, can process a batch consisting of several sensors at one time. First, the machine attaches an O-ring to the body and greases a metal bush. It then positions the O-ring and bush on top of the coil body and caulks this covering to create a form-fit connection with the workpiece. The bush protects the sensor head against mechanical damage and high temperatures when installed in the vehicle. Once the steel core has been magnetized, high voltage, signal voltage and resistance testing is carried out at the end of the production line to ensure that the finished product works properly. This extremely high-precision task can only be carried out by machine. The wire is so thin, for example, that it is almost impossible to detect breaks in the coil or faulty welds with the human eye. The machine checks each sensor individually to ensure that they all meet the highest quality standards. Finally, the sensor is laser-marked with a data matrix code containing its production data and serial number. It is then hand-packed ready for delivery.

Facts and figures

Knorr-Bremse produced over **2 million passive wheel speed sensors** in 2023.

Knorr-Bremse makes **about 150** different passive wheel speed sensor versions.

Knorr-Bremse has been producing passive wheel speed sensors made in Germany at its Aldersbach plant and engineered in Germany at its Munich development facility for over **10 years**.

In 2023, the Company also started making **active wheel speed sensors** on a separate line at Aldersbach. Fitted with a microchip, active sensors record the direction of rotation as well as the wheel speed. This gives them the ability to distinguish between forward and reverse travel, which is one of the reasons for which they are especially important for **highly automated driving**. They are also capable of self-diagnosis.

DESPITE HAVING ITS OWN VEHICLE MODELS, Quantron does not see itself as a traditional manufacturer, but rather as a provider of a zero-emission platform including a telemetry service and the sourcing of green hydrogen.

New prospects for the sector

Start-ups can bring a breath of fresh air to the transportation sector: a combination of agile innovation management and new ideas focused on specific products can deliver rapid results in many areas, including digital transformation and the introduction of revolutionary new drive systems. Bremspunkt takes a look at some examples that offer a potential new impetus to our sector.

A SIMPLE PAY-PER-USE MODEL is designed to facilitate the transition to net-zero mobility. Hylane sources the vehicles from a range of different manufacturers.

Truck fleets are currently experiencing dramatic changes, with environmental regulations, a lack of trained drivers and pressure to reduce costs forcing operators to look for ways of adapting to the new situation while still retaining their profitability. This is where start-ups can offer innovative business models, concepts and products to help companies weather the storm of technological change. Young companies can become innovation pacemakers for fleet operators and creative partners for vehicle manufacturers.

One such example is Hylane – which is rapidly establishing itself as a driving force behind climate-friendly road freight transportation. The Cologne-based start-up leases out commercial vehicles powered by fuel cells. According to Sales Manager Cara Kirchfeld and Senior Sales Manager Andreas Hewel, the company has always believed in taking a

Instead of

» We've always done it that way,

the attitude at Hylane is

Let's try something new! «

Cara Kirchfeld,
Sales Manager

Andreas Hewel,
Senior Sales Manager, Hylane

HYLANE AND CUSTOMERS SUCH AS GLS
have already put more than 40 fuel-cell trucks on the roads.

different approach. "Instead of 'We've always done it that way', the attitude is 'Let's try something new!' That is how start-ups can introduce new ideas into the sector. We didn't invent the fuel cell truck - but our aim is to significantly reduce the barriers to emission-free mobility," explains Hewel. Hylane uses suitable vehicles from a variety of manufacturers to offer a cross-segment portfolio as the basis of a simple pay-per-use model that transfers most of the cost risks related to the expensive drive technology – purchase, servicing, repair and residual value – to Hylane itself. Risk-taking rather than risk-avoidance is the name of the game. "We keep the vehicles for at least four years, without knowing how their residual value is going to develop. We can only tell that after the four years have elapsed," says Hewel. This willingness to take on risks is underpinned by Hylane's financially powerful parent company DEVK Insurance. "We are not concerned with short-term profitability – that is the long-term objective of our business plan. We are all about investing in sustainability," explains Kirchfeld. Nevertheless, she emphasizes that Hylane not only has a healthy parent company but also an offer that fits the market.

Quantron is another start-up that aims to help fleet operators transfer to emission-free trucks. "Our market offer fills the gap between innovative technology and mass production – effectively solving the chicken-and-egg problem of vehicle production and availability of the required infrastructure," explains company founder and CEO, Andreas Haller. "Our business model is based on a zero-emissions platform offering the customer a complete eco-system from a single source right across the entire value-chain – from clean energy, necessary infrastructure solutions and hardware, down to digital service and aftersales support such as telematics. Quantron offers all this in conjunction with a network of strong, globally significant partners," explains Haller. The company doesn't see itself as a competitor for traditional OEMs but rather as an independent platform provider that can embrace other truck brands as well as its own products.

Fernride also regards start-ups as drivers of innovation. This spin-off from Munich Technical University focuses on remote operation of trucks from a control center "We aim to transform fleets from manually-operated diesel-powered vehicles to autonomous, electrically-powered models. To achieve this we adopt a more pragmatic technological approach than other attempts to develop fully autonomous driving," explains Fernride's founder and CEO Hendrik Kramer.

» One of the challenges is to retain the elements that contributed to a company's original success as a start-up – a curiosity to develop innovations and question conventions. «

Peter Vaughan Schmidt,
CEO Torc Robotics

"Start-ups can offer the transportation sector new prospects of potential solutions and operational approaches," confirms Peter Vaughan Schmidt, CEO of Torc Robotics, a specialist in automated commercial vehicles. However he is quick to warn that, faced with such innovative prospects, companies have to keep their feet firmly on the ground. This, he says, can be ensured by working with customers, partners and advisors who have a thorough knowledge of the sectors involved. "From the very outset Torc has concentrated initially on developing the business model for autonomous driving and on understanding customers' needs before developing the technological solution. "It's easy for start-ups to dream up a product – the difficult part is developing one that is properly tailored to its customers' requirements. The key to our success is knowing exactly what our customers want and developing technologies that enhance their business," explains Vaughan Schmidt.

A zero-emissions platform for everyone

In 2011, Andreas Haller sold his first e-bus through Haller Nutzfahrzeuge and quickly identified the pitfalls involved in the technology. His efforts to improve the situation resulted in the creation of a network of like-minded people, and from this he developed an independent company – Quantron AG – as a high-tech spin-off of the Haller Group. Based in Gersthofen, Bavaria, the company now offers a range of fuel-cell propelled light and heavy commercial vehicles based on existing platforms from various OEMs. It also supplies green hydrogen and telemetry services. Haller aims to deploy 25,000 vehicles through Quantron by 2030. The company's first customer was Ikea Austria, but it also supplies Hylane. Altogether it has already delivered 200 zero-emission vehicles to customers. Founded in 2005, US start-up Torc Robotics (Tele-Operated Robotic Controls) has been a subsidiary of Daimler Truck since 2019. The company develops automated vehicles for safe, sustainable, long-distance transportation. Torc is currently developing a suitably scalable automation solution, with production slated to start in 2026.

FROM THE VERY OUTSET DESIGNWERK has focused on a range of truck systems including battery packs, and mobile (later-on also static) charging systems.

Fernride CEO Kramer also stresses the importance of strong partnerships: "Ambitious goals can be achieved much faster by working together. It is also important to incorporate solutions into operational activities at an early stage so that both parties can learn from experience. The sequence is: "develop, assess, learn". The faster one can go through each loop, the better." According to Kramer, this ensures high-speed development processes. Ultimately, the secret of Fernride's success is its strong focus on a single application and rigorous analysis of customer requirements. The next milestone on its way to that goal will be to commercialize and industrialize the Fernride solution and work with customers to upscale it. The company already appears to be well on its way to achieving this. Its expertise means it is part of the ATLAS-L4 project, launched back in 2022, which includes investigating Level 4 automated driving on rapid transit routes between logistics centers. The consortium is led by MAN, and Knorr-Bremse is also heavily involved in the project (see box on page XX). One statutory requirement of ATLAS-L4 is to develop a system of vehicle surveillance that enables a trained individual to take over remote control of an automated truck if necessary. The technology for this is contributed by Fernride.

Quantron's business plan is also highly ambitious. "We aim to achieve positive cash flow by early 2026," says the company's CEO. Currently, though, a round of financial negotiations is required to raise the necessary cash. Quantron is backed by strategic investors, green investment funds and other financiers. And according to Haller, the company also relies on stable partners and ensures consistent delivery by purchasing from at least two sources, so as to win investors' confidence. And when it comes to customers themselves having confidence in the Haller Group, he can point to the company's strong truck DNA: "With 140-odd years' experience in truck trading and service, we know exactly what they need." Fernride can offer customers similarly convincing credentials: "Our team's expertise is based on a decade of university research into automated driving as well as experience of the automobile industry itself," says Kramer. In addition, it holds many discussions to bring home to its customers the advantages of the technology.

Leasing net-zero mobility

Hylane GmbH is a spin-off from DEVK Versicherung. The company leases out fuel cell trucks on a pay-per-use basis, and has initially ordered 120 Hyundai Xcients, 42 of which are already in customer hands. In the medium term, it intends to operate a fleet of 300 FCE trucks. To complete the range, it recently chose Quantron and Iveco as suppliers of light commercial vehicles and fuel-cell tractor units. Initial customers include DB Schenker, Hermes, Spedition Koch, Henkel and dm-drogeriemarkt retail stores.

Despite the possibility of achieving economic success, these start-ups are focused on retaining their flexibility. "We are determined to remain an agile start-up with flat hierarchies that is capable of responding to changing customer needs and new market developments," says Cara Kirchfeld. It is an approach endorsed by Torc-CEO Vaughan Schmidt: "One of the biggest challenges as a start-up grows is how to retain the essence of what contributed to its success in the first place – a curiosity to develop innovations, question conventions and achieve ambitious goals. At the same time, achieving product maturity and scalability of production calls for robust systems, disciplined development and release processes and other stable operational conditions. Only by achieving this balance will the company grow beyond its start-up roots and develop into an innovative technology leader."

E-truck manufacturer Designwerk is currently involved in this process. When it was founded 15 years ago, the company was a pioneer in the truck e-mobility segment. But according to CEO Adrian Melliger, it is currently in the transition phase to becoming an industrial enterprise, with the Designwerk e-truck moving into series production at a consistent level of automotive quality. According to Melliger, the crucial boost to the company's success came with the acquisition of 60 per cent of its shares by Volvo Trucks. The Swedish company's strategic investment also strengthened Designwerk's credibility in the eyes of its customers. "We may no longer be a start-up," he says, "but we have remained creative." The art is to channel their many ideas and apply their creativity to actual road situations. Looking back, he confirms that "start-ups drive innovation and speed up processes. They take an open-ended and courageous approach to a task, focusing on the matter at hand and operating very swiftly."

For Melliger, the next milestone will come when Designwerk succeeds in doubling its turnover. But, he says, however successful a company may be, it is important to remain humble and vigilant. A lot can go wrong on the road to success, and even small errors can have serious consequences. Start-ups have no financial cushion to fall back on. "All the various teams – engineering, procurement, production and after-sales – have to develop at the same speed for a company to function

» Start-ups take a courageous approach to a task, focusing solely on the matter at hand and operating very swiftly. «

Adrian Melliger,
CEO Designwerk Technologies

DESIGNWERK MANUFACTURES E-TRUCKS for niche segments, operating as an extended workbench of investor Volvo Trucks

well." He, too, emphasizes the importance of strong partnerships. A start-up cannot develop all its capabilities in isolation. For example, in the case of Designwerk, its partner company Faun contributed crucial expertise in the field of municipal vehicles. And Volvo Trucks, as a strategic partner, provided help in terms of quality, product maturity and aftersales structures.

The latest developments confirm Melliger's assessment: Some apparently promising start-ups have already disappeared from the scene. Experience and an understanding of practical aspects are essential when looking for a partner amongst the many new companies in the transportation sector. In addition to innovative technology and sound promises, economically strong parent companies, prominent investors, secure supply relationships and credible reference customers are important indications of a potentially profitable collaboration. And finally, the start-up has to have the same mindset as its partner. "Fleet operators in a partnership should also be prepared to review their own processes," adds Kramer. Only then will that breath of fresh air be able to blow freely through the transportation sector and help it cope with the transformation process.

DAIMLER TRUCK SUBSIDIARY TORC ROBOTICS is trying out highly-automated driving on US motorways.

KRONE IS ONE OF FERNRIDE'S STRATEGIC PARTNERS. The two companies are currently working on developing an automated trailer.

» Fleet operators in a partnership should also be prepared to review their own processes. «

Hendrik Kramer,
CEO and founder of Fernride

Knorr-Bremse eCUBATOR: driving change

Since 2020, Knorr-Bremse has been using its in-house innovation unit eCUBATOR to conduct technology scouting, evaluate new business areas and drive forward innovations in the field of zero-emission mobility using particularly agile methods. The eCUBATOR is already bearing fruit, and has handed over numerous successful projects to the relevant business units within the company. These include, for example, the Electric Vehicle Motion Control (eVMC) software incorporated into the new GSBC electro-pneumatic braking system, which ensures that in an electrically-powered vehicle the motor is used for braking in generator mode and is geared towards maximum energy recuperation. Since its foundation, the eCUBATOR team has registered well over 100 patents, eight product solutions have been developed and more than 20 relevant product fields have been analysed and evaluated.

Efficiency and sustainability through remote operation

Fernride, a 2019 spin-off from Munich Technical University, focuses on 'human-assisted autonomy'. Remote operation enables an operator to take over control of autonomous, electrically-powered trucks in confined areas such as depots and ports. Several vehicles can be simultaneously monitored by a single operator and, if necessary, remotely controlled. Amongst others, Fernride technology is used for VW, HHLA and DB Schenker, to help combat a lack of trained drivers and improve the logistic sector's environmental performance and productivity. Fernride also has partnerships with vehicle builder manufacturer Krone, with which it intends to develop an automated trailer, and with Terberg, a manufacturer of terminal tractors.

FEDERN-SCHULZE FAHRZEUGTEILE opened its modern central warehouse in Boxdorf, near Dresden, in 2009. They always keep 50,000 parts in stock.

"Can't" isn't in our vocabulary

FROM VILLAGE BLACKSMITH TO SPRING MAKER AND AFTERMARKET DEALER: But Federn-Schulze still makes leaf springs for special applications.

CONSTANCE SCHULZE IS CO-OWNER OF FEDERN-SCHULZE FAHRZEUGTEILE ALONG WITH HER BROTHER, SEBASTIAN, and is also the head of FS Truckservice.

Air spring and brake manufacturer Knorr-Bremse has a long-standing partnership with spring and brake specialists Federn-Schulze Fahrzeugteile. The two companies have been working together since the 1990s. Federn-Schulze particularly values Knorr-Bremse's OEM know-how and the quality of its components.

"Can't" isn't in our vocabulary! But that isn't to say things aren't often difficult", says Constance Schulze, the co-owner of Federn-Schulze Fahrzeugteile along with her brother, Sebastian. Federn-Schulze always manages to find a solution, though. "We're troubleshooters, even if there are missing part numbers or we're dealing with a vintage commercial vehicle or agricultural machine", explains Sebastian Schulze. A long history going back to 1951 has allowed Federn-Schulze to build up the specialist know-how to tackle problems like this.

» People who buy parts also want them installed. «

Constance Schulze,
FS Truckservice

The company was founded in Wehrsdorf, in what was then East Germany, by the current owners' grandfather, village blacksmith Fritz Schulze. Over the years, he came to specialize in making car springs. But the winds of change that blew through Germany also brought change to the company. After the fall of the Berlin Wall, his son Bernd Schulze modernized the business, transforming it into a commercial vehicle aftermarket and service company. He also sought to improve customer service, opening a collection and delivery depot in Dresden in July 2006. This was followed in 2009 by a new building with a modern warehousing system at the Boxdorf business park near Dresden, which now serves as the central warehouse. When Bernd Schulze suffered a tragic accident in 2013, the reins were taken over by Constance and Sebastian Schulze. The parts business now has 30 employees, supplying customers across Europe as an aftermarket partner and also operating as an independent workshop.

Federn-Schulze operates out of its central warehouse in Boxdorf and two warehouses in Markersdorf and Crimmitschau that cover day-to-day demand. It offers up to three deliveries a day on weekdays, including a night delivery service, for service companies, transport companies with their own workshops, and dealers in Saxony, Brandenburg and parts of Thuringia. It even delivers to customers as far afield as the Czech Republic and Austria. In urgent cases, customers can collect their order themselves from the Boxdorf warehouse. Alternatively, Federn-Schulze will send out an extra vehicle to minimize customer downtime.

FEDERN-SCHULZE has relocated spring production to Markersdorf.

Federn-Schulze stocks around 50,000 parts with a total value in excess of a million euros. Knorr-Bremse components feature prominently in this stock – the spring, air spring and brake specialists have a long-standing partnership with air spring and brake manufacturer Knorr-Bremse. "We've been working with Knorr-Bremse since the start of the 1990s. I even did a work placement at Knorr-Bremse in Berlin in the early 2000s", says Constance Schulze. She adds that she learned a lot there and formed a personal bond with the Company. "We particularly value Knorr-Bremse employees' technical know-how, the personal relationships we've built up over the years, the quality of the parts and the excellent training programs", adds Sebastian.

In mid-2006, the aftermarket business was joined by the new service company FS Truckservice in Markersdorf. "People who buy parts also want them installed", explains Constance Schulze, who is also head of the service business. FS Truckservice is an Iveco contract service partner and also operates as an independent workshop. "We carry out maintenance and repairs on buses, trucks and trailers of all makes. Our customers expect this level of flexibility", says workshop boss Constance. FS Truckservice's eight employees get their customers' commercial vehicles back into top shape in the workshop's six service bays and two 18-meter service pits. They offer all the usual services for commercial vehicles and agricultural machinery, including accident repairs and work on electronics, electricals, hydraulics, tail lifts and tachographs. The business uses modern diagnostics and testing technology and also has axle and toe alignment equipment.

Today, the winds of change are once more blowing through Federn-Schulze. In the last two years, it has installed solar PV systems for two companies and is now in the process of training its first high-voltage service expert. But in spite of political change and the emergence of new drive types, there's still plenty of life in the spring-making business it all began with. It, too, has now moved to Markersdorf, where Federn-Schulze makes special springs and repairs leaf springs for agricultural machinery, trailers and vintage vehicles. "Customers want this kind of service when they can't get what they need off the shelf", says Sebastian Schulze. As his sister says, "Can't" isn't in Federn-Schulze's vocabulary.

THE CRIMMITSCHAU AND MARKERSDORF WAREHOUSES COVER DAY-TO-DAY PARTS DEMAND. There are at least two delivery runs a day to workshops, transport companies and other dealers.

» We value the expertise of the Knorr-Bremse specialists. «

Sebastian Schulze,
FS Truckservice

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