Knorr-Bremse Group

Annual Report 2013

KNORR-BREMSE

At a Glance

KNORR-BREMSE GROUP		2009	2010	2011	2012	2013
Sales	EUR mill.	2,761	3,712	4,241	4,300	4,303
Net income	EUR mill.	99	239	329	295	367
Employees (as per Dec. 31)*		15,613	18,053	20,050	19,120	20,833
Personnel costs	EUR mill.	641	721	805	861	907
Balance-sheet total	EUR mill.	1,664	2,194	2,530	2,615	2,869
Equity	EUR mill.	533	754	902	995	1,107
Capital expenditure**	EUR mill.	101	113	159	166	159
Depreciation**	EUR mill.	118	147	165	160	125
Incoming orders	EUR mill.	3,185	4,040	4,073	3,948	4,752
Research and development expenditure	EUR mill.	153	175	209	250	253

* Incl. HR leasing

**not including investments in financial assets

We are investing in the future.

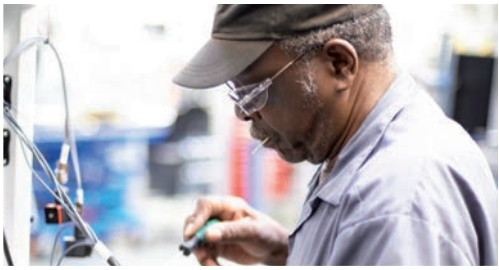
Australia
Granville

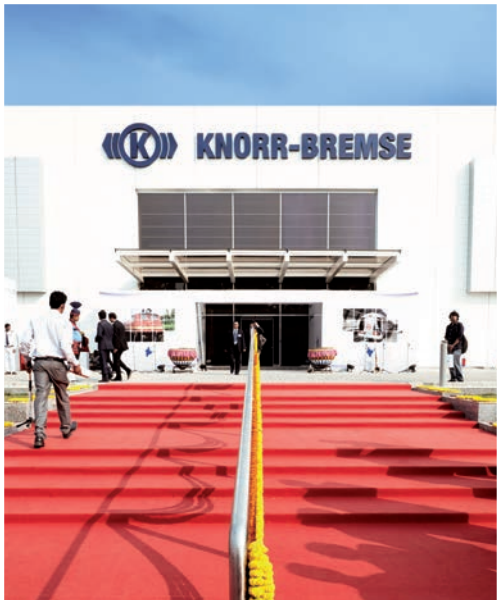
Brazil
Itupeva

India
Pune

With six newly opened plants, in 2013 the Knorr-Bremse Group continued its extensive investment program. Within this program the Company is investing in state-of-the-art production equipment and buildings around the world. The aim is to drive the strategic expansion and reinforcement of Knorr-Bremse's global development and production network in order to grow capacities and safeguard the Group's long-term future. Based on the principles of the globally applicable Knorr-Bremse Production System, the new factories comply with the highest international standards in terms of process organization, work efficiency, logistics and quality.





India
Palwal

Italy
Buccinasco

USA
Westminster

Overview

Report

Consolidated Financial Statements

2013 at a Glance

01

Nadia Thiele joins the board of the Knorr-Bremse Global Care association // Knorr-Bremse Global Care donates EUR 50,000 to the "Advent Calendar for Good Causes" campaign run by the Süddeutsche Zeitung newspaper

02

Spokesman of the Executive Board Dr. Lorenz Zwingmann welcomes Chinese Commercial Counsellor Tao Bialiang to Knorr-Bremse headquarters in Munich // Federal Cargo Company FGK and Knorr-Bremse set up a joint venture in Russia by the name of Knorr-Bremse 1520 // Knorr-Bremse supplies its first ever braking systems for light rail vehicles in China (Guizhou)

03

Knorr-Bremse publishes newly defined global uniform Leadership Principles // The in-house Knorr Excellence and Corporate Responsibility Awards are presented // The 2013 financial statements press conference is staged at headquarters in Munich // Knorr-Bremse's Munich plant is awarded the "audit berufundfamilie" certificate for its family-friendly HR policy // Chinese subsidiary Knorr-Bremse Rail Vehicles Suzhou Co., Ltd. concludes a strategic alliance with the CNR Group Dalian Locomotive and Rolling Stock Co., Ltd. // US senator Sherrod Brown visits Bendix at the company's headquarters in Elyria, Ohio, USA // Bendix manufactures the 400,000th ADB22X disc brake at its Bowling Green plant in Kentucky, USA

04

In Itupeva, Brazil, Knorr-Bremse inaugurates a state-of-the-art production plant where both commercial vehicle systems and rail vehicle systems are developed and produced // Knorr-Bremse equips diesel multiple units in the UK with LEADER driver assistance systems // In Kecskemét, Hungary, the cornerstone for a new Commercial Vehicle Systems plant is laid // Swedish subsidiary Knorr-Bremse Nordic Rail Services AB acquires Swedtrac, a local customer services provider for railways // Knorr-Bremse wins the elog@stics award 2013 for innovative concepts in the field of lean manufacturing of small series and one-off products.

05

Bernd Spies is appointed to the Executive Board of Knorr-Bremse Systeme für Nutzfahrzeuge GmbH // North American subsidiary Knorr Brake Company (KBC) opens its newly built Rail Vehicle Systems plant in Westminster, Maryland, USA // The 25-millionth disc brake comes off the production line at the Knorr-Bremse plant in Aldersbach // Bendix celebrates the 25th anniversary of its production plant in Acuña, Mexico

06

Microelettrica Scientifica opens its new headquarters in Buccinasco, Italy // Knorr-Bremse is voted "Best Brand in the Commercial Vehicle Sector" in the Brake category for the eighth time running // Global Knorr-Bremse Day takes place at all sites across the globe, themed in 2013 around the corporate value "Reliability" with a focus on product and process quality // US Consul General William Möller visits Knorr-Bremse in Munich // Knorr-Bremse supports victims of disastrous flooding in Germany

07

Dr. Michael Buscher is appointed Chairman of the Executive Board of Knorr-Bremse AG // Bosch, Knorr-Bremse and ZF found Alltrucks, a joint venture offering a new multi-brand workshop concept for commercial vehicles // As part of its focus on the topic of water, Knorr-Bremse Global Care supports the drilling of three wells in the Kitgum region of Uganda

08

Knorr-Bremse receives one of the largest single orders in the Company's history to equip the new Hitachi trains in the UK // The Japanese Deputy Minister of Transport, Ichiro Hao, visits the Knorr-Bremse plant in Berlin // Knorr-Bremse acquires Railcare, a provider of customer services for rail vehicles, specializing in maintenance

09

Rating agencies Standard & Poor's and Moody's reaffirm their outstanding ratings for the Knorr-Bremse Group // The truck air brake celebrates its 90th anniversary // A new high-tech showroom is opened at Knorr-Bremse's Chinese Rail Vehicle Systems plant in Suzhou // The Knorr-Bremse plant in Lisieux, France celebrates its 20th anniversary

10

Jochen Hahn, who prolonged his sponsorship agreement with Knorr-Bremse in the summer of 2013, wins his third FIA Truck Race European Championship title in succession

11

Knorr-Bremse expands its production capacities in India in both the rail vehicle and commercial vehicle sectors and opens two new production plants in Palwal and Pune, as well as a joint development center // Chinese subsidiary Knorr-Bremse Asia Pacific (Holding) Ltd. in Hong Kong and the non-profit association Knorr-Bremse Global Care donate EUR 100,000 for the victims of the typhoon on the Philippines

12

Knorr-Bremse inaugurates its new production plant for braking, entrance and HVAC systems in Granville, Australia

The Executive Board of Knorr-Bremse AG

Dr. Lorenz Zwingmann
Spokesman of the Executive Board
(until June 30, 2013)

Dr. Dieter Wilhelm

Dr. Michael Buscher
Chairman of the Executive Board
(from July 1, 2013)

Klaus Deller

The Supervisory Board of Knorr-Bremse AG

Georg Weiberg
Stuttgart (since November 7, 2013)
Retd. Head of Development, Daimler Trucks

Heinz Hausner*
Salzweg
Representative of the IG Metall Trade Union, Passau Office

Hans-Georg Härter
Salzweg
Former Chairman of the Executive Board of ZF Friedrichshafen AG

Günter Wiese*
Berlin
Full-time Chairman of the Works Council of Knorr-Bremse Systeme für Schienenfahrzeuge GmbH, Berlin plant

Dr. Wolfram Mörsdorf
Essen
Retd. Member of the Executive Board of Thyssen-Krupp AG

Dr. Eduard Gerum*
Rosenheim
1st Deputy Chairman, Consultant to the Executive Board of Knorr-Bremse Systeme für Nutzfahrzeuge GmbH

Heinz Hermann Thiele
Munich
Chairman,
Entrepreneur

Manfred Wennemer
Bensheim
2nd Deputy Chairman,
Former Chairman of the
Executive Board of
Continental AG

Wolfgang Hubert*
Munich
Representative of the disabled, Chairman of the Works Council of Knorr-Bremse Systeme für Schienenfahrzeuge GmbH, Knorr-Bremse AG, KB Media GmbH, Knorr-Bremse IT-Services GmbH

Wolfgang Tölsner
Uetersen
(since March 8, 3013)
Management consultant

Dr. Martin Kimmich*
Munich
Assistant Representative of the IG Metall Trade Union, Munich Office

Werner Ratzisberger*
Munich
Project engineer mechanical surface treatment, Knorr-Bremse Systeme für Nutzfahrzeuge GmbH

Dr. Michael Buscher
Meilen/ZH Switzerland
(until June 30, 2013)
Chairman of the Executive Board of Knorr-Bremse AG

Dr. Hans-Peter Binder
Berg
(until March 8, 2013)
Retd. Member of the Board of Management of Deutsche Bank AG, Munich Branch

* Employee representative

Report of the Supervisory Board

In the course of fiscal 2013, the Supervisory Board concerned itself in detail with the state and development of Knorr-Bremse AG and all Group companies.

Along with important individual transactions and human resources decisions, this also included consideration of fundamental aspects of strategic direction and corporate planning. In addition, the Supervisory Board received regular reports from the Executive Board either in the course of its meetings or in written or oral form regarding the commercial and financial development of the Company, as well as its risk situation and risk management. The Supervisory Board examined important individual transactions as well as deciding on items of business that required its approval either by law or in line with Company statutes. The information and analyses upon which the decisions of the Supervisory Board were based were discussed and assessed in depth together with the Executive Board. In order to comply with the requirements of the German Accounting Law Modernization Act in terms of corporate governance, a second meeting of the Financial Statements Committee was held in mid-year. At its meetings, the Financial Statements Committee dealt in particular with the supervision of the accounting process, the efficacy of the internal controlling system, the risk management system and the internal audit system, as well as the work of the auditors.

In fiscal 2013 the Knorr-Bremse Group again posted sales of well over EUR 4 billion. Against the backdrop of negative currency effects, sales remained stable at EUR 4.30 billion (2012: EUR 4.30 billion) but showed 3% growth in real terms. The Rail Vehicle Systems division offset downturns in other regions through growth in Europe and Asia. The Commercial Vehicle Systems division benefitted from the positive development of the commercial vehicle markets in Europe and South America in particular.

To safeguard the future development of the Company, in 2013 Knorr-Bremse continued to invest in the strategic development and expansion of its production plants. In the year under review, a new plant for both divisions was opened in Itupeva (Brazil). Also in 2013, a new Rail Vehicle Systems plant in Westminster (USA) and the new corporate headquarters of Microelettrica in Buccinasco (Italy) were opened. In India, Knorr-Bremse celebrated the inauguration of two new production plants: in Pune for the Commercial Vehicle Systems division and in Palwal for the Rail Vehicle Systems division. Directly alongside the new plant in Pune, the Knorr-Bremse Technology Center India (TCI) hosts activities for both divisions. A new production plant for both divisions was opened in Granville (Australia).

In addition to organic growth, the year under review saw corporate strategy continue to focus on targeted acquisitions and joint ventures with the aim of optimizing the product portfolio. By way of example, in Russia a joint venture for rail vehicle brake technology was established together with Federal Cargo Company FGK, with a new production plant slated to open in 2014. The Alltrucks company founded together with Bosch and ZF is based in Munich and offers a new workshop concept for commercial vehicle service outlets. In the Rail Vehicle Systems division the acquisition of Swedtrac in Sweden and the contribution of the recently acquired Railcare to the newly founded Knorr-Bremse RailServices UK in the United Kingdom are expanding the customer service portfolio in respect of rail vehicle maintenance, repairs and overhauls.

While posting a similar level of sales, the Company continued to assign top priority to safeguarding the highest quality standards in all of its products, processes and structures. This was ensured not only through the quality processes in place across the Group but also through targeted employee development. Thus, in 2013, Knorr-Bremse was awarded the "audit berufundfamilie" certificate by the German Federal Minister of Family Affairs. This award confirms that Knorr-Bremse facilitates combining a career and family life, making a targeted effort in the interests of its employees.

The 2013 Financial Statements and the Management Report on Knorr-Bremse AG, the 2013 Consolidated Financial Statements and the Management Report on the Knorr-Bremse Group drawn up by the Executive Board, and the Company's accounts were examined by the auditors elected by the Annual Shareholders' Meeting, KPMG AG Wirtschaftsprüfungsgesellschaft, Munich, and endorsed with their unqualified opinion dated March 3, 2014.

The Financial Statements Committee and the full Supervisory Board also examined the Financial Statements for fiscal 2013, the Management Report, the proposed allocation of unappropriated retained earnings, and the Consolidated Financial Statements and Management Report of the Knorr-Bremse Group. In accordance with the final findings of the Financial Statements Committee and the Supervisory Board, no objections were raised. At its meeting on March 14, 2014, the Supervisory Board approved the 2013 Financial Statements, which thereby became legally binding. The Supervisory Board concurs with the Executive Board's proposal for the allocation of unappropriated retained earnings. The Consolidated Financial Statements were also approved.

The auditors attended the meeting of the Financial Statements Committee on February 28, 2014 as well as the financial statements meeting of the Supervisory Board on March 14, 2014, reported on their key findings and answered outstanding questions.

KPMG AG Wirtschaftsprüfungsgesellschaft, Munich, also examined the Executive Board's report on relations with affiliated companies, drawn up in line with § 312 German Corporation Law (AktG). The auditors endorsed this report with the following opinion:

"Having audited and assessed this report in accordance with professional standards, we confirm that: 1. The factual contents of the report are correct. 2. The consideration furnished by the Company in the legal transactions set out in the report was not unreasonably high."

The Supervisory Board also examined the Executive Board's report on relations with affiliated companies and has no objections to the concluding statement by the Executive Board or to the auditors' findings.

Effective March 8, 2013, Dr. Hans-Peter Binder stepped down from his position on the employer's side of the Supervisory Board of Knorr-Bremse AG. Since 1987 Dr. Binder has made a substantial contribution to the positive development of the Company. In particular, his contribution to the successful conclusion of the restructuring phase in the 1980s merits special mention. On behalf of Knorr-Bremse AG, the Supervisory Board wishes to thank Dr. Binder most sincerely for helping to shape the success of Knorr-Bremse.

The vacancy left by Dr. Binder on the employer's side of the Supervisory Board of Knorr-Bremse AG was filled on March 8, 2013 by Wolfgang Tölsner. Mr. Tölsner has amassed many years of international experience in the field of industry and commerce. In particular his expertise in the field of railway engineering and rail vehicle production will benefit the future work of the Board.

In addition, on June 30 and November 4, 2013 respectively, Dr. Michael Buscher stepped down from his seats on the employer's side of the Supervisory Board of Knorr-Bremse AG and the Supervisory Board of Knorr-Bremse Systeme für Schienenfahrzeuge GmbH. This was due to him taking up his new position as Chairman of the Executive Board of Knorr-Bremse AG on July 1, 2013.

Effective November 7, 2013, Dr. Buscher was succeeded on the employer's side of the Supervisory Board of Knorr-Bremse AG by Georg Weiberg who, on the same date, also became a member of the Supervisory Board of Knorr-Bremse Systeme für Nutzfahrzeuge GmbH. As an expert in the commercial vehicle sector who can look back on more than 40 years of experience, in the future Mr. Weiberg will be bringing his extensive technical and entrepreneurial experience to bear in the best interests of Knorr-Bremse.

On January 1, 2014 Dr. Martin Kimmich left the employees' side of the Supervisory Board of Knorr-Bremse AG. Furthermore, with effect from the end of January 2014, Heinz Hausner also left the employees' side of the Supervisory Board of Knorr-Bremse AG. On behalf of Knorr-Bremse AG, the Supervisory Board wishes to thank Dr. Kimmich and Mr. Hausner for their contributions to the work of the Board.

Munich, March 14, 2014

The Supervisory Board

Heinz Hermann Thiele,
Chairman

Management Report

In fiscal 2013, the Knorr-Bremse Group again reported global sales of more than EUR 4 billion. Against the backdrop of negative currency effects, sales remained stable at EUR 4.30 billion (2012: EUR 4.30 billion). Moderate first-half sales were offset by stronger performance in the second half-year. Reflecting positive market developments, incoming orders were up against the previous year in all regions, reaching a record level of EUR 4.75 billion.

Combined Management Report Knorr-Bremse AG and Group

About the Group

An overview of the Knorr-Bremse Group

The Knorr-Bremse Group is the world's leading manufacturer of braking systems for rail and commercial vehicles. For more than 100 years now the Company has pioneered the development, production, marketing and servicing of state-of-the-art braking systems. Other lines of business in the rail vehicle systems sector include entrance systems, HVAC systems, control components and windscreen wiper systems, platform screen doors, friction material, simulators and driver assistance systems. In the commercial vehicle systems sector, the product range includes complete braking systems with driver assistance systems, as well as torsional vibration dampers and powertrain-related solutions, and transmission control systems for enhanced energy efficiency and fuel economy.

The structure of the Knorr-Bremse Group is based on the regions Europe, North/South America and Asia/Australia, and the development of the Group is geared to meeting the specific requirements of the markets and customers in these regions.

This regional organizational structure is designed to offer globally active customers uniform technical platforms which at the same time take specific local needs into account. It also ensures that customers who operate on a regional basis are supplied with globally proven systems and components.

Business report

General economic and industry-related backdrop

The global economy showed moderate growth in 2013, with low growth in the industrialized nations and medium single-digit growth in the emerging economies.

The worldwide market environment for rail vehicles showed a slight improvement over the prior year.

Following a downturn in 2012, overall the commercial vehicle markets returned to growth. Global output of air-braked trucks with a gross vehicle weight of 6t and over was 6.3% up in 2013 (2012: -12.8%).

Europe

Overall, the rail vehicle market in Europe remained at its prior-year level. The various national markets largely developed in line with the general economic trend in the respective country. In Spain and Italy in particular, however, which were still feeling the effects of the financial market crisis, a shift toward stability was evident, while in Germany and France there was a slight improvement in the state of the market. The rail vehicle market in the UK, by contrast, experienced a modest downturn.

Truck production in Europe moved ahead 7.3% in 2013 following an 8.1% downturn in 2012. The European commercial vehicle market benefited from advance purchases driven by the pending introduction of the Euro VI standard at the beginning of 2014.

North America
Demand for rail vehicles in North America was largely at the prior-year level. While demand for freight cars fell, the passenger coach sector provided positive impetus. Demand for locomotives remained stable.

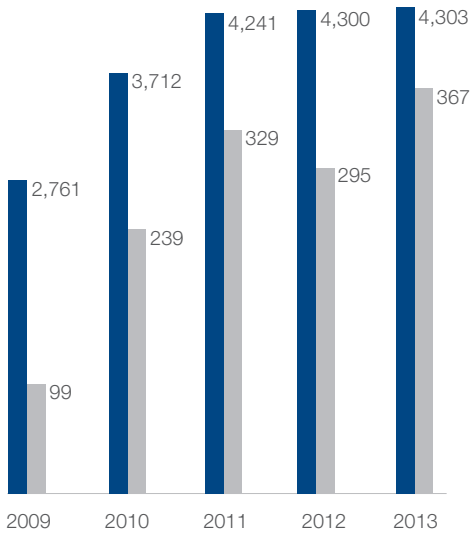
Truck production in North America was down 7.7% against a prior year that had seen 4.4% growth.

South America
In the South American rail vehicle sector, demand for freight cars remained steady at a low level, while demand for passenger coaches declined.

Truck production in South America was 40.9% up in 2013 against a backdrop of government subsidy programs (2012: -35.4%).

Asia/Australia
The rail vehicle markets in Asia/Australia benefitted above all from the second-half recovery of the Chinese high-speed sector. Positive impetus was also generated by the light rail vehicle, metro and locomotive segments in China.

In Asia/Australia, and in China in particular, the commercial vehicle market staged a recovery in 2013, with truck production 7.9% ahead of the prior year (2012: -15.7%). However, the market still remained 17.6% below the record production level of 1,787,000 units achieved in 2010.



Sales and net income for the Knorr-Bremse Group
in EUR millions

Sales Net income

Development of the Knorr-Bremse Group in 2013

Developments by region and division

Europe

Rail Vehicle Systems

In the year under review, Knorr-Bremse was able to further enhance its strong market position in Europe by securing some important orders.

By way of example, Knorr-Bremse received an order from vehicle builder Hitachi Rail Europe to supply the complete braking system for the first 600 units of the new Class 800 series for the UK. The package includes the EP Compact electronic brake control system, bogie equipment and the air supply system using the oil-free compressor. The Class 800 units are Intercity trains with a top speed of 200 km/h. The impact on sales will probably extend from 2014 to 2017.

Commercial Vehicle Systems

As in past years, in 2013 disc brakes and electronic braking systems were the key sales drivers for the Commercial Vehicle Systems division in Europe. The year under review also brought further reinforcement for the division's future business. By way of example, a long-term agreement running until 2019 and covering the full product portfolio was concluded with a major European commercial vehicle builder, with whom a far-reaching strategic alliance was also agreed.

As a result of Knorr-Bremse's technological expertise, in the year under review another long-term agreement was concluded with a further major European commercial vehicle manufacturer governing the next generation of the electronic braking system (EBS) and running until 2020. These agreements will form the basis of further market penetration founded on the systems expertise and innovative power of Knorr-Bremse.

In the trailer segment too, Knorr-Bremse scored a major success in 2013, securing a framework agreement with SAF-Holland for the supply of type SK7, ST7 430, SN6 and SN7 disc brakes that runs until December 31, 2015.

North America

Rail Vehicle Systems

Business in North America remained stable in the year under review. Major orders were obtained primarily in the metro segment.

In the context of the further expansion of the Los Angeles metro, Knorr-Bremse subsidiary Knorr Brake Company LLC is supply the braking, entrance and HVAC systems for 175 cars that are being built by Kinki Sharyo. The order comprises both the taking up of existing options and additional vehicles. Initial subsystems for prototypes were already supplied at the end of 2013 and the beginning of 2014.

Further successes in the metro segment were achieved in Washington and Miami. Knorr Brake Company LLC is to supply the braking and HVAC systems for 164 7K-series cars being built by Kawasaki and ordered by the Washington Metropolitan Area Transit Authority (WMATA). WMATA also holds options on a further 220 cars from the 7K series. For the Miami metro, 136 cars being built by AnsaldoBreda are to be fitted with HVAC systems. Deliveries of these systems will begin in 2014 and be completed by 2017.

Supplying equipment for freight cars is a major pillar of the business of New York Air Brake Company. In 2013, the company supplied over 20,000 DW-60 control valves for freight cars, including 7,000 for Trinity Rail Group.

Commercial Vehicle Systems

Knorr-Bremse's North American business is handled by its subsidiary Bendix Commercial Vehicle Systems LLC, Elyria, Ohio (USA) under the Bendix brand.

In August 2013, the scope of the Reduced Stopping Distance mandate in the USA was extended. The legislation governs the maximum permissible stopping distance of commercial vehicles. Bendix expects this to generate additional sales of disc brakes and in November of the year under review already concluded an agreement with Kenworth Trucks governing the supply of the ADB22X disc brake for the manufacturer's Class 8 vehicles.

Also in 2013, Knorr-Bremse responded to the more rigorous requirements for fleet data recording in the USA. April saw the launch of the SmarTire Trailer-Link TPMS system which continuously monitors the pressure and temperature of each tire, providing real-time status information to the driver.

Constant fluctuations resulted in an overall truck build decline for the period under review, which was offset by a robust aftermarket.

South America

Rail Vehicle Systems

The surge in investment anticipated as a result of the pending World Cup in Brazil and the Olympic Games in Rio de Janeiro largely failed to materialize, leaving the market stagnating at its prior-year level. Knorr-Bremse is nevertheless participating in major projects in the mass transit sector. The Company is supplying braking and entrance systems for the new trains on Line 4 in São Paulo as well as braking and HVAC systems for the trains on Line 5. In Rio de Janeiro, Knorr-Bremse will also be supplying braking, entrance and HVAC systems for the new metro cars.

Commercial Vehicle Systems

The commercial vehicle sector witnessed a 40% surge in production output compared to the previous year. In part this was due to a catch-up effect following the reticence of buyers in 2012 in view of the introduction of the more stringent Euro V emissions standard. At the same time, 2013 brought the introduction of a regulation whereby 40% of commercial vehicles in Brazil must be equipped with ABS anti-lock brakes. Against this positive backdrop, Knorr-Bremse was able to increase its market share in South America in 2013.

Asia/Australia

Rail Vehicle Systems

Given the positive development of several sub-markets, particularly in the second half-year, Knorr-Bremse was able to maintain the success of its business in Asia/Australia.

In China, there were major successes to report: the Rail Vehicle Systems division is to supply brake equipment for 486 high-speed trains as well as entrance and HVAC systems for some of the car-sets. The volume of business for the Knorr-Bremse Group totals approximately EUR 500 million. These orders will impact on sales in 2014 and 2015.

Knorr-Bremse will also be supplying the braking systems for approximately 1,000 locomotives being built by Chinese manufacturers, CSR Zhuzhou Electric Locomotive (CSR) and CNR Dalian Locomotive (CNR). In the coming years, the two OEMs will be delivering the locomotives to the state-owned railway company of the People's Republic. The biggest single order from CNR involves equipment for 268 Type HXD3C six-axle 7,200 kW electric locomotives and the biggest from CSR ZELC is for 260 eight-axle 9,600 kW locomotives.

Finally, for the first time Knorr-Bremse was also able to win several orders in the light rail vehicle (LRV) segment in China. The Company is to supply hydraulic braking systems and entrance systems for 18 LRVs for Line 1 in Suzhou. Knorr-Bremse is also supplying the braking systems for twelve low-floor LRVs being built by AnsaldoBreda for the coastal city of Zhuhai.

Further market successes recorded in the Asia/Australia region included the supply of braking systems for 57 three-car units being built by Hyundai Rotem for the metro in the Indian city of Hyderabad. Knorr-Bremse also won a ground-breaking order in Australia, where the Company is supplying its Driverless LEADER system to enable the operation of driverless trains by Australian mining company Rio Tinto.

Commercial Vehicle Systems

In the year under review the Chinese joint venture CAFF Systems for Commercial Vehicles Chongqing Ltd. was appointed exclusive supplier of air disc brakes for the heavy-duty tractor platform of SAIC-IVECO HONGYAN Commercial Vehicle Co., Ltd. (SIH). SIH is a joint venture between SAIC-IVECO Commercial Vehicle Investment Co., Ltd. and Chongqing Machinery & Electronics Holding (Group) Co., Ltd., which mainly builds trucks for the Chinese market.

Also in 2013, Knorr-Bremse Commercial Vehicle Systems China was able to conclude an agreement with the second largest light-duty truck manufacturer in China, JAC, governing the exclusive supply of ABS anti-lock brakes for JAC's newly developed light-duty truck platform.

In a challenging market environment, Knorr-Bremse won an important order from Daimler in India, where the Company is to supply pneumatic braking systems for the new heavy-duty platform designed for the Asian and African markets. The brakes are to be manufactured at the newly opened Knorr-Bremse production plant in Pune.

In 2013, Knorr-Bremse was able to access the market for safety systems in South Korea. The Company is supplying both the autonomous emergency brake system (AEBS) and the lane departure warning system (LDWS) for the newly developed HMC bus from Hyundai.

Acquisitions, additions and joint ventures

In February 2013, Knorr-Bremse and Federal Cargo Company FGK, a subsidiary of Russian Railways RZD, established a joint venture in Russia by the name of Knorr-Bremse 1520 OOO, Burashevskoe. The new company is to manufacture rail vehicle brake technology products for use in Russia and other CIS states.

In April 2013, Knorr-Bremse Nordic Rail Services AB, Lund, Sweden, acquired SWT Swedtrac Sverige AB, Solna, one of the country's largest independent vehicle maintenance companies. With two rail service depots in Sweden, Swedtrac offers its customers an extensive range of services. Through this acquisition, Knorr-Bremse is reinforcing its market position in the rail services sector in Northern Europe.

In July 2013, the three leading automotive and commercial vehicle suppliers – Robert Bosch GmbH, Knorr-Bremse Systeme für Nutzfahrzeuge GmbH and ZF Friedrichshafen AG – founded Alltrucks GmbH & Co. KG, a joint venture based in Munich to serve as the base for a new service concept for commercial vehicle workshops.

In August 2013, the Group's UK subsidiary Knorr-Bremse Rail Systems (UK) Ltd. acquired the operations of the old-established Railcare company in England by way of an asset deal. The new company created to this end, Knorr-Bremse RailServices (UK) Ltd. based in Melksham, is active in the field of rail vehicle overhauls.

At the end of August, Knorr-Bremse RUS OOO, Nizhny Novgorod, Russia, was merged with Knorr-Bremse Systems for Commercial Vehicles OOO, Moscow, Russia. As a result, sales activities for the Russian market and production operations in Nizhny Novgorod are now both controlled from Moscow.

In addition, in October 2013, Knorr-Bremse Raylı Sistemler Turkey Sanayi ve Ticaret Limited Şirketi, was founded in Ankara, Turkey. The primary purpose of the company is to provide servicing, overhaul and maintenance work on rail vehicle braking, entrance and HVAC systems.

Overall, these acquisitions had no substantial effect on the assets, financial status and profitability of the Knorr-Bremse Group in fiscal 2013.

Major projects

In 2013, Knorr-Bremse continued its rigorous strategy of localizing production by creating production capacity in its various markets. Aligned with its regional approach, this enabled the Group to further enhance its global market position in a number of business areas, helping to safeguard its commercial success.

In the year under review, Knorr-Bremse was able to complete the construction of numerous new production facilities and thereby boost its existing high standards of production.

In April 2013, Knorr-Bremse opened a new state-of-the-art plant for rail vehicle and commercial vehicle systems in Itupeva, Brazil. Hosting development, production and sales, the Itupeva facility comprises 32,000 m^2 of floor space and boosts capacity by approximately 30%. It replaces the former plant in São Paulo, some 80 kilometers away, which had reached the limits of its capacity as a result of high growth rates in recent years.

The new Rail Vehicle Systems plant in Westminster, Maryland, USA was inaugurated in May. At the new facility almost 300 employees will be employed in development, production and sales of modern system solutions for rail vehicles.

In June 2013, the new Microelettrica headquarters was opened. The new premises bundle the activities of four separate former facilities and bring all of Microelettrica's production activities under one roof in Buccinasco, near Milan, Italy.

Knorr-Bremse is further expanding its presence in India and in November opened not only a new Commercial Vehicle Systems plant in Pune but also a new Rail Vehicle Systems plant in Palwal, along with a shared development center also located in Pune.

December saw the inauguration of the new plant in Granville, Australia, which also brings together four former facilities from both divisions.

In all, this represents a total of some 2,600 employees who now benefit from new, state-of-the-art workplaces.

Also in December, a new employee car park with over 600 parking spaces was opened at Group headquarters in Munich.

Quality and processes

Knorr-Bremse continues to target best-in-class processes as the foundation on which its competitive capabilities are based. In 2013, quality, processes and structures were again reviewed and enhanced.

For many years now, Knorr-Bremse has been bundling initiatives designed to drive the continuous improvement of its business processes within the Knorr Excellence (KE) business model, which has been rolled out

across the Group. In this context, the Company has brought together all process optimization initiatives from across the divisions and merged its management systems within a single, harmonized process model. As a result, KE forms a common platform within the Group that boosts the transparency of the business processes and enhances communications.

To underline the great importance of quality and processes, in the year under review a special one-day event dedicated to this topic was staged at all Knorr-Bremse sites worldwide. At the heart of Knorr-Bremse Day 2013 were a variety of workshops themed around quality. In 2013 numerous activities were again launched within the Quality First initiative, aimed at improving product quality, boosting process efficiency, continuing employee development and increasing customer satisfaction.

By organizing supplier days Knorr-Bremse has also intensively involved its suppliers in quality improvements and ensured their further integration into the ongoing quality program. Supply chain partnerships were expanded and the quality of outsourced components was further enhanced. By opening new plants and introducing the latest production technology – not least in Brazil, India, the USA and Australia – Knorr-Bremse is fostering a sustained improvement in quality and internal processes. As part of the KE management system, work focused on the harmonization and standardization of internal processes. Internal quality audits that were conducted worldwide examined and enhanced the implementation of quality management at the Group, as confirmed in the course of external IRIS and TS 16949 certification audits.

In the context of product safety management, special training courses were staged at the production plants in order to ensure strict compliance with quality and safety standards for all safety-critical systems and products. This was accompanied by on-site product safety audits and/or product safety reviews in the course of product development and verification. This provided ongoing support for the Company's zero-defect strategy. To further improve process quality, the worldwide rollout of VDA 6.3/IRIS audits was also driven forward. Implementation of the auditing measures was systematically pursued, thereby ensuring a process of continuous improvement.

Research and development

As a technology group, Knorr-Bremse continued to drive forward its research and development efforts in the year under review in close collaboration with its customers. Total expenditure on research and development and project planning amounted to EUR 252.5 million in 2013 (2012: EUR 249.7 million), which equates to 5.9% (2012: 5.8%) of consolidated sales.

As the global technology leader in the fields of braking systems for rail and commercial vehicles, Knorr-Bremse develops innovative products distinguished by their safety, high quality, reliability and customer benefits. This applies in equal measure to the other fields covered by the product portfolios of the Rail Vehicle Systems division (entrance systems, HVAC systems, driver assistance systems, control components and platform screen doors) and the Commercial Vehicle Systems division (driver assistance systems, torsional vibration dampers and other powertrain-related components, such as PBS and transmission control systems).

In 2013, research activities in the rail vehicle sector focused among other things on expansion of the product portfolio through the development of innovative service solutions in the rail services sector. Through the acquisition of SWT Swedtrac Sverige AB and Railcare, Knorr-Bremse was able to extend its range of products and services and thereby meet the needs and expectations of its customers even more effectively. One core element here is the additional offering of more complex service packages from a single source.

Through Knorr-Bremse 1520, the newly founded joint venture between Knorr-Bremse and Federal Cargo Company FGK, a subsidiary of Russian Railways RZD, the Company is in a position to immediately step up its local production of products for the CIS states. The innovative KAB60 control valve was fully approved in 2013 and launched on the CIS market. In addition, the new AKb1 load-dependent brake valve is currently undergoing trials in collaboration with RZD, with market launch scheduled for 2015.

Other major new developments include an enhanced entrance system from Knorr-Bremse subsidiary IFE. In the course of 2014 and beyond, the entire Wiener Linien light rail vehicle fleet in Vienna, Austria is to be refurbished with the newly developed entrance system from IFE.

In the commercial vehicle sector, development activities in the year under review focused on driver assistance systems. This segment will remain a focus of activity as such systems are set to become mandatory in Europe in 2015. Initial customer orders in this field were successfully acquired. Numerous electronic systems from the existing product portfolio were brought to series production with additional customers, including EAC for DAF, ELC for Irisbus, EBS for Ford Otosan, and the new ABS8 generation for Mercedes. In the non-electronic product segment too, Knorr-Bremse launched impressive innovations, as evidenced by the start of production of the large two-cylinder ESS compressor for Volvo, or the complete pedal unit, also for Volvo.

In line with Knorr-Bremse's regional strategy, in 2013 the proportion of the Group's development capacity located in countries such as India and China was further increased. In India, for example, the Knorr-Bremse Technology Center India (TCI) was opened, providing development services for both divisions. In total, the number of employees in the field of research, development and project planning worldwide showed a rise over the previous year.

Consolidated research and development expenditure in EUR millions

Social responsibility and sustainability

Entrepreneurial activity and commercial and technical progress are closely linked with social and societal responsibility. As a long-standing family firm with a history stretching back over a century, Knorr-Bremse recognized this fact early on and considers its social responsibility towards its employees, business partners, society and the environment an integral part of its business activities.

To drive forward the sustainability performance of the Knorr-Bremse Group its Bendix subsidiary set up a Corporate Responsibility & Sustainability Department. In line with the Group's Corporate Responsibility strategy, the department is tasked with raising awareness of the topic of sustainability, identifying the risks and opportunities in global megatrends and systematically controlling current and future activities.

Responsible and sustainable corporate management is closely linked with corporate values and principles. With this in mind, Knorr-Bremse works systematically to further refine its own corporate and leadership culture. In the year under review the Company revised and finalized its Leadership Principles. The outcome is a set of principles tailored to the needs of Knorr-Bremse today and covering five key aspects of leadership, aligned with the concepts of transformational leadership. These principles guide all of the Company's managers as they lead their staff and shape the corporate strategy, organization and culture.

Through the Group-wide Corporate Responsibility strategy, Knorr-Bremse systematically implements its voluntary commitment to responsible business practices. The strategy gives concrete form to how the Company sees its responsibility towards employees, the environment and society and determines which areas it focuses on.

As in previous years, in 2013 Knorr-Bremse supported the charitable organization Knorr-Bremse Global Care, which was founded in 2005. The main focus of the organization's activities in 2013 was again on projects designed to sustainably transform the situation of people in need by helping them to help themselves.

By way of example, in India, which is also an important production location for Knorr-Bremse, Global Care is helping to provide access to basic medical care, healthy nutrition and clean water for mothers and new-born babies in the slums of Delhi. Every year in India almost two million children die before reaching the age of five – most of them in the first few months of life – as a result of readily preventable diseases that could be stopped from spreading by providing better sanitation.

Knorr-Bremse Global Care was founded in response to the tsunami disaster of December 26, 2004 to provide effective and lasting help to the victims. In the year under review, 51 aid projects were realized in a total of 25 countries on four continents. The projects are supervised on a voluntary basis and with great dedication by Knorr-Bremse employees. In 2013, by providing EUR 1.85 million in funding, Knorr-Bremse Global Care reached out to help some 88,000 people.

Assets, financial status and profitability

Profitability

In 2013 the main factor in the development of the Knorr-Bremse Group's business was the diverse nature of regional developments.

At EUR 4,302.7 million, consolidated sales remained at the prior-year level (2012: EUR 4,300.1 million) despite negative currency effects. In Europe, sales were up 3.2% to EUR 2,252.5 million (2012: EUR 2,181.7 million), which corresponds to 52.3% of the consolidated total (2012: 50.7%). The Americas contributed EUR 1,019.1 million (2012: EUR 1,070.9 million) or 23.7% (2012: 24.9%) to consolidated sales. In the Asia/Australia region, sales amounted to EUR 1,031.1 million (2012: EUR 1,047.5 million), which equates to 24.0% (2012: 24.4%) of the consolidated total.

The Rail Vehicle Systems division witnessed very diverse regional developments in the year under review and was able to increase sales to EUR 2,247.0 million (2012: EUR 2,216.9 million), benefitting from positive developments in Europe.

The Commercial Vehicle Systems division posted a slight year-on-year drop in sales in 2013, with revenues totaling EUR 2,070.4 million (2012: EUR 2,098.2 million). Positive developments in Europe and South America were almost able to offset downturns in North America and Asia/Australia.

Incoming orders were valued at EUR 4,751.8 million (2012: EUR 3,948.5 million), 10.4% higher than the level of annual sales and 20.3% up on the previous year. Orders on the books at the Knorr-Bremse Group rose 13.0% in the year under review to EUR 3,284.2 million (2012: EUR 2,905.3 million).

Net income for the Knorr-Bremse Group moved ahead in 2013 to EUR 366.7 million (2012: EUR 295.0 million). Net

Consolidated sales by region

return on sales reached 8.5% (2012: 6.9%). The European region contributed EUR 160.2 million to net income, corresponding to a net return on sales of 7.1%. Net income from the Americas totaled EUR 78.2 million, with a net return on sales of 7.7%. The Asia/Australia region posted net income of EUR 128.3 million, which equates to a net return on sales of 12.4%.

In fiscal 2013, the rail vehicle HVAC systems business unit, Merak Sistemas Integrados de Climatización S.A., Getafe (Spain), again had to contend with a drop in profitability. The measures already initiated in 2012 are being implemented and will facilitate improvements which – probably from 2015 – should lead to break-even.

Assets

The consolidated balance sheet total rose 9.7% in 2013 to EUR 2,869.1 million (2012: EUR 2,615.0 million), largely influenced by the rise in accounts receivable and liquid funds. At year-end 2013, total assets represented 66.7% of sales. As a proportion of the balance sheet total, intangibles, fixed assets and investments were down from 31.6% in the prior-year to 29.1%. Working capital, defined as the sum of inventories and accounts receivable, minus accounts payable trade, stood at EUR 474.7 million at year-end (2012: EUR 463.0 million) or 40 days' sales (2012: 39 days). The equity ratio rose by 0.5 percentage points from 38.1% to 38.6%.

Of the Group's total assets, 50.8% are tied up in the European region (2012: 49.9%), 21.1% in the Americas (2012: 22.5%), and 28.1% in the Asia/Australia region (2012: 27.6%).

Financial status

The increase in net liquidity, defined as the balance of liquid funds and liabilities to financial institutions, to EUR 675.8 million (2012: EUR 551.0 million) was primarily achieved by the positive balance of inflow of funds from operating activities in the amount of EUR 495.3 million and outflow of funds to investments (EUR 159.5 million) and disbursements to company owners and minority shareholders in the amount of EUR 191.9 million.

In 2013, the Knorr-Bremse Group's investments in fixed and intangible assets totaled EUR 159.5 million and were down by 3.8% compared to the previous year.

At EUR 92.8 million, 58.2% of the Company's capital expenditure was invested in Europe. EUR 39.3 million (24.6%) was invested in the Americas and EUR 27.4 million (17.2%) in Asia/Australia.

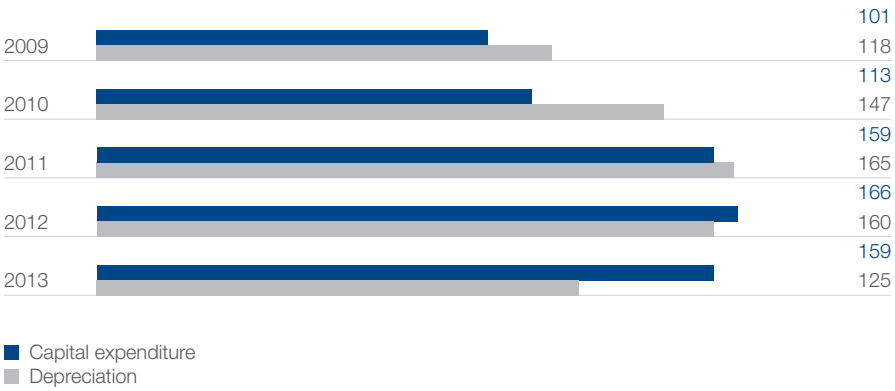
In 2013, investment activity focused primarily on the completion of construction of the new production plants and facilities in India (Palwal and Pune), the USA (Westminster), Australia (Granville), Brazil (Itupeva) and Germany (Munich) and the continuation of construction activity for a new plant in Kecskemét (Hungary). Replacement investments were also undertaken.

Broken down by division, the allocation of capital expenditure was such that the Rail Vehicle Systems division benefitted in the amount of EUR 84.0 million (2012: EUR 79.5 million) and the Commercial Vehicle Systems division in the amount of EUR 67.3 million (2012: EUR 56.9 million).

Depreciation on intangible and fixed assets declined across the Group, falling from EUR 159.8 million in 2012 to EUR 125.2 million in the year under review. With EUR 81.5 million, Europe accounted for the largest share of depreciation, followed by the Americas with EUR 28.3 million and Asia/Australia with EUR 15.4 million. A breakdown of depreciation by division shows that the larger proportion of EUR 59.6 million (2012: EUR 93.6 million) was accounted for by the Rail Vehicle Systems division, while depreciation at the Commercial Vehicle Systems division amounted to EUR 58.0 million (2012: EUR 60.6 million).

The ratio of net liquidity to shareholders' equity stood at 61.1%, compared to 55.4% in 2012.

Knorr-Bremse's robust strategic positioning, the positive development of the Company's business and its excellent working capital management were confirmed in 2013 by the rating agencies Standard & Poor's and Moody's, who have been rating the Knorr-Bremse Group ever since 2001. Both Moody's and Standard & Poor's confirmed their prior-year ratings of "A3/Outlook stable" and "A-/Outlook stable" respectively. This means that Knorr-Bremse remains the only family-owned company in the Standard & Poor's Global Automotive Suppliers Ranking 2013 to be awarded an "A" rating.



Consolidated capital expenditure and depreciation in EUR millions

Overall assessment of the economic position of the Group

Within the general economic environment described above, the Knorr-Bremse Group maintained its overall position with regard to its assets and financial status, and was able to further improve its liquidity position. The Group's profitability was ensured by rigorous cost management and above all by the internal optimization of processes and structures.

With an equity ratio of 38.6% and net liquidity of EUR 675.8 million, the structure of the Group's assets is extremely stable.

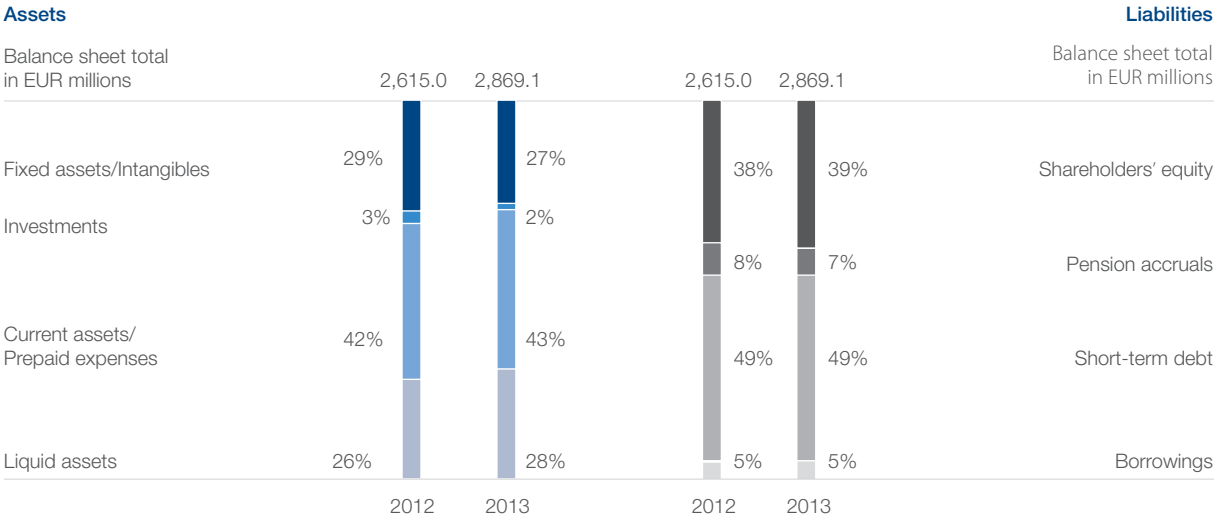
The Executive Board confirms that the representation of the assets, financial status and profitability of the Group presents an accurate overall picture of the Group on December 31, 2013.

Development of Knorr-Bremse AG in fiscal 2013

As the parent company, Knorr-Bremse AG performs the role of service provider and holding company, as well as a strategic management function on the operational side.

Rising income from investments in associated and related companies, resulting from higher transfer of profits from the Rail Vehicle Systems division, meant that income before taxation increased to EUR 243.7 million in the year under review (2012: EUR 134.9 million).

Along with interests in affiliated companies, the balance sheet of Knorr-Bremse AG largely reflects receivables from and payables to Group companies and these are centrally administered, partly within the framework of a cash-pooling process managed by Knorr-Bremse AG. Knorr-Bremse



Structure of assets, liabilities and finances of the Knorr-Bremse Group

AG acts as an in-house bank for its subsidiaries around the world. This includes handling the central hedging of market price risks. The subsidiaries contract their hedging transactions with Knorr-Bremse AG, which in turn hedges part or all of the net residual risk for the Group with external banks.

With the aid of global process standardization and transparency, achieved through Knorr Excellence, Knorr-Bremse AG is able to efficiently control its own business and that of the associated and related companies.

Appropriation of retained earnings

Knorr-Bremse AG posted unappropriated retained earnings of EUR 283.2 million in 2013 (2012: EUR 241.0 million). The Annual Shareholders' Meeting will be asked to approve the proposal that an amount of EUR 208.0 million from the unappropriated retained earnings of Knorr-Bremse AG be used to pay a dividend of EUR 80.00 (2012: EUR 60.00) per dividend-bearing share with a par value of EUR 26.00, with the balance to be carried forward to new account.

Relations with affiliated companies

KB Holding GmbH, Grünwald, Germany, directly holds more than half the share capital of Knorr-Bremse AG. Pursuant to § 312 German Corporation Law (AktG), a report on relations with affiliated companies has been drawn up which includes the following statement: "In the legal transactions listed in the Report on Relations with Affiliated Companies, in accordance with the circumstances known to us at the time at which the said transactions took place, our Company received appropriate counter-performance in each case." The report was verified by the Auditors and received their unqualified opinion.

Non-financial performance indicators

Human Resources

At year-end 2013, the Knorr-Bremse Group employed a total of 20,833 persons (18,499 excluding HR leasing). This equates to a year-on-year increase of 9.0% (5.5% excl. HR leasing).

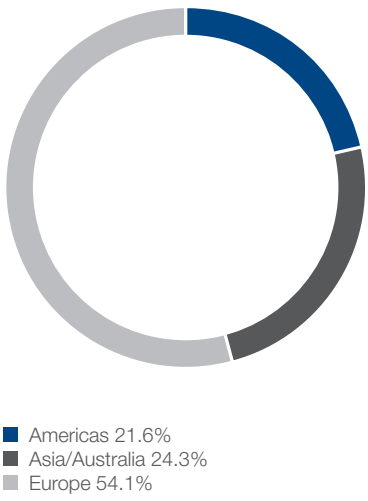
In the European region, there were 11,271 employees on the payroll at year-end 2013 (10,468 excl. HR leasing) compared to 10,251 (9,766 excl. HR leasing) at the end of 2012. At the same time, the proportion of the Group workforce employed in Europe increased from 53.6% in 2012 to 54.1% in 2013. The workforce in Germany totaled 4,087 employees (3,727 excl. HR leasing), up from 3,750 in 2012 (3,541 excl. HR leasing). The number of employees in the Americas also rose in 2013, reaching 4,496 (4,184 excl. HR leasing) at year-end, compared to 4,185 (4,011 excl. HR leasing) in 2012, as the proportion of the Group workforce in the Americas fell from 21.9% to 21.6%. In Asia/Australia, the size of the workforce increased from 4,684 in 2012 (3,762 excl. HR leasing) to 5,066 (3,847 excl. HR leasing). The proportion of the total headcount employed in the region fell from 24.5% in 2012 to 24.3% in 2013.

In the Rail Vehicle Systems division, the number of employees at year-end 2013 had risen from 10,840 (9,781 excl. HR leasing) in the previous year to 12,098 (10,406 excl. HR leasing). In the Commercial Vehicle Systems division too, the headcount rose from 7,941 employees (7,422 excl. HR leasing) at year-end 2012 to 8,371 (7,733 excl. HR leasing) in 2013.

In the year under review, the People Excellence (PEX) initiative was driven forward intensively. The work on the Leadership Principles that had begun in the previous year was brought to a successful conclusion. In terms of content, the Leadership Principles are now interlinked with the Corporate Values. In the HR Planning sub-project a standardized system for the qualitative description of job requirements was developed and rolled out worldwide. This helps create greater transparency in terms of workforce structure, optimize training processes and define fair and competitive remuneration. In 2013, HR development was a key focus of attention. As part of the PEX initiative, leadership training was intensified, the process of early identification of high potentials at the Company was improved and the international professional development programs at Knorr-Bremse were enhanced.

We would like to thank all of the Company's employees for their commitment and hard work in 2013. Our thanks also goes to the employee representatives for their constructive collaboration.

Group workforce on Dec. 31, 2013



Group workforce by region on Dec. 31, 2013

Report on risks and opportunities

Risk management system

The Knorr-Bremse Group operates an established, multi-stage, worldwide planning, reporting and controlling system. Standard reporting periods and report contents have been defined across the Group. These formal reports are supplemented in greater depth by presentations on routine and special subjects at monthly review meetings.

In addition, the Knorr-Bremse Group has put in place a standardized risk management system at top management level. This is based on a risk report that is discussed at regular top management and Executive Board meetings and used as a basis for introducing appropriate measures. This ensures that the operational risk management system is duly complemented at strategic level. In its entirety, this control system has proved an effective, reliable network for the early identification and remediation of potentially undesirable developments.

Risk assessment and management also form an important part of the process of describing, documenting, and continuously improving business processes across the Knorr-Bremse Group (Knorr Excellence model).

Business risks

The regional rail vehicle and commercial vehicle markets are subject to irregular cycles. Market volatility and fluctuating growth can affect individual suppliers, market segments or entire regions. As a globally active corporate group, Knorr-Bremse is particularly exposed to the risks implicit in the changing state of the global economy. The economic development of the individual countries and worldwide trade flows are carefully monitored in order to minimize and/or anticipate risks affecting the Company's sales. At the same time, Knorr-Bremse's international presence renders the Group largely immune to risks that are restricted to an individual region. The increased volatility being encountered worldwide in the commercial vehicle industry also affects Knorr-Bremse and continues to be carefully monitored. If customer creditworthiness falls, the risk of the loss of receivables outstanding increases and Knorr-Bremse counters this risk through effective receivables management.

In the course of its dynamic growth in recent years, Knorr-Bremse has integrated a number of companies and shareholdings into the Group. The financial and cultural risks typically associated with such integration processes were effectively minimized by means of systematic analysis and assessment of the target companies. When it comes to overcoming cultural barriers, Knorr-Bremse can draw on 20 years of experience with integration processes related to the acquisition of numerous companies as well as to joint ventures in which the Company holds a majority stake and is responsible for operational management. This experience will pay dividends in any future mergers and acquisitions and has been mapped in the form of structured processes.

Knorr-Bremse and its systems are at the leading edge of technological development. This also engenders risks which, because of the safety-critical nature of the applications concerned, require particularly careful monitoring. To this end, Knorr-Bremse routinely employs comprehensive quality planning, quality assurance and testing procedures. To ensure continuous improvement of its business processes, Knorr-Bremse takes its lead from international standards. The individual plants regularly undergo internal and external audits in this context. Above and beyond this, despite having already attained a very high level of quality, both divisions work intensively to continuously improve the quality and reliability of their products with the aid of the Knorr Excellence quality program "Quality First".

Operational risks

Risks due to production downtimes are covered by commercially appropriate insurance contracts. Flexible working

time models enable unexpected short-term shifts in capacity requirements to be accommodated efficiently.

Knorr-Bremse maintains a close working relationship with suppliers and service providers. In order to avoid delivery delays or quality defects, which in turn could lead to lost production time and have a negative impact on profitability, Knorr-Bremse attaches great importance to careful supplier selection procedures. Suppliers are also continuously subjected to technical and commercial audits. In the current economic environment, there is also a risk of business partners becoming insolvent – a risk to which the Company responds directly.

On the customer side, particularly in the original equipment segment, it can happen that, due to the expiry of long-term price agreements and the longer-than-expected duration of follow-up negotiations, for a restricted period shipments are made without a valid supply agreement in place. This can lead to price differences and the associated risks. Moreover, contractual obligations can lead to warranty risks. Systematic contract management to control these risks is ensured by appropriate Knorr Excellence processes.

Exchange rate risk is not of crucial importance for the Knorr-Bremse Group because geographic diversification over recent years has enabled the Group to establish a high proportion of local manufacturing and local suppliers within the respective currency zones. In order to limit the residual exchange rate risk related to transactions across different currency zones, Knorr-Bremse is increasingly identifying opportunities to exploit compensatory supply volumes within the Group. In selected cases, currency risks are also hedged by means of derivatives. Such measures, however, serve exclusively to hedge basic transactions within the scope of normal business operations.

The basis for managing foreign exchange risks is provided by the Guideline on Managing Currency Exposure in the Knorr-Bremse Group, which sets out the procedures to be followed and the necessary scope of hedging transactions in binding form for all Group companies. The monitoring of compliance with this guideline is part of the relevant Knorr Excellence process.

The risk of fluctuations in the price of commodities that are of relevance to Knorr-Bremse is also hedged to an appropriate extent by means of derivatives, insofar as these fluctuations could have a substantial impact on the Group's profitability. In the case of steel and aluminum, basis hedging is undertaken to cover a part of the risk.

Business processes within the Knorr-Bremse Group are supported by powerful and state-of-the-art IT systems. In order to avoid malfunctions, Knorr-Bremse attaches great importance to harmonization of the hardware and software architecture, the integrity and security of existing data, appropriate back-up solutions, and careful management of access control. Compliance with the IT Security Guideline is comprehensively monitored with the aid of internal and external audits at all major sites around the world. The Corporate Data Center in Munich, Germany, meets the very highest requirements (industry standard) in terms of efficiency, reliability and security. Based on this platform, the necessary global transparency and the integration of all corporate sites – and of recent additions in particular – are being further enhanced.

In order to comply with increasingly stringent environmental requirements, Knorr-Bremse has aligned its worldwide activities with the international standard ISO 14001. The majority of the Company's sites have already been certified or recertified accordingly.

In Asia, as well as in the other regions, imitation and counterfeit products remain a serious threat to business in the commercial vehicle and rail vehicle sectors. The most effective countermeasure to this threat is Knorr-Bremse's technical expertise, which on account of the highly safety-critical applications of its products is both recognized and appreciated by customers around the world.

In the high-tech environment in which Knorr-Bremse's products are used, there is a risk that physical limits will be reached in product applications. In addition, the demand-led expansion of production capacities and the increasing integration of production plants in emerging countries make safeguarding the quality of products and processes more challenging. Here too, the systematic use of the relevant Knorr Excellence processes ensures the high reliability of the Company's systems portfolio.

Opportunities

In the course of the multi-stage, worldwide planning, reporting and controlling system established at Knorr-Bremse, the opportunities arising in the various business areas are regularly identified and appraised. The main opportunities are set out below:

A possible end to the sovereign debt crisis and a modest recovery in the global economy could generate positive impetus for Knorr-Bremse's worldwide business across both divisions.

A continuation of the disproportionate rise in transportation volumes relative to global economic growth would lead to corresponding demand for further investments in commercial vehicles and rail vehicles, which could give rise to new business for Knorr-Bremse.

Targeted acquisitions and the establishment of joint ventures result in opportunities to enhance Knorr-Bremse's market position and expand its portfolio of products and services along the entire value chain. With this in mind, Knorr-Bremse continuously monitors current and future markets to identify suitable partners.

Knorr-Bremse invests in new technologies across a broad front in order to build on its technology leadership and thereby access new sales markets. Increasing demand for high-quality technology in emerging countries leads to additional sales opportunities for the Company. Further growth potential for Knorr-Bremse results from new or more stringent regulatory requirements in its markets.

Within the framework of Knorr Excellence, Knorr-Bremse works constantly to identify additional potential for cost cutting and process improvement, in order to further enhance the competitiveness of the Company's products and services.

If the drop in the value of the euro against the dollar widely anticipated for 2014 were to materialize and stabilize, this could be expected to lead to improved sales opportunities compared to competitors outside the euro zone.

General statement on the opportunity and risk situation

Careful analysis of the Group-wide risk profile has revealed that no identifiable risks exist that would threaten the survival of the Company or have a substantial impact on its assets, financial status or profitability. Nor are any such risks currently expected to arise in the future.

Follow-up report

On January 29, 2014, Knorr-Bremse Systeme für Schienenfahrzeuge GmbH, Munich, a subsidiary of Knorr-Bremse AG, acquired two companies: Transtechnik GmbH & Co. KG, Holzkirchen, and PCS Power Converter Solutions, Berlin. Both takeovers are subject to approval by the antitrust authorities.

Above and beyond this, no events with a material influence upon the assets, financial status or profitability of the Knorr-Bremse Group have taken place since the balance-sheet date.

Outlook

For the coming fiscal year, Knorr-Bremse is expecting to see a slight improvement in the market environment, although the individual regions and business fields will continue to show different developments. In both Europe and the USA, the consolidation of national budgets will come at the expense of investment activity, so that substantial growth stimulus cannot be expected there. Above-average growth is widely predicted for the emerging markets as long as there is no change in the current financial market conditions. Against this backdrop, further moderate global growth is anticipated, albeit exposed to risks and uncertainties in the regional markets.

In the European rail vehicle market, a largely stable market environment is expected for the coming year. While divergent developments in the French and Russian markets are predicted, Spain and Portugal, which were harder hit by the financial crisis, are suffering from a decline in state investment activity. The UK is set to benefit from forthcoming projects in high-speed rail, although not from any major investments in the metro sector. In Germany the market remains stagnant. Knorr-Bremse is expecting to continue to participate in infrastructure projects in the Middle East, which also forms part of the Group's "European" region.

In the European commercial vehicle sector, the market is expected to continue its recent positive development in 2014. However, due to the introduction of the Euro VI norm and the corresponding advance purchases in 2013, there could be a downturn year-on-year.

In the North American rail vehicle market, Knorr-Bremse is anticipating different developments in the various business areas in 2014. A moderate decline in the mass transit sector will likely be offset by slight growth in the locomotive segment. The freight car segment is expected to show stable development.

Knorr-Bremse is expecting to see a moderate recovery in the North American commercial vehicle market in 2014, following the downturn on 2013, accompanied by a slight increase in sales. Growth will largely be driven by higher unit sales of ABS/ESP products.

In the South American rail vehicle market, Knorr-Bremse expects demand for freight cars and locomotives to remain stagnant in 2014. In the passenger transportation sector, too, no substantial increase in demand is anticipated.

The South American commercial vehicle sector is currently expected to show a slight decline in 2014 compared to the previous year, with a corresponding drop in the number of trucks built.

In the rail vehicle sector in the Asia/Australia region, the outlook for 2014 presents regional differences. Substantial impetus is expected from China, driven primarily by the anticipated further expansion of the high-speed network and mass transit segment.

In the commercial vehicle sector in the Asia/Australia region truck production is expected to fall in 2014, due above all to a slowdown in the Chinese market. The commercial vehicle markets in India and Japan are expected to remain stable.

Based on the assumptions set out above, Knorr-Bremse is planning for sales to outperform the anticipated market average in 2014, driven in particular by the positive outlook for the Rail Vehicle Systems division in China. The increase in sales is expected to be disproportionately high compared to the rise in the number of employees. Tied-up working capital, measured in days' sales, is expected to remain at the healthy level of the previous year. Knorr-Bremse is budgeting for profits to show a modest rise in line with sales growth. After several building projects were completed in 2013, capital expenditure is expected to be slightly lower in 2014.

In line with expectations in terms of profits, working capital and investments, Knorr-Bremse is reckoning with a further increase in net liquidity and thus with a further improvement in what is already a sound asset position.

Given the positive development of the Group, Knorr-Bremse AG is again anticipating a rise in income from investments in 2014 that will safeguard its future ability to pay dividends.

Based on the assumptions made for the Group, the assets, financial status and profitability of Knorr-Bremse AG can be expected to show further moderate positive development.

In the coming years, Knorr-Bremse will continue to pursue a policy geared to safeguarding the Company's long-term success. The ground has been prepared for this by implementing the necessary increases in capacity and modernization measures. In addition, Knorr-Bremse is constantly working to develop and launch new products in order to add further value for its customers and build on its market leadership.


KNORR-BREMSE AG

Report

In a volatile business environment that has nevertheless staged a modest recovery, the Knorr-Bremse Group posted 3% growth in operational terms in the year under review. To safeguard its future viability, the Company once again rigorously pursued its ongoing investment program. Not only were six new production plants opened, but new development centers were also inaugurated in Asia and Europe, while modernization measures were implemented and cornerstones laid at other facilities. In recognition of its global strategy and the two major and mutually supportive pillars of its Commercial Vehicle Systems and Rail Vehicle Systems divisions, Knorr-Bremse was awarded high ratings by the leading rating agencies for the third time in succession. The fact that the Company is on the right track was also documented not least by a new record level of incoming orders and by numerous awards presented to Knorr-Bremse.

The chapter "Report" is not included in the audit of the consolidated financial statements.

Think and act innovatively – generate added value

Constant growth calls for safe foundations

You can only afford to step on the gas if you know you can rely on your brakes. And maintaining a steady speed is generally more efficient than short bursts of acceleration. These simple rules apply not only on the roads and railways but by analogy to the business sector as well. Scoring a quick success regardless of the cost or chasing growth for its own sake often leads nowhere. Consequently, Knorr-Bremse pursues organic, sound and thus sustainable growth. This healthy take on growth is anything but new at Knorr-Bremse, but today it is more relevant than ever. And above all, it is successful, as evidenced by the positive development of the Company over many years.

Sustaining this success and further securing the Company's future viability is the entrepreneurial driving factor at Knorr-Bremse. This is reflected in the Group's Corporate Vision, in which Knorr-Bremse sets itself an ambitious goal for its everyday activities, aiming to be the world's driving force for innovative and sustainable system solutions that make rail and commercial transport safer, more reliable and more efficient. The inner motivation behind these efforts is an ambition to create value for the customer and at the same time have a positive impact on society.

Knorr-Bremse can only live up to these high standards by striving for technological excellence day in, day out. That explains why the Company has set itself the goal of becoming a benchmark for the complex integration of mechanical engineering and electronics within trailblazing system solutions. The pivotal factor here is an in-depth grasp of market requirements and customer needs. Only by understanding the challenges that its customers face today and will face in the future can a company go on to develop tailor-made solutions. Proximity to the customer and to the market is decisive in this respect, and so Knorr-Bremse is pursuing the targeted expansion of its worldwide presence. In 2013, as part of an extensive program of investments, the Group opened six new plants in Australia, Brazil, India, Italy and the USA.

Delivering dependable standards worldwide

For Knorr-Bremse, maintaining a global presence is about more than just "being on site". It is more about setting worldwide standards in terms of quality, safety, productivity and environmental protection. These uniform standards enable Knorr-Bremse to offer its customers all over the world exactly what they have been relying on for many years now: technological excellence, reliability, passion and responsibility. These values form part of the corporate DNA at Knorr-Bremse and at the same time constitute a core promise made by this family firm. Day by day its employees across the globe strive to keep this promise.

Knorr-Bremse is well aware that employees can only turn in an exceptional performance if, in return, they can depend on a fair, reliable and attractive employer – an employer who actively helps them achieve their own professional and personal goals. That is why Knorr-Bremse invests in the individual development of its motivated and committed employees. As a further module in its successful HR policy, in 2013 Knorr-Bremse introduced its newly defined Leadership Principles, based not least on its Corporate Values and closely interwoven with the Corporate Vision.

Building strong bridges to the future

In a measured response to a dynamic and accelerating global economy, through its focus on core Corporate Values and sound, far-sighted business and financial policies Knorr-Bremse is building strong bridges to a successful future. This has been confirmed by external observers: Ever since 2010 Standard & Poor's has assigned Knorr-Bremse a rating of "A-/Outlook stable", while since 2011 Moody's has awarded the company an "A3/Outlook stable" rating. Both agencies confirmed these ratings in the year under review.

So today more than ever, Knorr-Bremse stands for an intelligent blend of acceleration and braking – accelerating where new potential opens up around the world; braking wherever growth threatens to become an end in itself, taking precedence over the human factor. Because for over a century now, Knorr-Bremse has been well aware that speed must have a constant companion: safety.

EMPLOYEES.

Highly qualified and committed employees are a key factor in the success of a global corporation that depends on technological excellence to set it apart from the competition. It follows that the more attractive the company is for employees and applicants, the better it will perform. This doesn't just mean offering job security, but also opportunities to develop professionally and personally – fostering an environment of personal responsibility in which individual talents can develop and achieve the extraordinary.

Employment situation

At the end of 2013, the Knorr-Bremse Group employed 20,833 people (18,499 excl. HR leasing). This represents a 9.0% increase in staffing levels (5.5% excl. HR leasing) compared to December 31, 2012, when the Group had 19,120 employees (17,539 excl. HR leasing).

Proactive human resources development

Knorr-Bremse prioritizes proactive human resources development in its HR activities.

One focus of Knorr-Bremse's HR strategy is increasing the Group's attractiveness as an employer. Knowing that opportunities to develop professionally and personally are the key to a great place to work, Knorr-Bremse prioritizes proactive human resources development over reactive employee recruitment. Knorr-Bremse values long-term employment relationships, which allow people to grow, develop, experience affirmation and discover meaning in their work.

To achieve success, HR development must draw on solid data and an accurate picture of employee productivity and commitment. Knorr-Bremse has therefore further refined its IT-based tools and programs for evaluation processes and potential management and rolled them out around the world – for instance as part of the Staff Dialogue. This new tool is being used to standardize the performance review process across the Group. The Staff Dialogue includes defining individual targets in writing as well as rating performance and potential. As a result, not only do both sides develop a clear picture of the employee's productivity and prospects, but the employee also receives an individual roadmap for their professional development. The number of employees who have profited from this computer-supported process rose from 7,500 to more than 13,000 in 2013. The Group-wide rollout of the tool is scheduled for completion in 2014.

There are also uniform standards in place for the identification of high potentials within the Group. Following the Staff Dialogue, highly talented employees are invited to attend internal

assessment centers, where they are evaluated by experienced managers and external consultants. 2013 saw the start of the new process, with seven assessment centers in Europe, the USA and Asia welcoming the first cohort of management trainees. Knorr-Bremse uses this targeted, standardized program to develop its own pool of talent. The process for identifying high potentials is part of an agreement with the Group Works Council.

Fostering the professional growth of employees is one aspect of leadership. In the year under review Knorr-Bremse continued to expand several of its professional development programs, such as the Engineering Development Program (EDP) in North America. College graduates who majored in technical subjects are given an opportunity to participate in a 24-month, individualized program in the field of mechatronics, for example acquiring experience in another division by working in different departments in the USA and/or Mexico. Another professional development initiative is the Knorr-Bremse Management Evolution Program (MEP). Management trainees recruited from around the world have 18 months to become acquainted with several specialist departments and gain experience working on international projects. Six months of MEP are spent working abroad, and training courses in different soft and hard skills are offered every quarter. Each trainee is mentored by an experienced manager. In the year under review twelve participants successfully completed the program, which in 2013 was honored as a "career-enhancing and fair" initiative by the Absolventa internet career platform. The International Management Potential Group (IMPG) is another important professional development program offered for young managers at Knorr-Bremse. In 2013, eleven management talents from seven international locations attended training courses and worked on projects designed to build their leadership skills and expand their international networks.

Leadership excellence

Knorr-Bremse communicates the newly defined Leadership Principles across the whole Group.

Fostering individual professional development is above all a management responsibility. With this in mind, Knorr-Bremse has developed new Leadership Principles and communicated them throughout the Group. They guide all managers as they lead their staff – and shape the Company's strategy, culture and organization. The Principles address the five key aspects of leadership, which can be summarized as "Reflect", "Step Ahead", "Engage", "Develop" and "Execute". The Leadership Principles were developed in multiple workshops held in the Americas, Asia and Europe with the active participation of employees from all levels of the hierarchy. This ensured that the principles align with the Corporate Values and management culture at Knorr-Bremse – and made them a key instrument in empowering managers to live the Corporate Values as they lead their teams. Not only was information on the principles communicated worldwide at the annual Global Knorr-Bremse Day, but a new management curriculum guarantees that the associated tools and methods will be applied at all locations and levels of the hierarchy.

For these global management training courses, Knorr-Bremse worked with renowned experts, in particular with Dr. Wolfgang Jenewein, a professor at Switzerland's University of St. Gallen, to develop uniform content and standards and roll them out across the Group. One of the course's key topics is the principle of transformational leadership, which goes beyond just setting targets, assigning tasks and monitoring outputs. What counts here is to motivate people to work towards a shared goal, to inspire them, and to integrate the individual potential of the employee into the leadership situation. This principle is based on the conviction that people are more motivated to perform a task when they understand how it fits into the big picture and contributes to the success of their company.

Culture of open dialogue

A culture of open dialogue is essential to constructive and successful teamwork. Knorr-Bremse

fosters such a culture with its Leadership Feedback instrument. Around the world, this allows managers with at least five direct reports to receive feedback from their employees on their management performance. A total of 12,067 employees and 1,141 managers were invited to participate in Leadership Feedback in 2013. The first stage, which ran until the end of September, involved completing an anonymous computerized questionnaire on leadership performance. Although participation was already high in 2010, this time the response rate was even better. 80% of the employees worldwide submitted their feedback, while 97% of the managers completed a self-assessment. The second step called on all managers to discuss the results of the survey with their employees. In the year under review 937 workshops were held worldwide, with managers and employees working together to define measures for optimizing leadership and teamwork. Consolidated on a global level, the results of Leadership Feedback showed that managers at Knorr-Bremse not only empower their employees to act and encourage them to take on responsibility, but are also very open to other cultures.

Leadership also means reflecting on one's own work. This is the aim of the regular Leadership in Dialogue meetings. Managers at locations in Germany and USA come together to discuss current leadership issues, reflect critically on their own management performance and develop specific ideas for improvement.

Becoming a more attractive employer

Making the Company a more attractive employer is a key aspect of HR policy at Knorr-Bremse.

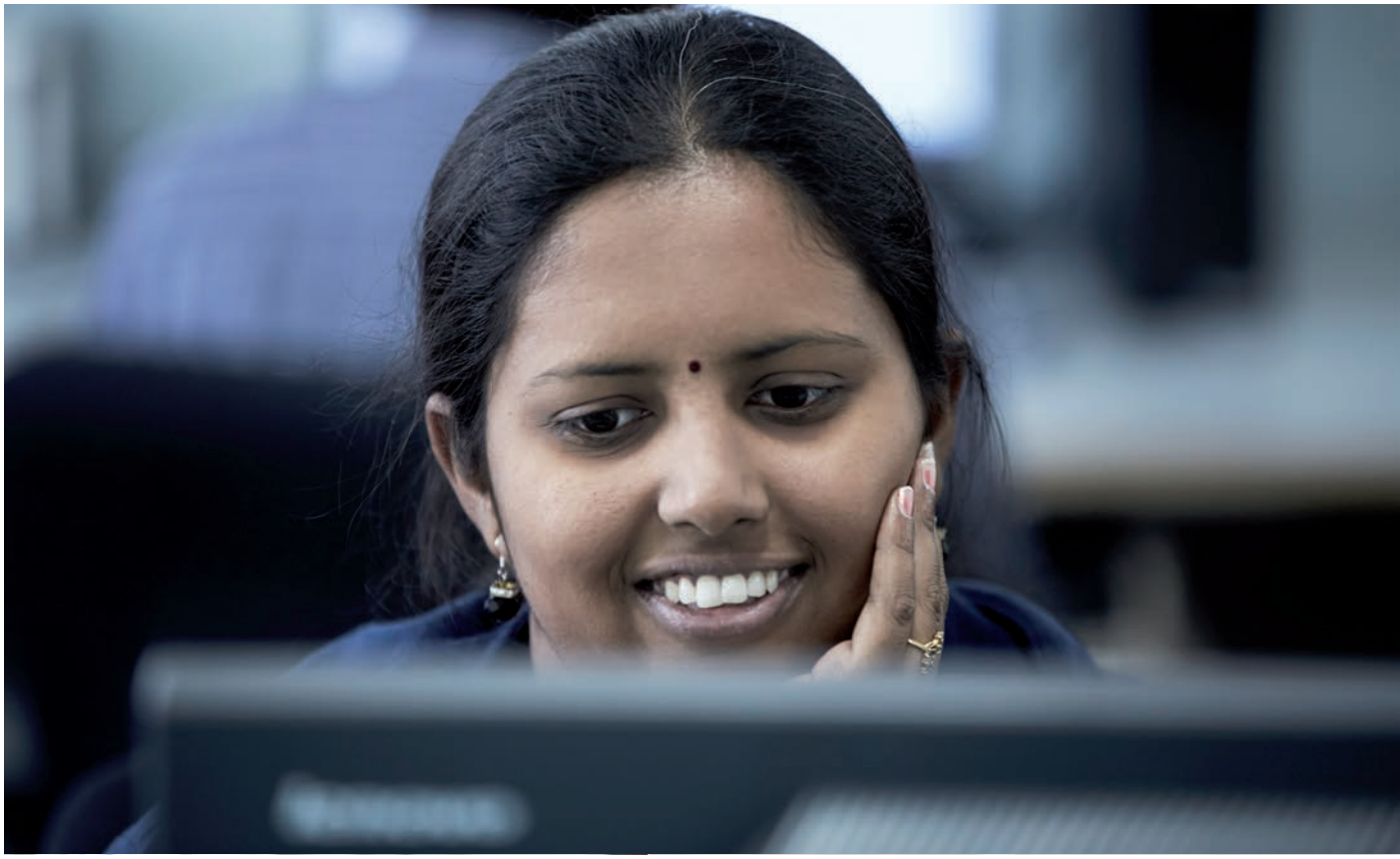
Attractiveness is always subjective, with every employee prioritizing different areas and opportunities. Knorr-Bremse adopts a targeted approach to address these individual needs. At the same time, there is a universal toolbox of measures that can be applied to make a company a more attractive place to work.

First, there is fair remuneration that rewards good performance. Here Knorr-Bremse has launched a project to assess all positions across the Group, developing standard job descriptions and grouping them by categories and roles. In the next stage, all employees will be classified by job role. This will bring more transparency to how employees are distributed among job families and within the hierarchy and offer more structured inputs for the development of career paths within the Group; it will also facilitate the determination of fair and appropriate compensation at all of the Group's locations.

In addition to remuneration, work-life balance is a key factor in employee satisfaction – and therefore in employee motivation. Knorr-Bremse has developed a number of initiatives in this area:

- Part-time positions with flexibility in the hours worked and options for returning to full-time work.
- Sabbaticals extending for several months, which give employees the chance to take a longer break from work and return to their jobs after the defined period.
- Telecommuting, which allows the employee to work some of their defined working hours away from the office.
- Family care services such as child care or elder care services.
- Family support programs such as contributions to preventive health care and health insurance; special financial assistance or loans; vacation programs for children; days off when children or elderly family members are ill; maternity leave and parental leave, including in countries where this is not required by law.
- Health programs and facilities.

In recent years Knorr-Bremse has significantly expanded the programs that help its employees achieve a better work-life balance. With the aim of maintaining this high standard in the future




KNORR-BREMSE
KNORR-BREMSE

and refining it where necessary, in the year under review Knorr-Bremse took part in the Hertie Foundation's "berufundfamilie" (career and family) audit and successfully obtained certification. A target agreement including specific measures was drawn up and this will serve as a basis for re-certification in three years.

Employee satisfaction is a reliable indicator of a company's attractiveness as an employer. The level of employee satisfaction is assessed at Knorr-Bremse through the regular Global Employee Survey. The next such survey will be conducted in 2014. At the same time, feedback from outside the company – from potential job applicants, for example – is another gauge of employer attractiveness. WirtschaftsWoche, a German business magazine, ranks preferred employers in its Universum Student Survey. Knorr-Bremse rose significantly in the ranking in 2013, appearing for the first time among the top 100 companies in Germany perceived as attractive employers by engineers.

The positive effects could be felt in the recruitment of new employees. In the summer of 2013 Knorr-Bremse applied for Top Employers Institute certification in the field of engineering, and was certified for the first time at the beginning of 2014.

Following the success of the dual model of vocational training which has been offered in Germany for many years, Knorr-Bremse has now applied the principle in a non-German location for the first time. In Kecskemét, Hungary, cooperation with the local trade school and another partner from the industry began at the end of 2012 to train engineers in a program which closely combines classroom instruction with hands-on experience in the local Knorr-Bremse production plant. In the past two years, a total of 22 young people have been selected for the dual education program from some 200 applicants.

All of these HR policy instruments – from standardized feedback for determining individual career potential to tailored professional development programs – make Knorr-Bremse a more attractive place to work. The effectiveness of these measures is regularly reviewed based on improvements in key performance indicators such as employee turnover, as well as on the internal and external surveys described above.

International transfers

In an increasingly globalized world, opportunities for international job assignments contribute to the attractiveness of an employer. With more than 90 international locations, Knorr-Bremse offers numerous opportunities of this kind. In 2013 some 100 employees were involved in the Company's international transfer program, in which they spend between six months and five years in a foreign location. All of these expatriates are supported by a team of specialists in the International Transfers department, from the moment they embark on the transfer process through their return and re-integration to their former workplace. Knorr-Bremse is currently working to improve its internal job listings to facilitate and simplify the international transfer process for its employees. This will provide earlier information on attractive positions and projects throughout the world of Knorr-Bremse.

With over 90 international locations, Knorr-Bremse offers employees a wealth of opportunities for international transfers.

By fostering international exchange, the Group has boosted intercultural competence over the years, especially at the management level. At the same time, Knorr-Bremse also prioritizes the development of skill sets and responsibilities at each of its locations. In concrete terms, this means recruiting specialists primarily from local markets and filling plant manager and other management positions with regional talent when possible. Knorr-Bremse views this as part of its global social responsibility: Developing necessary skills on a local level is an important factor for regional growth, while hiring people from the community gives them a direct stake in its economic prosperity.

Future-oriented leadership

Achieving excellent leadership, day by day

Sustainable excellence can only be achieved through excellent leadership. Yet what characterizes excellent leadership? How can we breathe life into the five Leadership Principles of Knorr-Bremse: "Reflect", "Step Ahead", "Engage", "Develop" and "Execute"? Dr. Marc Pastowsky, Head of Corporate Human Resources at Knorr-Bremse, discussed this subject with Julia Thiele-Schürhoff, Chair of Knorr-Bremse Global Care e. V. and Head of Corporate Responsibility, Dr. Michael Buscher, Chairman of the Executive Board of Knorr-Bremse AG, Baoping Xu, Head of the Commercial Vehicle Systems Business Unit in China, and Lorenzo Stendardi, Managing Director of the Microelettrica Scientifica subsidiary in Italy.

Marc Pastowsky: To start with here's a question for all of you. Imagine a prospective manager, someone equipped with excellent training and in-depth theoretical background knowledge. What advice would you give this person – in order to turn a good leader into an excellent one?

Lorenzo Stendardi: The most important thing is to remain authentic. Employees can tell straight away when a manager is playing a role, hiding behind a theory or posture. Remaining honest and genuine is what really matters. Of course this also means being able to take difficult decisions – and standing by them.

Michael Buscher: That's right. And in addition to his or her own strength of character, every outstanding leader should develop an ambitious vision for the business unit for which they are responsible. On top of this they need the ability to get things done and to work as part of a team in order to attain the goals that help to realize this vision, even under challenging circumstances.

Baoping Xu: For me, integrity is the number one issue here: Leaders need to possess integrity in order to provide a role model for their employees. It is also important to be aware of the responsibility that comes with leadership and not treat this lightly. Leadership is not just one task among many others – ideally it's a passion.

Julia Thiele-Schürhoff: This is why we look for leaders who don't just see themselves as office-holders or as experts with disciplinary powers. We look for charismatic leaders. I advise young managers to work not just on their professional development but on their personal development too. Leading one of our charitable international Global Care projects is an ideal way to do so.

Marc Pastowsky: For us, leadership is not just about setting goals, assigning tasks and monitoring their implementation. In our Leadership Principles we restate our claim that leadership should transmit a sense of meaning, inspiring people to work towards a common goal. Let's look at this in concrete terms: What is it that inspires the engineers and technicians of today?

Lorenzo Stendardi: In our case it's simple: At Knorr-Bremse, engineers and technicians have the opportunity to make something happen, in a Group with a culture of entrepreneurship and in the highly dynamic mobility sector – driving the world forward and mastering key challenges of the future.

Baoping Xu: In China we're currently experiencing – at first hand – a rapid expansion of mobility in passenger and freight transport. Knorr-Bremse employees are playing an important role in shaping this growth through our products. This fascinates us and makes us proud.

Julia Thiele-Schürhoff: Alongside the direct content of the work we do there are other aspects that can inspire enthusiasm and emotional involvement. One example is social en-

1. Reflect

Leadership begins with an honest look at oneself.

gagement – our employees' involvement in our Local Care projects. Employees can also get involved in sustainability initiatives at their workplace – achieving much more by working together than they could as individuals.

2. Step Ahead
Leading means stepping forward, not standing idle.

Marc Pastowsky: Good leaders develop employees who will be better than them one day: a noble aspiration, but is it realistic, too?

Julia Thiele-Schürhoff: Yes, it is realistic. Admittedly, it's not that simple, particularly as a young manager, to let good employees move on, or even overtake you. But most successful executives have overtaken their former line managers at some point – and hopefully not just by elbowing past them. Anyone who wants to develop talents must support this with the appropriate corporate and leadership culture, helping individual careers take flight within the Group.

Marc Pastowsky: Dr. Buscher, how do you identify the people who've got what it takes to become excellent leaders?

3. Engage
Targets are about numbers. Reaching them requires inspiration.

Michael Buscher: Experienced leaders are often quick to spot this potential in others. A single encounter could be enough to discover a "rough diamond". But in some cases, unique talents lie hidden, undetected by their line managers. This is where the discussion groups in our annual Staff Dialogue help us, bringing managers together to discuss the talents and high potentials in their respective sectors. To confirm their potential we employ diagnostic procedures such as assessment centers. But we are most successful when a manager sees it as his or her personal responsibility to systematically develop emerging leaders.

Marc Pastowsky: Which skills do leaders at the Knorr-Bremse Group need most?

Lorenzo Stendardi: Above all they need intercultural competence. Our products are at home all over the world and most of our projects extend far beyond our individual sites. So they need to be able to operate in the international arena – engaging with customers quickly and effectively and working in a focused way with internal partners to find solutions together. But that doesn't mean always seeking consensus just to keep the peace. With us, at Microelettrica in Italy, there's no such thing as consensus for its own sake. We have a lot of strong characters and we enjoy our internal battles – sometimes hard-fought – to find the best solution. So it's important for us that managers develop their own views and stand up for them – even in the face of opposition. Maybe at Microelettrica in Italy "motivation" is expressed a little more passionately than at other sites.

Marc Pastowsky: So excellent leadership means always keeping the regional context in mind. Yet at the same time Knorr-Bremse sets great store by maintaining uniform standards worldwide. Reconciling the two priorities – upholding global standards, while allowing for local specifics – is a major challenge. What do Chinese employees expect of a good leader, for example?

Baoping Xu: Particularly in a country like ours that is developing at phenomenal speed, two things are fundamental. First, leaders must be able to set a clear course. That calls for a great deal of inner strength, which is where the "honest look at oneself," described in our Leadership Principles, can help. And second, in this dynamic environment, it is important to be open to new ideas and suggestions from the team, in order to make the right decisions. Keeping in mind ideas from colleagues and employees, and putting them into practice fast and accurately – I'd say that's particularly important.

Marc Pastowsky: But is there really "One Best Way" when it comes to leadership? Or does leadership style in fact depend on individual factors? After all, whether a company is in crisis or flourishing makes a difference to how leaders work – don't you think?

Julia Thiele-Schürhoff: Absolutely. Some situations call for a manager to take control, give instructions, make things happen. But the charismatic leader is just as important – someone who can turn grand visions into clear strategies and inspire people. Targets are about numbers – but reaching them requires inspiration. The young generation in particular is increasingly confronting us with questions about the meaning of their work. Leaders need to provide answers here, and offer solutions.

Marc Pastowsky: Yet leadership isn't always just about developing and fostering people; it's also about sending out clear messages …

Lorenzo Stendardi: … which won't always be welcomed – but I think that a good leadership culture needs to include a robust ability to accept and deal with conflicts.

Michael Buscher: An excellent leader is able to identify the appropriate leadership instruments depending on the situation. Because effective, efficient leadership happens at individual level and in concrete terms – after all, it's about people and about reaching goals. And because people and circumstances are highly diverse, so too are the demands made of a leader. That said, preserving integrity is important in all circumstances. Addressing critical subjects honestly may be painful at times – but that's fine as long as there is no lasting loss of mutual respect. The ability to express constructive criticism – and honest praise, too – should be a fundamental virtue of a leader. This is the only way to develop individual employees in a targeted manner.

Baoping Xu: In markets offering a host of local employment opportunities for highly qualified engineers it is vital to offer adequate opportunities for ongoing personal development. These employees expect clear messages in terms of the development and career opportunities that are open to them – geared to their individual strengths. In this way we build employee loyalty and offer them precisely the new challenges that will help them to grow.

Julia Thiele-Schürhoff: And I would like to see our leaders taking pleasure in supporting and accompanying employees as they grow.

Marc Pastowsky: Thank you all for taking part in this discussion.

THE OUTSIDE VIEW

Excellent leadership also needs an external perspective. This is why Prof. Dr. Wolfgang Jenewein has been supporting Knorr-Bremse's leadership development efforts since 2011. Prof. Jenewein is an internationally renowned expert in leadership development and professor of business administration at the University of St. Gallen in Switzerland, where he directs the Executive MBA program and the Center for Customer Insight. He has led numerous workshops involving reflection and discussion on the subject of leadership. In his own words: "The openness of Knorr-Bremse's top managers and their readiness to engage intensively with leadership issues is inspiring."

4. Develop
Leaders create fertile ground for people to grow.

5. Execute
Strong leadership is not about words, it's about results.


CONFIANÇA
reliability

RESPONSIBILITY.

Doing business with foresight, showing consideration for the environment, and treating others fairly – these principles have a long tradition at Knorr-Bremse. The three dimensions of sustainability – i.e. entrepreneurial thinking combined with environmental and social responsibility – have become a natural part of the company's culture and an integral component of corporate responsibility. In order to ensure the company's future viability, Knorr-Bremse is actively working on a systematic sustainability program that stands for innovation and added value on the one hand and environmental compatibility and social commitment on the other.

Corporate responsibility

At Knorr-Bremse, corporate responsibility (CR) is divided into the following areas: product responsibility, responsibility for employees, responsibility for the environment and climate, and social responsibility.

In organizational terms, CR is established at the most senior level of management at Knorr-Bremse. The highest-ranking decision-making organ is the CR Council, which is made up of the Chair of the Executive Board, two management representatives from the company's two divisions, and the head of the Corporate Responsibility department. The council defines the objectives and measures to be taken to achieve continuous improvement in all aspects of sustainability. Beyond that, a Group-wide network, the CR Round Table, facilitates inter-regional and cross-divisional exchange regarding strategic goals, current CR projects and communication of examples of best practices.

All activities are based on the CR strategy, which outlines the specific goals of CR management at Knorr-Bremse. It defines six fields of action:

Strategy and management: The goals are sustainable value creation and corporate governance, integrating environmental and social aspects into strategic planning and all company processes.

Employees and leadership: The goal is a safe, healthy, and attractive working environment characterized by trust, diversity, fairness, respect and equality of opportunity. Intensive dialogue between employees and managers is a key element of corporate culture.

Products and partners: The goals are not only innovative products offering maximum customer benefit, but also close collaboration with customers and suppliers in order to minimize undesired effects on the environment and society.

Environment and climate: The goals are a clean environment and comprehensive climate protection. This means steadily reducing CO_2 emissions and energy and resource consumption throughout the entire product life cycle.

Commitment and society: The goal is to champion social causes as a good corporate citizen, for example through social involvement at company sites and through the charitable organization Knorr-Bremse Global Care.

Communication and cooperation: The goals are constructive dialog and close cooperation with stakeholders, and transparent information on the progress Knorr-Bremse has made in achieving its sustainability objectives.

The CR strategy and CR goals are based, among other things, on the company's corporate values and the principles of the UN Global Compact.

The CR strategy and CR objectives defined by Knorr-Bremse are based, among other things, on the company's corporate values and the principles of the United Nations Global Compact, a voluntary business initiative with the aim of making globalization socially, environmentally and economically more just. Knorr-Bremse joined this initiative in 2010.

All acting in concert – the Code of Conduct

Knorr-Bremse has set itself the goal of always acting in a lawful, responsible, and exemplary manner. In 2012, these principles were summed up in a binding Code of Conduct, which pro-


KNORR-BREMSE
Planted by
Mr. Heinz Hermann Thiele
Chairman of the Supervisory Board,
Knorr-Bremse AG
On
November 15, 2013
on the auspicious facility inauguration of
Knorr-Bremse India Pvt. Ltd., Palwal

vides each employee with clear guidelines for behavior that is compliant with the rules. The highest precept is to act correctly, with integrity, and always in accordance with the law, complying both with national legislation and with international agreements. Moreover, each employee is called upon to avoid conflicts of interest, to protect the company's assets, to ensure safety in the workplace and high quality of products and to be mindful of environmental protection.

Product responsibility

Knorr-Bremse works on products that combine maximum customer benefits with a contribution to sustainability.

Knorr-Bremse develops and manufactures products by means of which both people and goods can be brought to their destinations safely and reliably by road and rail. This has always been the source of the company's particular sense of product responsibility.

Product responsibility also encompasses environmental and climate protection – both during the manufacturing process and with regard to the use of the final product itself. Therefore, Knorr-Bremse has set itself the goal of manufacturing products that minimize energy consumption and maximize fuel efficiency, that reduce air and noise emissions, and that are based on materials and manufacturing processes with a low environmental impact. Knorr-Bremse products are assessed internally with regard to these goals. For this purpose, the company analyses various stages of the value chain throughout the product life cycle and produces recommendations for improvements on the basis of the findings. These are then adopted in the further development of the products.

Example: New LL pads make freight trains quieter
The newly-developed LL brake pad is used for so-called "whisper brakes". "LL" stands for "Low Friction, Low Noise", as the pad prevents roughening of the wheel during braking, thereby reducing noise levels by some 10 dB(A). Residents near railway lines perceive this as a halving of noise emissions. The pad can easily be retrofitted to replace traditional cast iron blocks and offer a comparable braking performance. With its Icer Rail joint venture, Knorr-Bremse is one of only two suppliers of the sole LL pad currently in use, which was approved for sale in Europe in mid-2013, following ten years of development work. The door is now open for mass retrofitting of many thousands of freight cars.

Example: Improved safety, thanks to new driver assist systems
By developing innovative driver assist systems for commercial vehicles, Knorr-Bremse contributes towards sustainable mobility and the safe transportation of passengers and freight. The main focus is on improving road safety, significantly reducing fuel consumption and making more efficient use of existing routes.

The adaptive cruise control ACC system helps avoid most short-term acceleration and deceleration. And the AEBS autonomous emergency brake system can significantly reduce the severity of tail-end collisions or even avoid them entirely. When a danger arises and the system has already issued an alarm, AEBS intervenes to activate the EBS electronic braking system. Existing assist functions such as the ABS anti-lock braking system and the ESP electronic stability program have been integrated into a single, all-embracing safety system. In addition, Knorr-Bremse's North American subsidiary Bendix also offers the camera-based AutoVue and SafetyDirect safety systems. AutoVue warns the driver if his vehicle begins to move toward an unintended lane change; and SafetyDirect systematically helps improve driver skills.

Sustainability beyond the factory gates

In order to anchor sustainability firmly in the entire supplier network as well, Knorr-Bremse has now made its sustainability requirements a binding part of its contracts with all suppliers. In the year under review, questions regarding compliance with the ten principles of the Global Compact were added to the systematized supplier audit. As a condition of continued collaboration, Knorr-Bremse reserves the right to verify compliance with these principles at the suppliers' sites, and if necessary make recommendations for improvement. The goal of this constructive dialog is always the development of the individual supplier. If there is no noticeable development in the long term, however, Knorr-Bremse will terminate the business relationship. This applies not only to suppliers of raw materials, parts and components, but also to suppliers of indirect materials and services, such as software and hardware, construction work or office supplies. In the year under review, 50 suppliers of the Rail Vehicle Systems division were audited with regard to these criteria. The Commercial Vehicle Systems division will conduct a similar survey in 2014.

Responsibility for employees

Creating an attractive working environment and assuming responsibility for its employees is important to Knorr-Bremse.

Assuming responsibility for employees primarily means ensuring that their workplace is safe and that their health is safeguarded and promoted. Knorr-Bremse does this by means of its health, safety and environment policy and a systematic, internationally standardized work safety management program. This involves assessing risks, training employees to raise awareness, and thoroughly analyzing accidents, so that specific accident-avoidance measures can be developed. Local measures are coordinated by the Health, Safety and Environment (HSE) function represented at each site. The health and safety management system is certified by an external auditor: In the Rail Vehicle Systems division, for example, one by one, all the European sites have been certified in accordance with the Occupational Health and Safety Assessment Series standard OHSAS 18001.

Responsibility for employees goes beyond safety at work and active health promotion, however – for example, with ergonomic workplaces, nutritional advice or prevention and sports programs: It is also a question of giving each employee the opportunity for professional and personal development. A basic prerequisite is equality of opportunity – irrespective of religion, gender, age, ethnic or social background, disability or political convictions. A further goal is to enable employees to achieve the best-possible balance of work and private life. The combination of these and many other factors is what makes for an attractive employer and satisfied employees – the measures taken by Knorr-Bremse to achieve this are listed in detail in the chapter entitled "Employees" starting on page 36.

Responsibility for the environment and climate

With strategic foresight, Knorr-Bremse assumes responsibility for protecting the climate and the environment. For this purpose, the Group pursues an active environmental management policy, with the aim of saving natural resources, increasing energy efficiency, and reducing waste. The endeavor to achieve ecological sustainability in dialog with all stakeholders is part of the Company's culture and is incorporated into binding environmental policy throughout the Group.

The Company is committed to its responsibility for a clean environment and climate protection.

The most ambitious goals are the ones you set yourself

Defined targets provide employees and suppliers with clear guidelines. Environmental performance indicators are regularly measured at all production and service sites, so that target achievement can be monitored and controlled. The sharing of best practices further enhances environmental and climate protection at operational level. Regular internal and external audits serve to ensure compliance with standards. For example, nearly all sites are certified in accordance with the environmental management standard ISO 14001.

Change begins at the grass roots

Environmental protection succeeds when everybody plays their part. Knowing this, Knorr-Bremse is raising the environmental awareness of all its employees through training courses. To this end, each site determines the training requirements for its employees on an annual basis and draws up training programs accordingly.

One prize – many winners

A fundamental part of the strategy to strengthen environmental awareness within the Group is the CR Award, which was presented for the third time in the year under review. This award honors outstanding achievements in the categories "Environment" and "Social Commitment".

In the "Environment" category, a new plant belonging to the US subsidiary Knorr Brake Company was awarded the first prize. The photovoltaic system installed there meets one third of the site's power requirements, thus reducing its CO_2 emissions by approx. 900 t annually. The design of the plant and the building technology are certified in accordance with the US Green Building Council's LEED standard (Leadership in Energy & Environmental Design).

Don't let up – from one goal to the next

By introducing the ECCO$_2$ initiative (Efficient Cut of CO_2), Knorr-Bremse is pursuing two goals throughout the Group: to increase energy efficiency and reduce the CO_2 emissions connected with energy consumption by 20% compared with the base year 2009. In addition, an energy management system is to be introduced on the basis of the ISO 50001 standard. The target year for these goals is 2020. ECCO$_2$ identifies energy savings potential in all areas of the company, and suitable measures are then defined and implemented in order to realize this potential. With the help of external consultants, the ECCO$_2$ process has already been introduced at more than 40 Knorr-Bremse sites around the world. Local energy savings successes are multiplied throughout the Group by means of best-practice exchange.

The specific measures taken during the period under review were focused on optimizing buildings, plant and manufacturing processes. This included optimized waste heat recovery, ener-

gy-saving lighting systems, optimized production lines and a general raising of employee awareness for energy savings. Measures were also taken towards meeting the requirements of the ISO 50001 international energy management standard in internal processes. As a result, part of the objective of the ECCO$_2$ initiative – the increase in energy efficiency – has already been achieved this year. Knorr-Bremse will therefore define further energy efficiency targets for the years ahead. As part of the plan to systematically introduce an energy management system worldwide, the current status of compliance with ISO 50001 has been analyzed at the various sites, so that the necessary changes to internal processes could be determined. Implementation will follow in the years to come.

Joint award

This year for the first time, Knorr-Bremse is teaming up with DKV Euro Service, one of the leading providers of logistics and transport services, to present the Eco Performance Award 2014. The award is given to logistics companies that successfully balance economic, environmental and social sustainability. Knorr-Bremse is thus promoting awareness for sustainability beyond the confines of the company.

Growth with responsibility – the guideline for factory and building planning

Knorr-Bremse develops globally uniform standards for new industrial buildings and modernization projects.

Knorr-Bremse is growing. New sites around the globe are an expression of this growth. The company's new guideline for factory and building planning is a unified global standard for new industrial buildings and modernization projects that was developed during the year under review. Knorr-Bremse is thus ensuring that growth and environmental responsibility go hand in hand – and that this is checked and controlled systematically.

The guideline defines standards for resource-efficient building and contains binding check lists. At the same time, local features are taken into account, so that the optimum building materials, for example, can always be selected for the particular climate zone. The objective is buildings that conform to the Green Building standard, i.e. are systematically designed from the very outset to be built and operated with economic, environmental, and social benefits in mind. Accordingly, the guideline contains basic information on the energy concept, CO_2-neutral energy production, life cycle cost calculation, and energy monitoring. This enables each project manager to examine and assess the complex planning topics. Implementation of the building standard is supported with reference to internationally recognized standards for environmentally friendly, resource-saving and sustainable building.

Last but not least, optimum architecture also increases productivity, as it encourages open communication between the different departments. Clearly recognizable material flow and value chains help employees to be more efficient and to understand internal processes better. A transparent building layout shortens distances between the development and production departments. All these elements ensure sustainable facility management throughout the company.

The factory and building planning guideline will be communicated throughout the Group in 2014 and will be established as a binding standard for all new construction projects.

A solid basis: project examples from 2013

During the period under review six new production facilities were opened. For all of them, Knorr-Bremse applied globally uniform standards with regard to environmental impact, resource use and a healthy working atmosphere. Here are some examples:

Itupeva, Brazil
During the year under review, Knorr-Bremse opened a new facility in Itupeva, in the Brazilian state of São Paulo. On this spacious site, the buildings for production, administration and development cover an area of 31,500 square meters. During the construction phase special care was taken to ensure energy efficiency, protection of natural water resources and active protection of nature. Thus by making maximum use of natural light, with 106 prismatic skylights, the energy consumption for lighting has been reduced to a minimum – during the day the production areas have no need for any artificial lighting at all. Air vents in the production hall enable an automatic exchange of air to take place, and air conditioning is not required. A "green" roof above the staff buildings reduces the temperature by up to 5 °C, with the result that – despite the tropical climate – no air conditioning is required here either. Water is drawn from two deep on-site wells, which means the natural water in the surroundings is protected. And the waste water system is completely self-contained, with all waste water from the sanitary facilities being treated and then used to irrigate the green spaces or for toilet flushing. Treated industrial waste water is recycled. And rainwater is gathered in a seepage system with a capacity of up to 4,000 cubic meters, so that it does not leave the site, thereby reducing to a minimum the risk of the factory being flooded.

Granville, Australia
Here Knorr-Bremse constructed a 13,000 square meter facility for the production of braking, door and HVAC systems. 40% of the roof area consists of skylights, so that on sunny days lighting levels of 3,500 lux are achieved without using any energy. Sensors calculate the intensity of the daylight and only switch on the lighting as required. The use of new energy-saving bulbs has also reduced energy consumption by about two-thirds. The entire plant lighting system is

divided into six zones that can be switched on independently of one another by a smart bus control system. In the warehouse and offices the lighting is also controlled by movement and light sensors and is only switched on if it is really required. Air vents and large roof openings ensure a natural circulation of air, so that even on hot days there is no need for air conditioning on the shop floor.

Westminster, USA
Knorr-Bremse built a 20,000 square meter new building near the existing facility, where systems for rail vehicles are developed, produced and marketed. Roof-mounted solar panels on the new building can generate up to one megawatt of power – a third of the site's annual electricity requirement. As a result, CO_2 emissions have been reduced by some 900 t per year. The site is recognized under the US LEED (Leadership in Energy and Environmental Design) classification system as being particularly environmentally friendly, resource-efficient and sustainable.

Buccinasco, Italy
As a result of expansion and acquisitions the various divisions of Knorr-Bremse subsidiary Microelettrica Scientifica were spread across four different sites. In a bid to increase the efficiency of processes, Knorr-Bremse brought together all divisions, with around 300 employees, under a single roof. This removed the need for many transportation operations between sites and therefore avoided CO_2 emissions. Instead of a new building, a brownfield site was chosen and the existing buildings converted to value-stream based production in line with the Knorr-Bremse KPS production system.

Palwal and Pune, India
Knorr-Bremse opened two new plants in India: a production facility for commercial vehicle systems in Hinjawadi-Pune and another for rail vehicle systems in Palwal. At the same time it also created a joint development center. The Palwal plant was constructed according to the standards of the Indian Green Building Council (IGBC) with the main focus on water and energy efficiency, materials efficiency and a healthy working atmosphere. The entire building has high levels of insulation using polyurethane foam paneling. Prismatic skylights utilize natural daylight for illuminating the interior and therefore bring about significant energy savings. The water supply comes from deep wells. Waste water is treated and used for toilet flushing and for irrigation of the green areas. Production waste water is also treated and recycled as process water. As a result, consumption of fresh water has been significantly reduced. Environmental compatibility and energy efficiency were also improved at the Pune site, thanks to a comprehensive system of utilizing rainwater and treating waste water. In addition, Knorr-Bremse ensured proper insulation of facades, new glazing and installed a lighting system based on extensive use of natural light.

Social responsibility

As part of society, Knorr-Bremse is committed to social and community issues.

Knorr-Bremse is not just part of the business community but also a member of society. The company understands its role in society as exercising a positive influence on its social environment and helping to shape it by means of various initiatives. The company's social commitment ranges from local to global projects.

The 2013 CR Award

Knorr-Bremse encourages its employees' social involvement and honors their commitment with the CR Award. In the year under review three educational projects were the winners. The

commitment shown by Westinghouse Platform Screen Doors in Guangzhou, China, for a local elementary school was awarded third prize. The second prize went to Knorr-Bremse Kecskemét, Hungary, for a dual training program for engineers. The special feature of this project is its combination of academic and practical aspects. The first prize went to the Knorr-Bremse site in Pune, India, where a training program for disadvantaged young people was initiated in cooperation with the Don Bosco organization. Knorr-Bremse employees support the young people during the program, sharing their technical know-how and their professional experience in working with Knorr-Bremse products. At the end of the six-month training course, the young people are able to work for themselves or find employment in a service center.

Knorr-Bremse encourages employees to become involved in community matters and honors outstanding contributions to society with its CR Awards.

Sustained by the employees – the advantages of a global presence

More than 90 sites in 27 different countries – a perfect starting point for targeted local community commitment. Projects initiated by individual Knorr-Bremse sites are gathered under the heading Local Care. In the year under review, a Local Care guideline formulating the standards and objectives of local involvement was drawn up and communicated throughout the Group. The guideline contains recommendations regarding areas for support, funding criteria and resources. In the medium term, a list of local projects is to be compiled and each one systematically analyzed, so that best-practice examples can be exchanged and possibly transferred to other sites. Here are some examples:

In the summer of 2013, many regions in Germany along the Elbe and Danube rivers were affected by extreme flooding. Numerous Knorr-Bremse employees from the sites in Berlin and Aldersbach took part in the flood relief operations. Knorr-Bremse contributed by giving them paid leave and by doubling any donations raised by employees. In Hungary, employees filled sandbags and took part in the cleaning and clearing-up operations.

The US Junior Achievement Initiative is directed at students in elementary and secondary education across the country. The aim of the program is to motivate the students to achieve a higher educational qualification, to prepare them for working life, and to awaken the entrepreneurial spirit in them. The program is designed to encourage independent thought and action and improve employability and commercial knowledge. On Junior Achievement Day, 23 employees from Knorr-Bremse subsidiary Bendix, in Cleveland, Ohio, went to a local elementary school as voluntary tutors.

The organization LIFE-Journey works to encourage the reintegration into society of juvenile offenders in Hong Kong. The main focus is on designing meaningful leisure activities and fostering personal talents. Knorr-Bremse employees in Hong Kong took part in the individual events as volunteers.

Knorr-Bremse not only promotes its own employees' social commitment, however, but also supports other development cooperation actions around the world within the framework of the charitable organization Knorr-Bremse Global Care.

Setting wheels in motion – with global relief projects

Knorr-Bremse Global Care was set up in 2005 in response to the tsunami in South-East Asia. Since then it has devoted its efforts to supporting social development projects. Besides providing disaster relief, the organization focuses on education & training and social infrastructure. These are areas in which it is possible to achieve lasting improvements in local living conditions and support the development of independent individuals. Involving Knorr-Bremse sites during the implementation of Global Care projects provides a great deal of support, as it means the

organization can rely on local, trustworthy colleagues, as well as their networks and expertise. The willingness and motivation of Knorr-Bremse staff to become involved in social projects and take on voluntary roles of responsibility is remarkable.

In the year under review, the organization supported 51 projects in 25 countries at a cost of EUR 1.85 million. When selecting projects, the basic aim is to support individual independence. Projects should enable the local people to bring about structural changes themselves. This strengthens social cohesion, increases the long-term success of a project and often leads to follow-on projects initiated by the local communities themselves, producing a maximum result for everyone involved.

In 2013, Knorr-Bremse Global Care's projects focused on two main issues that can be seen as the key to improving the lives of people in need. The first is water – the basis and prerequisite for life.

In 2013 Knorr-Bremse Global Care prioritized projects concerned with the supply of drinking water and sanitation, hygiene measures and agricultural irrigation.

Nearly 800 million people in the world are still living without access to clean water. And around 2.5 billion people around the world do not have adequate sanitary facilities. To address this problem, in 2013 Knorr-Bremse Global Care prioritized projects concerned with the supply of drinking water and sanitation, hygiene measures and agricultural irrigation. Since water is an issue that cuts across all eight of the UN's Millennium Development Goals, projects that provide drinking water can achieve improvements in a number of areas, including child mortality, maternal health and gender equality and, as a result, the emancipation of women.

Case study: WASH project, India

India has a high birth rate, but also an incredibly high infant mortality rate. Of the 26 million babies born each year, 940,000 do not survive beyond their first month. The main causes of death are diseases like diarrhea and chest infections. Knorr-Bremse Global Care and Save the Children have launched a project called "Integrated Health, Nutrition and WASH Services for the Women and Children of Delhi's Urban Slums, India" that is using simple measures to produce a big impact. The diseases mentioned above can mostly be avoided through access to basic medical care, clean water and sanitation. In the first instance, the WASH (water, sanitation and hygiene) project promotes the development of sanitary facilities, sewage systems and clean wells. But the second step is much more important: teaching people about hygiene, health care and good nutrition, and training voluntary advisers to support pregnant women and young mothers so that they receive comprehensive antenatal and post-natal care. The project has brought about a significant improvement in the conditions necessary for healthy, stable care of pregnant women and children.

A second focus of Knorr-Bremse Global Care projects in 2013 was on vocational training. Training empowers young people to provide for themselves financially and to live independent lives.

Project example: SKILL project, Germany

Poor people in Germany suffer from social exclusion. Young people from low-income families are particularly affected, which in turn worsens their chances on the job market. The SKILL project run by Stadtteilarbeit Milbertshofen, a neighborhood association in Munich, supports disadvantaged young people. Its work focuses on the difficult transition period between school and training or work, and promotes important social skills like reliability, independence and motivation. SKILL stands for "Soziale Kompetenz, Integration, Lernen und Lebensperspektive" (social skills, integration, learning and prospects). The project was launched in November 2009 as part of an initiative funded by the European Social Fund (ESF) for Germany and was very successful. A total of 212 young people in Milbertshofen received intensive support. Of these,

22 re-took their school leaving certificate, 21 found training places and 19 found a job on the regular labor market or were offered a place at a college. The ESF funding ran out at the end of the three-year project phase. This was where Knorr-Bremse Global Care stepped in, taking over the funding of the entire SKILL program, so that it could continue. As a result, a further 41 young people received support up to October 2013. Global Care will continue to fund a full-time position on the project over the next two years. At the same time, the neighborhood association is pursuing long-term funding by the City of Munich, which currently part-finances the project.

KNORR EXCELLENCE.

Excellence does not come naturally – it is both a challenge and a commitment. Only through a combination of awareness that has grown throughout the Group, optimized processes and reliable technologies can the dynamic be created that is both essential for, and characteristic of, real progress. From the outset, striving for outstanding performance has been part of the self-image of Knorr-Bremse. Today it applies to all of the Group's areas of activity and business processes. And we are doing our best to keep it that way. Knorr Excellence is a worldwide program that both bears and safeguards our good name.

A program of excellence

In Knorr Excellence, Knorr-Bremse has a program that drives the optimization of all business areas and processes.

Outstanding products and services are founded upon personal and technological excellence. Also essential is an ability to find creative solutions that keep pace with developments on the market and in society, identify new needs at an early stage and go beyond the current state of the art to offer added value to our customers. In Knorr Excellence, Knorr-Bremse has devised a program that ensures the optimization of all business areas and processes across the Group.

Knorr Excellence

Knorr Excellence (KE) is a cross-functional program that allows people to speak the same language with respect to innovations, to define a common goal, and to reach a joint understanding of how to achieve that goal. In strategic terms, the program focuses on the development of management systems that guarantee high performance standards by contributing to the establishment of best practices and measuring the implementation of such practices. This way, a system of excellence is gradually built up.

The goal: excellence in all areas

In the year under review, two new Knorr Excellence initiatives were launched. Engineering Excellence focuses on efficient, standardized processes in development, while Aftermarket Excellence is concerned with enhancing and emphasizing the distinctive character of our worldwide service business.

EE – optimizing development processes

The Engineering Excellence initiative was launched in the year under review, taking the worldwide implementation of the Knorr-Bremse production system KPS as its model. The initiative has the clear goal of standardizing and optimizing all development processes with a view to integrating them into the Knorr-Bremse Engineering System KBES of Rail Vehicle Systems and the Truck Engineering Footprint TEFP of Commercial Vehicle Systems.

Within the modular structure of KBES, the initial objective is to continue the refinement of contract and risk management. In the first step, systematic validation management and monitoring after commissioning are to be introduced. The successful implementation of KBES will have a decisive impact in significantly reducing development expenditure.

TEFP aims to further strengthen the competitive position of Knorr-Bremse, intensify worldwide cooperation within the Group, especially at the development centers in Asia and Europe, and further harmonize standard solutions.

AME – excellence in the aftermarket

In the year under review, aftermarket activities within the Knorr-Bremse Group were further expanded in both divisions, Rail Vehicle Systems and Commercial Vehicle Systems. The Aftermarket Excellence initiative launched in 2013 combines the Group's diverse worldwide activities in the area of process optimization.

In the Commercial Vehicle Systems division, the Alltrucks joint venture, which has already been launched in Germany, offers a cross-brand full-service workshop concept for trucks. In the medium term, this concept is to become established throughout Europe. In the Rail Vehicle Systems division, a separate business unit named Knorr-Bremse RailServices was set up in the year under review to provide aftermarket services in the rail vehicle sector. Through the acquisition of Swedtrac in Sweden and the British company Railcare, the core foundations were laid for offering a portfolio of excellent services for rail vehicles throughout the world.

Both divisions are striving to create regional growth, expand their portfolios and partner networks and last but not least harmonize the underlying processes. Their success in achieving excellence in the aftermarket segment will be measured in terms of growing customer demand and against the sales targets set for the next five years.

In the year under review, the six excellence initiatives already launched were further refined: the Q-First quality initiative, Global Purchasing Excellence, Supply Chain Excellence, the People Excellence initiative established in 2011 for HR and executive development, the worldwide energy efficiency initiative (Efficient Cut of CO_2) and Finance & IT Excellence.

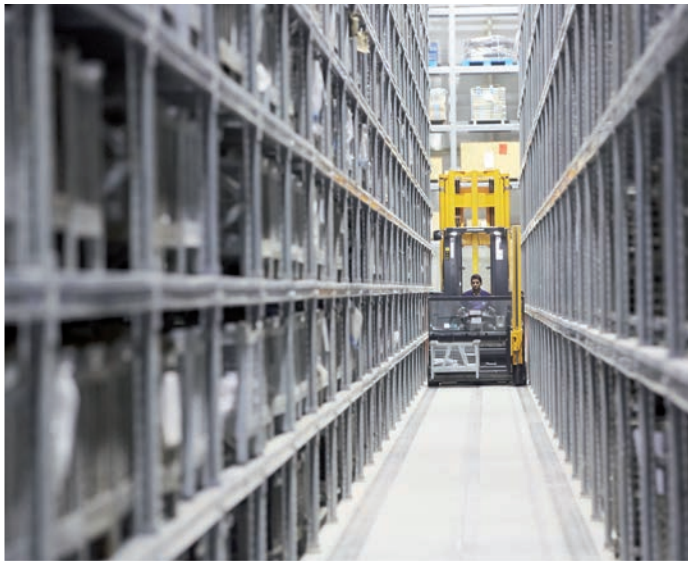
Q-First – smart quality management

Within the Q-First quality initiative, Knorr-Bremse defines specific measures to ensure that each and every component developed and supplied by Knorr-Bremse is of the highest possible quality. Thanks to regular process and project audits, safety-relevant requirements are integrat-

ed into development processes from the very outset. Since the year under review, especially strict audits that are specific to Knorr-Bremse have been conducted to guarantee that internal and external suppliers comply with the Group's high quality standards.

GPE – optimization of purchasing

Purchasing and supplier management constitute a key success factor in the Knorr-Bremse val-



ue chain. One of the mainstays of the Global Purchasing Excellence initiative is the expansion of commodity management, i.e. the systematic control of purchasing activities in the light of product specifications and utilization cycles. One of the primary objectives is to focus on identifying sources of supply in best-cost countries and on further bundling the purchase of outsourced goods.

SCE – improved logistics performance

In 2013, further progress was made with the optimization of processes over the entire supply chain and flexibility was again improved in both divisions. The measures taken respond to the steadily mounting challenges faced as a result of the growing importance of the BRIC countries, with their longer supply chains and more volatile demand behavior. The second focus of the initiative is on continuing professional development. The Knorr-Bremse Value Stream Academy provides training for employees from both divisions on how to attain improvements along the entire value stream.

Knorr-Bremse is working to enhance and harmonize the level of logistics performance across the Group.

PEX – first-class HR and executive development

Within the People Excellence program, work on the Leadership Principles was successfully completed in the year under review. The Leadership Principles are now linked to the content of the Corporate Values and provide the golden thread that runs through the leadership training courses which – together with global professional development programs – are at the heart of the Company's HR development activities. In this context, a systematic feedback process was established which gives managers a chance to reflect on their leadership behavior and identify and implement improvements in discussion with their staff. Further progress was also achieved in human resources planning. The worldwide harmonization and systematization of job descriptions makes for greater transparency in the employee structure, as well as improving training processes and helping to define fair and competitive remuneration.

ECCO$_2$ – energy efficiency and reduced emissions

The overall objective of the ECCO$_2$ (Efficient Cut of CO$_2$) initiative is to significantly reduce carbon dioxide emissions by improving energy efficiency. In 2009, the Group adopted the target of cutting its CO$_2$ emissions by 20% by 2020. To this end, Knorr-Bremse adopted a comprehensive raft of measures, ranging from waste heat recovery through more efficient energy use in production operations to raising environmental awareness among employees. In connection with the ECCO$_2$ initiative, in the year under review improvements were achieved at plants throughout the world, including Berlin, Qingdao and Suzhou. In addition, the many new buildings and expansion projects completed throughout the world in the year under review also comply with strict resource conservation and sustainability requirements.

FIT – efficient financial management and reliable IT systems

Within this initiative, the aim is to optimize processes in finance and IT management with a view to ensuring the highest possible levels of reliability and efficiency. In the finance area, the planning process in particular was made more efficient and adapted to allow for greater market volatility. The overarching goal is to allow precision forecasts which will make a substantial contribution to the more effective use of the available funds. In the year under review, efforts to consolidate structures in the IT field continued. The main emphasis was on expanding project portfolio management, thereby providing targeted support for business processes.


KNORR-BREMSE

SITE-SPECIFIC PROJECTS.

In 2011 the Knorr-Bremse Group launched an extensive program of investment aimed at modernizing and extending its global development and production network. By 2014 the Company intends to invest more than EUR 250 million in state-of-the-art production plant and buildings. As part of this program, Knorr-Bremse opened six new sites in Australia, Brazil, India, Italy and the USA during 2013. With these new buildings, which are all designed in line with the global KPS production system, the Group has realized the highest international standards of process organization, operational efficiency, logistics and quality.

GROUP

At its headquarters in Munich Knorr-Bremse invests in the construction of a modern testing and development center.

Extensive construction projects in Munich

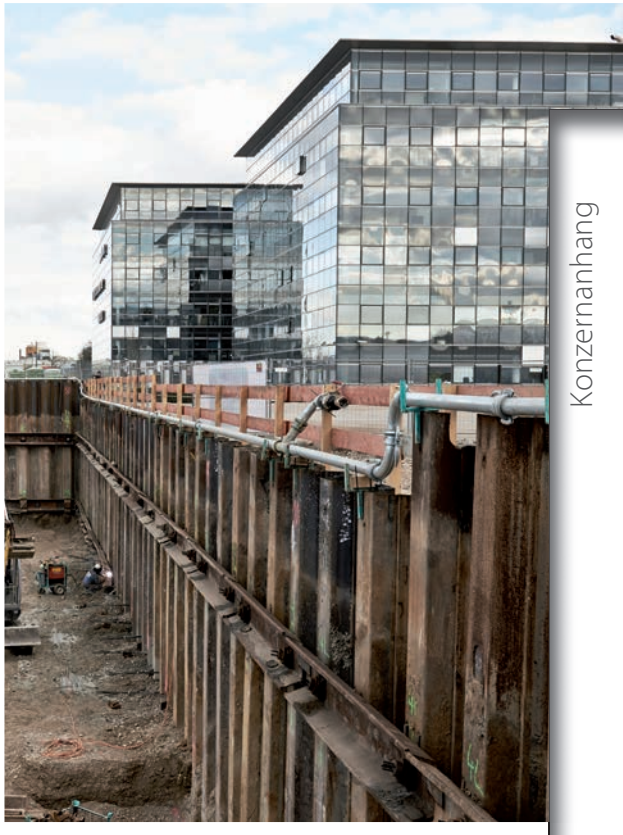
The face of Knorr-Bremse's Munich headquarters is changing: Directly in front of the main entrance the Company has opened a parking block for employees and visitors. Not far from this the Company also celebrated the symbolic ground-breaking ceremony for a new testing and development center. The two projects are not just connected by geographical proximity: Once the testing and development center has opened, its waste heat and ground water heat will provide the entire heating for the parking block.

The testing and development center will bring together the two specialist divisions at the parent site in Munich. In particular in the fields of friction interfaces and brake control, including mechatronics, this will enable the Company to further strengthen its technological leadership in the field of key braking system elements on a cross-divisional basis, making maximum use of synergies.

On completion – planned for the end of 2015 – the building will offer workspace for approximately 350 engineers, who will have at their disposal some 100 test rigs that meet all current global standards. In addition to numerous function, material and endurance test rigs, there will also be four inertia dynamometers and equipment for basic testing of wheel-rail contact. In addition to all this, system test rigs will make it possible to reproduce the braking systems of entire freight trains according to international standards. This is particularly helpful for overall balancing of the entire braking system and offers customers considerable technical and commercial advantages. The testing and development center will provide a basis for Knorr-Bremse to further develop its innovative strengths.

The new buildings meet the highest standards of energy efficiency and sustainability. The testing and development center will be heated entirely through solar radiation and the waste heat generated by the test rigs. Third-generation heat pump technology will transfer any excess heat to the nearby parking block, which therefore also operates without the use of fossil fuels.

All in all, the parking block offers spaces for 637 automobiles, ten disabled drivers and nine motorcycles. The parking space and ramp widths and ramp gradients go beyond compliance with current standards. Owners of electric automobiles have the possibility of recharging them during work, using appropriate charging points.



Rail Vehicle Systems

Opening of new Microelettrica headquarters

Microelettrica merges the production operations of four sites under one roof.

Knorr-Bremse subsidiary Microelettrica Scientifica is the global market leader in the field of electronic and electro-mechanical control components for rail vehicle and infrastructure applications. In the last few years the company has expanded its portfolio not least through acquisitions and today offers its customers a wide range of products including contactors, disconnectors, high-speed circuit breakers, protection relays, resistors, high-voltage transducers and fans as well as DC substation switchgear and equipment. A combination of organic growth and two acquisitions meant that the Company's systems and components were being developed and manufactured at four different locations around Milan in northern Italy, so to boost the efficiency of its structures and processes the Company decided to merge its sites under one roof. In the summer of 2012 the first departments moved into the new Microelettrica headquarters in nearby Buccinasco, and in June of the year under review the facility was officially opened.

To develop the new facility Knorr-Bremse had taken a brownfield site, extensively renovated the buildings and adapted them to its specific needs. This included integrating numerous new test labs with, among other things, a DC traction current supply of up to 3.5 megawatt. In so doing Microelettrica was underlining both the high quality standards that it sets for its products and the importance it attaches to its internal development competence.

Structured by product areas, the components are manufactured in various value-stream oriented production cells, each with its own logistics and warehouse management. Scope has also been provided for each production unit to expand, enabling the company to respond rapidly to any future changes in demand. Total investment in Buccinasco has run to around EUR 26 million.

Acquisition of SWT Swedtrac Sverige AB

Knorr-Bremse has significantly expanded its local service offer in Sweden. In April 2013 the Company acquired SWT Swedtrac Sverige AB, a specialist in rail vehicle maintenance and overhaul with comprehensive service expertise. The acquisition of the company with its 180-strong workforce enables Knorr-Bremse to benefit from its strong positioning in the Swedish market.

The acquisition is designed to bring about a targeted expansion of Knorr-Bremse's portfolio of products and services and enable it to respond better to the needs and expectations of Swedish customers. One focus will be on the additional provision of complex packages of services from a single source. And last but not least, through Swedtrac Knorr-Bremse is also reinforcing its market position in the key region around the Swedish capital of Stockholm. The two Swedtrac depots are situated in the nearby towns of Tillberga/Västeras and Hagalund/Solna and thus have ideal strategic links with all of the country's main rail lines.

With the acquisition of the Swedish service provider Knorr-Bremse expands its local service in Sweden.

SWT Swedtrac Sverige AB was founded in 1998 by former employees of Swedish national rail operator SJ, and its first major project involved the overhaul of the bogies of SJ locomotives. Over the next few years the young company expanded its customer base and business fields, contributing to such important projects as Bombardier's X2000 high-speed train and Alstom's X40 electric multiple unit. The company also succeeded in generating substantial growth based on the creation of new subsidiaries. Knorr-Bremse now intends to continue this policy of expansion.

UK service network expanded

With its acquisition of the long-established British company Railcare, Knorr-Bremse significantly expanded its service network in the UK. The takeover was officially completed on August 26, 2013, and the new company bears the name of "Knorr-Bremse RailServices (UK) Ltd." It is continuing to operate its two service sites at Springburn, near Glasgow, and Wolverton, close to Milton Keynes.

The newly-acquired sites complement Knorr-Bremse's existing presence in Melksham, Corsham and Burton upon Trent. Knorr-Bremse RailServices (UK) Ltd. currently employs more than 200 highly-skilled personnel and in the medium term will not only offer UK customers its established portfolio, which includes rail vehicle parts, overhaul and modernization, but also further customer-specific services.

Opening of new test center in Hungary

Knorr-Bremse's site in Hungary is one of the largest R&D facilities in the entire Group, with more than 200 development engineers in Budapest working on brake components, valves, electronics, software and systems for a wide range of rail applications. As a result of growing demand for testing in recent years, partly triggered by new customer requirements, the site has set up its own test center. The new building, covering an area of almost 3,000 square meters, was completed in June 2013 and began operations shortly afterwards.

The engineers have at their disposal a wide range of equipment that enables them to complete and test their development work in situ. Virtually all the rail vehicle products manufactured by Knorr-Bremse in Hungary can now be tested – mainly consisting of brake calipers, block brakes, valves, compressors and the LEADER driver advisory system.

The test center equipment includes a climate chamber, various vibrator units, infrastructure for environmental testing, an electromagnetic compatibility test chamber, endurance testing equipment for compressors and test rigs on which the engineers can carry out complete product life cycle testing. The ability to carry out testing parallel to production not only complements the development work at the site but also helps maintain the highest standards of product quality. As well as housing the test equipment, the design of the test center takes into account the need to maximize energy efficiency. Waste heat from the compressor test rigs, for example, is used for various surface treatment processes instead of the usual heating elements.

Knorr-Bremse Rail Systems in Turkey

Knorr-Bremse expands its presence in the Turkish rail market.

The Knorr-Bremse Group continues to grow: The creation of Knorr-Bremse Rail Systems in Turkey has strengthened its presence in the country and enabled it to play a more prominent role in various segments of the rapidly growing Turkish rail market. The new company has its headquarters in Ankara, where both the state rail company Türkiye Cumhuriyeti Devlet Demiryolları (TCDD) and Ankara metro have major depots.

The underlying conditions for economic prosperity in Turkey are highly promising: Gross national product has been increasing for years – as have the country's exports – government borrowing is at a low level, and unemployment is steadily declining. 26% of the population is aged 15 or below, and their levels of education are very high. Against this background, the country has been heavily investing in its rail network in recent years. New high-speed routes have been built or are currently at the planning stage, and infrastructure planning is now focusing in particular on passenger mass transit systems in major cities. Rail also plays an important role for freight transportation in Turkey. In 2011 the Turkish rail network totaled just under 12,000 kilometers, but the government has ambitious plans to expand this to more than 25,000 kilometers by the year 2023.

Knorr-Bremse Rail Systems is scheduled to launch operations in Turkey in April 2014. In workshop and office facilities covering 400 square meters the initial focus will be on strengthening the service business for braking, door and HVAC systems. Upcoming privatizations and a growing fleet of rolling stock in the Turkish market suggest that the next few years will see considerable growth. The new company will start by overhauling 6,000 Isobar brake pads per year in its workshops for the high-speed trains operated by the Turkish state railroad company TCDD. The company's service offer will be backed up by a joint field service team for all three systems.

In order to benefit from a highly diversified Turkish supply market, Knorr-Bremse is also integrating strategic procurement for the Rail Vehicle Systems division into the new company. At the same time, Knorr-Bremse Rail Systems in Turkey will be able to respond more rapidly to local requirements and can therefore provide a basis for future localization projects.

Joint venture for Russian rail market

Knorr-Bremse has strengthened its position in the Russian rail market by the creation of a new joint venture. The company, which will produce technical brake products for Russia and other CIS states, was formed in February 2013 in conjunction with Federal Cargo Company FGK, a

subsidiary of Russian rail operator RZD. The name of the new joint venture – "Knorr-Bremse 1520" – is derived from the Russian track gauge of 1,520 millimeters.

With the founding of the joint venture "Knorr-Bremse 1520" Knorr-Bremse has strengthened its position in the Russian rail market.

The rail market in Russia and the other CIS states is of major importance, with over 30,000 locomotives and more than a million freight cars already in operation. In Russia alone, the rail network covers some 85,000 kilometers. For Knorr-Bremse the joint venture offers many opportunities to play a more prominent role in this market. In the medium and long terms there are likely to be large numbers of new projects and upgrades.

The joint venture is based in the city of Tver, roughly 170 kilometers north of Moscow. Following the signing of the joint venture agreement, "Knorr-Bremse 1520" started its operations with manufacturing activities initially taking place at the existing Knorr-Bremse plant in Voronezh and an entire assembly line for the KAB60 control valve being created in Tver. In 2014 it is planned to build a new factory in Tver and expand service facilities in St. Petersburg, Sochi and Astana, Kazakhstan. During 2014 production of the control valve, which was designed especially for the Russian rail freight market, will be transferred completely to the joint venture facility in Tver. With the start of full production, some 400 jobs will be created.

The joint venture is to some extent the next logical step in Knorr-Bremse's business relationship with Russia and other CIS states, which dates back to the 1960s when the former Knorr-Bremse parent plant in East Berlin – "Berliner Bremsenwerk" – supplied brake equipment to Soviet rail passenger cars. In 2007 Knorr-Bremse GmbH was set up to serve the Russian rail market, and since 2011 the company has operated an assembly plant for bogie equipment in Voronezh. In the year under review this was transferred into the "Knorr-Bremse 1520" joint venture.

Thanks in no small part to these past developments, Knorr-Bremse now has an extensive portfolio of products designed specifically for the requirements of the CIS market, and the joint venture will increase the extent to which these are produced locally. In the medium term "Knorr-Bremse 1520" intends to add further products that will also be especially designed for local requirements. One new core product is control valves for freight vehicles, and there will also be a focus on the production of disc brakes and oil-free compressors – all carefully adapted by Knorr-Bremse development engineers to cope with ambient temperatures down to -60 °C.

New Knorr Brake Company facility in Westminster

In recent years a combination of steady growth in the North American aftermarket and three major orders for HVAC systems had brought the existing plant operated by Knorr-Bremse's North American subsidiary Knorr Brake Company in Westminster, Maryland to the limits of its production capacity. In 2011 Knorr-Bremse therefore launched the planning process for a new production plant, and the following year the symbolic ground-breaking ceremony took place. In May 2013 the new plant for the Rail Vehicle Systems division finally opened.

The new plant is located only a few miles away from the previous one in Westminster, which means the company can continue to benefit from skills and expertise of the workforce. Just under 300 employees will develop, manufacture and sell modern rail vehicle systems on a site offering almost three times as much office and production space as the previous one. In addition to brake control systems and bogie equipment, the plant will also produce compressors, air dryers, HVAC and door systems for all types of passenger cars in the American rail market.

Aligned with the principles of the globally harmonized Knorr-Bremse production system KPS, the new plant in Westminster is designed to meet the highest international standards in terms of process organization, operational efficiency, logistics and quality. It also sets new standards

in environmental terms: Under the US LEED (Leadership in Energy and Environmental Design) classification it is rated as being particularly eco-friendly, resource-efficient and sustainable.

Knorr-Bremse has invested a total of approximately USD 28 million in the plant as part of its comprehensive investment program aimed at strategically expanding its development and production network. Provision was also made at the planning stage for the site to be expanded relatively easily should more capacity be required in the future.

20 years of Knorr-Bremse in Korea

Knorr-Bremse Korea is a major supplier to South Korean company Hyundai Rotem, one of the world's biggest manufacturers of rail vehicles. This is partly thanks to the local presence that Knorr-Bremse has maintained in the country for many years – its South Korean subsidiary was originally set up as a joint venture in 1993 and in the year under review celebrated its 20th anniversary.

Within two years of its foundation the joint venture became a wholly-owned subsidiary of the Knorr-Bremse Group. In addition to company headquarters in the South Korean capital Seoul, there is also a production plant in Songtan manufacturing rail vehicle brake components for local and international markets. Through its involvement in new metro projects between 1996 and 1998 for example, Knorr-Bremse quickly established itself in South Korea as a pioneer in modern, state-of-the-art braking systems.

Modern braking systems were also later supplied for light rail vehicles, electric and diesel locomotives as well as air supply systems for the KTX-1 express train. As South Korea continues to invest extensively in modern high-speed trains, locomotives and mass transit systems, Knorr-Bremse is counting on there being opportunities for further growth over the years to come.

Opening of a new site in Australia

Efficiency was the key factor when the decision was made to consolidate Knorr-Bremse's presence in Australia. Since the acquisition of HVAC manufacturer Sigma Coachair in 2010, Knorr-Bremse had been operating four separate facilities in New South Wales. In December 2013, the cross-functional merger of the various factories was completed with the expansion of the Granville plant, and the new shared site was officially inaugurated.

In Granville the company has brought together its Australian business and production activities for rail and commercial vehicle brake systems, Sigma HVAC systems and IFE-Tebel door systems at a single location. The Granville site also hosts aftermarket activities for brake, door and HVAC systems in the rail vehicle sector. This was one factor in the approximately fivefold increase in shop floor space at the newly expanded plant. After the first turf had been cut in February 2012, production at the site, which now covers an area of some 16,000 square meters, was already able to start in April 2013.

Within a few weeks of Knorr-Bremse starting up operations at its new Australian site in Granville, the buildings became the focus of public attention when they received a "Development Excellence Award" from the Urban Taskforce Australia. This is a not-for-profit organization that operates as an adviser to government and local authorities on architectural matters and once a year hands out awards to acknowledge the quality of individual buildings or groups of buildings produced by developers.

A number of different criteria are applied in selecting the winners, including the building's impact on the environment and local economy, as well as the question of how well it fits into its immediate surroundings. As this is a nation-wide competition, the award is a highly prestigious honor. The new Knorr-Bremse site was granted the award in the "Best New Industrial Building" category.

Relocation of Sydac to new facility

Knorr-Bremse subsidiary Sydac, a leading global specialist in the development and manufacture of rail driving simulators, has a new home. In July 2013 the company moved to a building specially designed for its needs in Adelaide, Australia. The site has a total area of 1,700 square meters, of which just over two-thirds is devoted to office space, with the remaining 500 square meters housing assembly and testing equipment for simulators.

The fact that all Sydac's facilities are now on the same floor means the company can benefit from considerably greater synergies between design, production, testing and administration than at the previous site – also in Adelaide – where the various departments were spread across three different floors of an older building and the manufacturing facility was 15 kilometers away.

New facility in Palwal, India

Knorr-Bremse opens a state-of-the-art facility for rail vehicle systems in India.

India has been investing in infrastructure expansion for many years, with an important focus on creating an up-to-date rail network. Modernization of existing rolling stock is involved, as well as the ordering of new vehicles for passenger and freight transportation – two areas in which Knorr-Bremse has been highly active in India for several years. With the extra capacity provided by the opening of a new facility in 2013, the company is now in a strong position to respond to growing demand in the future.

The new facility is located in Palwal 30 kilometers south of the former site in Faridabad, and offers around 26,000 square meters of production and office space. Here, some 500 employees manufacture brake control systems, bogie equipment, compressors and air dryers for rail vehicles. In line with Knorr-Bremse's international strategy they are destined primarily for the Indian market and are manufactured in close collaboration with certified regional suppliers.

Along with state-of-the-art production technologies, optimized plant logistics and an improved working environment for the employees, the new facility also presents an ecological focus. Energy-efficient air conditioning and high levels of insulation help reduce its carbon footprint, while water consumption is substantially reduced by the systematic recycling of production waste water.

Commercial Vehicle Systems

20 years of Knorr-Bremse at Lisieux site

Every year more than 700,000 brake cylinders and 300,000 compressors leave the French plant in Lisieux.

The town of Lisieux in northern France may only have some 21,000 inhabitants but it plays an important role for the Knorr-Bremse Group. Every year, more than 700,000 brake cylinders and 300,000 compressors leave the factory. In September of the year under review the site celebrated its 20th anniversary in the presence of many invited guests.

It all started in the early summer of 1993 when the plant first opened and production of the NG3 brake cylinder was launched. Since then the site has grown rapidly: At the turn of the millennium Knorr-Bremse Commercial Vehicle Systems expanded the building by 50% in order to increase capacity and boost production efficiency. In 2002 a new test laboratory for compressors was opened, and four years later production was launched of the NG5 – a new brake cylinder series featuring an integrated valve – for Iveco. Then in 2009 Lisieux came up with another innovation: the first compressor with clutch. Because this offers considerable fuel savings and significantly reduces oil loss, this plays a key role in the air supply for all pneumatic braking systems and as such is of considerable importance for the development of sustainable transport networks.

Nowadays, the Lisieux site generates annual sales revenues of almost EUR 150 million – three times as much as when it first opened. Research & Development, Quality and Supply Chain Management are the site's main pillars – and one of the reasons why its importance goes well beyond the production of components and systems.

Damper production in Berlin optimized

Visco dampers play an important role in reducing unavoidable torsional vibration, thus avoiding crankshaft damage and ensuring safe engine performance. Hasse & Wrede, part of the Knorr-Bremse Group, develops and manufactures visco dampers for car, truck, marine and industrial engines. Improvements introduced during the year in question mean that the production process for these components now involves significantly fewer parts.

As part of a project run by the Value Stream Academy – the in-company training center – a new workplace concept was developed. This was then visualized using cardboard engineering and elaborated in detail with the aid of a software application. The result of the modelling process was a new value stream consisting of synchronized process steps that have created an improved materials flow. On some production lines it has been possible to more than halve the overall production space and the inventory required between individual process steps.

The project also looked at the scope for improving workplace ergonomics, for example by the use of workpiece holders and modern handling technology such as manipulators. This has been of particular benefit to older employees.

New test center in Budapest

Knorr-Bremse has expanded its testing infrastructure at its commercial vehicle plant in Budapest. Staff moved into the new test center in December, and it started up operations shortly afterwards. On a work area of 4,000 square meters spread over three floors engineers can now carry out their own in-house testing as part of the development process.

Testing is mainly carried out on products destined for volume production and involves functional, endurance and environmental resistance testing of valves, conventional air treatment

units and clutch boosters. But the center also supports advance development of torsional vibration dampers, transmission and clutch activators and compressors. Expansion of the testing department has also enabled the plant to carry out previously outsourced activities directly on-site. At the same time the new buildings have increased efficiency by making it possible to combine various testing activities. And the new mud test chamber is unique within the entire Knorr-Bremse Group.

Opening of on-site health center at Bendix

In September 2013, the site operated by Knorr-Bremse subsidiary Bendix in the US state of Indiana, which produces systems and components for the North American truck market, was further improved by the opening of an on-site health center. Employees now have access not only to health advice and primary care services but to follow-up care as well. The main focus of the new center, though, is on prevention.

The fact that Bendix runs the health center in partnership with Marathon Health Inc. is no coincidence. Both partners share a forward-thinking approach to health management based on prevention and a holistic view of health promotion. The goals of the Bendix "Be Healthy" program fit well with those of the new health center's operator.

25 years of Bendix in Acuña

When Knorr-Bremse's North American subsidiary Bendix first opened its production plant in Acuña, Mexico, back in 1988, few people could have imagined that it would become one of the Bendix family's fastest-growing manufacturing campuses. In May 2013 the Acuña site celebrated 25 years of innovation, expansion and community involvement.

The Bendix Acuña manufacturing operation now consists of three state-of-the-art facilities employing more than 1,000 workers and covering an area of some 40,000 square meters. The Acuña campus – honored by Knorr-Bremse as its top-ranking plant in 2011 – has undergone various stages of growth over the years: Plant I was established with a focus on OEM assembly and machining. Acuña II opened in 2000 and is primarily dedicated to remanufacturing and OEM service. And Bendix opened Acuña III in 2010, adding more than 150 jobs to the roster.

Acuña achieved a long list of accomplishments as part of the Bendix family, including several growth initiatives, product line expansions, and a world-class safety record. But the plant has also been a positive force in the community, amongst other things funding the construction of a community library, infrastructure improvements at nearby schools, playground installations and assistance for a local orphanage. It also offers its own employees an extensive in-house program of training and medical services.

New facility for Knorr-Bremse in Brazil

For 35 years Knorr-Bremse Brazil was located in São Paulo, but business growth in recent years meant the site had reached the limits of its capacity. As the area around the plant was also increasingly turning into a residential district, expansion was not an option, so a new, state-of-the-art development, production and sales facility was created on a site measuring 31,500 square meters in the town of Itupeva, 85 kilometers away. Since early February 2013 it has been operating at full stretch. In April the official opening ceremony was held in the presence of large numbers of distinguished customers and business partners.

In its new facility in Brazil Knorr-Bremse sets the highest standards with regard to process organization, operational efficiency, logistics and quality.

The highest standards in terms of process organization, work efficiency, logistics and quality are assured by application of the global Knorr-Bremse production system KPS. Planning of the site focused not only on optimizing layout and improving production processes but also on setting up an in-house surface treatment section and introducing a modern logistics concept for materials supply. Suppliers were also involved in the process. A "lean conversion" project introduced measures to enhance the efficiency of production line workplaces. All in all this has resulted in considerably shorter manufacturing throughput times.

Another planning principle was to make the distance between development and production activities as short as possible, with all production-related departments including product development located directly in the plant. Other advantages of the site are its excellent transport links and the availability of a highly-qualified workforce. In Itupeva environmental considerations were also taken into account at the planning stage for the new plant with a view to reducing energy consumption and environmental impact to a minimum. Thanks to measures such as these, the plant, in which some EUR 40 million has been invested, is one of the most modern in the entire Knorr-Bremse Group.

Itupeva is the biggest joint production facility for the Knorr-Bremse Group's two divisions. In the truck division, Knorr-Bremse produces the full product portfolio for the South American truck market, including brake control valves, air supply and treatment systems, brake cylinders, disc and drum brakes and torsional vibration dampers. Some 70% of the site's business relates to this sector. For the rail vehicle division, the company sells brake control systems for passenger and freight trains, bogie equipment and on-board systems.

New commercial vehicle system research and development center in Shanghai

In recent years the ongoing growth of the Chinese economy has led to a constant high level of demand for commercial vehicles. Knorr-Bremse has been quick to react to this state of affairs

and for several years has been successfully manufacturing a variety of commercial vehicle products in Dalian and Chongqing.

In the year under review, the Company opened a research and development center for commercial vehicle systems at CVS China's headquarters in Shanghai – the Technical Center China (TCC). The engineers who work there are tasked with intensive research into new products and system solutions that are precisely tailored to the Chinese market. This enables Knorr-Bremse to work more closely with local commercial vehicle customers.

Own compressor test rigs in India

In the past, when Knorr-Bremse India wished to test compressors, considerable costs were involved. Because the Pune site did not have its own test rigs for such systems, Knorr-Bremse had to send the compressors to its plant in Lisieux, France – in many ways an expensive and complex operation, not just because the compressors had to be shipped to France, but also because the test rigs in Lisieux usually operate at full capacity.

It was this that prompted Knorr-Bremse to install its own compressor test rigs for commercial vehicle applications in Pune. During the year under review, the last of the three rigs went into operation – simplifying existing procedures and lightening the load on the test rigs at the Lisieux plant. Knorr-Bremse in India is now able to carry out its own testing on the spot – thereby helping to enhance local levels of expertise and customer service.

Opening of a new production and development center in India

In the long term, India is one of the biggest commercial vehicle growth markets in the world. The healthy order levels at Knorr-Bremse India in recent years reflect the steady economic growth enjoyed by the country, and there are few signs that growth rates will decline in the

Together with the new production facility Knorr-Bremse opened a modern development center for both corporate divisions in Pune.

medium and long term. However the sheer volume of orders would have been more than Knorr-Bremse could have handled at its existing commercial vehicle plant in Pune in Central India. To remedy the situation, the Company therefore started work in November 2011 on building a new production plant and development center for commercial vehicle products. Two years later, in November 2013, the opening ceremony took place for the new plant, which is located just a few hundred meters from the original site.

The new building houses an ultra-modern factory that offers 12,000 square meters of production and office space – significantly more than the previous site. Here, 250 employees manufacture a range of products including brake cylinders, valves, pedal units, air dryers, slack adjusters, compressors and an internally developed lift-axle system for the Indian commercial vehicle market.

In line with Knorr-Bremse's corporate philosophy, the architecture and layout of the new production plants support optimum procedures through transparent structures that are designed to promote open communications between production and support departments. Knorr-Bremse has also created extensive opportunities for expansion in the production sector. As a result, in the future, Knorr-Bremse in India will be able to respond very quickly to new market requirements and flexibly expand its portfolio to include new product lines.

In India Knorr-Bremse has also implemented the globally standardized Knorr-Bremse production system KPS in order to ensure uniform processes throughout the entire supply chain, from raw material processing via surface treatment to assembly and final quality testing. The new building not only meets the highest standards in terms of an improved working environment; the Company has also taken environmental issues into account and adhered to "Green Building Standards". For example, an effective air-conditioning system combined with high standards of insulation has significantly reduced carbon dioxide emissions.

To strengthen R&D activities, a modern development center for both company divisions has also been set up alongside the new production plant. This brings engineering and development services for rail and commercial vehicle products under one roof and enables the Company to respond to strong growth in the Asia Pacific region and expand its product portfolio in response to specific customer requirements. By the end of 2014 the development center will provide work for some 200 employees.


Technology Center India

MARKET SUCCESSES. Strong business expansion, particularly during the latter half of 2013, drove orders to an all-time high at Knorr-Bremse. While in Europe and North America demand returned to the high level of previous years, dynamic growth in Asia, in particular, continued apace – as demonstrated by numerous contracts signed for new rail vehicle systems in the Far East.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In the European region – which for the Knorr-Bremse Group includes the Middle East and Africa – many new contracts were signed. The Commercial Vehicle Systems division succeeded in securing orders for new platforms created by well-known European truck manufacturers. Special vehicles from Goldhofer and Dennis Eagle, for example, continue to be equipped with Knorr-Bremse systems. And important orders in the rail vehicle segment came from the Czech Republic, Russia and Turkey. Finally, with its involvement in what is currently the most challenging high-speed project in the world – the line between Mecca and Medina – Knorr-Bremse is able to demonstrate its systems and development competence in Saudi Arabia as well.

Rail Vehicle Systems

Sales successes for low-noise LL-blocks

Unlike the cast iron brake blocks traditionally used on freight cars, so-called LL-blocks do not cause roughening of wheel running surfaces, and their use therefore reduces noise emissions. They can easily replace cast iron blocks without any need to modify the braking system, and they play a vital role in making freight trains as quiet as possible. In 2013 Knorr-Bremse recorded two major successes with this product in its two core markets of Germany and Austria.

Both German Railways and Austrian Railways have launched plans to equip part of their freight car fleets with low-noise LL brake blocks.

2013 saw German Railways (DB) and Austrian Railways (ÖBB) launch plans to equip part of their freight car fleets with low-noise LL-blocks. In Germany Knorr-Bremse succeeded in winning an order to supply 25,000 such blocks for installation in DB freight cars during the course of 2014 – half the volume that had been put out to tender. And in the case of Austrian Railways, Knorr-Bremse received an order for 40% of the total tender volume. The 5,000 LL-blocks in this case form part of a major field test of 450 sets of freight car equipment launched by ÖBB with a view to gathering practical experience with the new blocks.

The decision made by DB and ÖBB as major freight operators to start retrofitting their trains with LL-blocks sent an important signal to the European rail sector, where some 500,000 freight cars are currently in operation of which around 250,000 would be suitable for LL-blocks. At a rough estimate the initial requirement will be for at least four-and-a-half million new brake blocks.

The LL-blocks are manufactured by Icer Rail, a Knorr-Bremse joint venture located in Pamplona, Spain. Knorr-Bremse also sells numerous other noise-reducing brake components including, for example, the CFCB compact freight car brake, oil-free compressors and the Flexpad Silent sintered brake pad.

First major order from Škoda

Bavarian train operator Bayerische Eisenbahngesellschaft (BEG) recently put out its regular call for tenders for the operation of regional trains between Nuremberg, Ingolstadt and Munich (NIM) – the so-called "Ringzug West" – from 2016 onwards. This time the contract was won by DB Regio Oberbayern, which aims to run new trains built by Škoda on the high-speed route. Knorr-Bremse is to supply braking, door and HVAC systems for the six six-car bilevel trains. It is the first time Knorr-Bremse has supplied HVAC systems to the Czech company – and also Škoda's first project with German Railways (DB).

The new trains are capable of top speeds of 200 km/h, but DB Regio Bayern will be running them at a maximum of 189 km/h. The bilevel cars are designed to be particularly pressure-resistant – significantly reducing sudden interior pressure fluctuations in tunnels – and the door systems therefore play a crucial role.

The passenger cars are designed to be spacious and comfortable, and the train will offer multi-purpose areas throughout its length in order to cope with high demand from commuters and leisure travelers. The first prototype is scheduled for approval testing at the end of 2014.

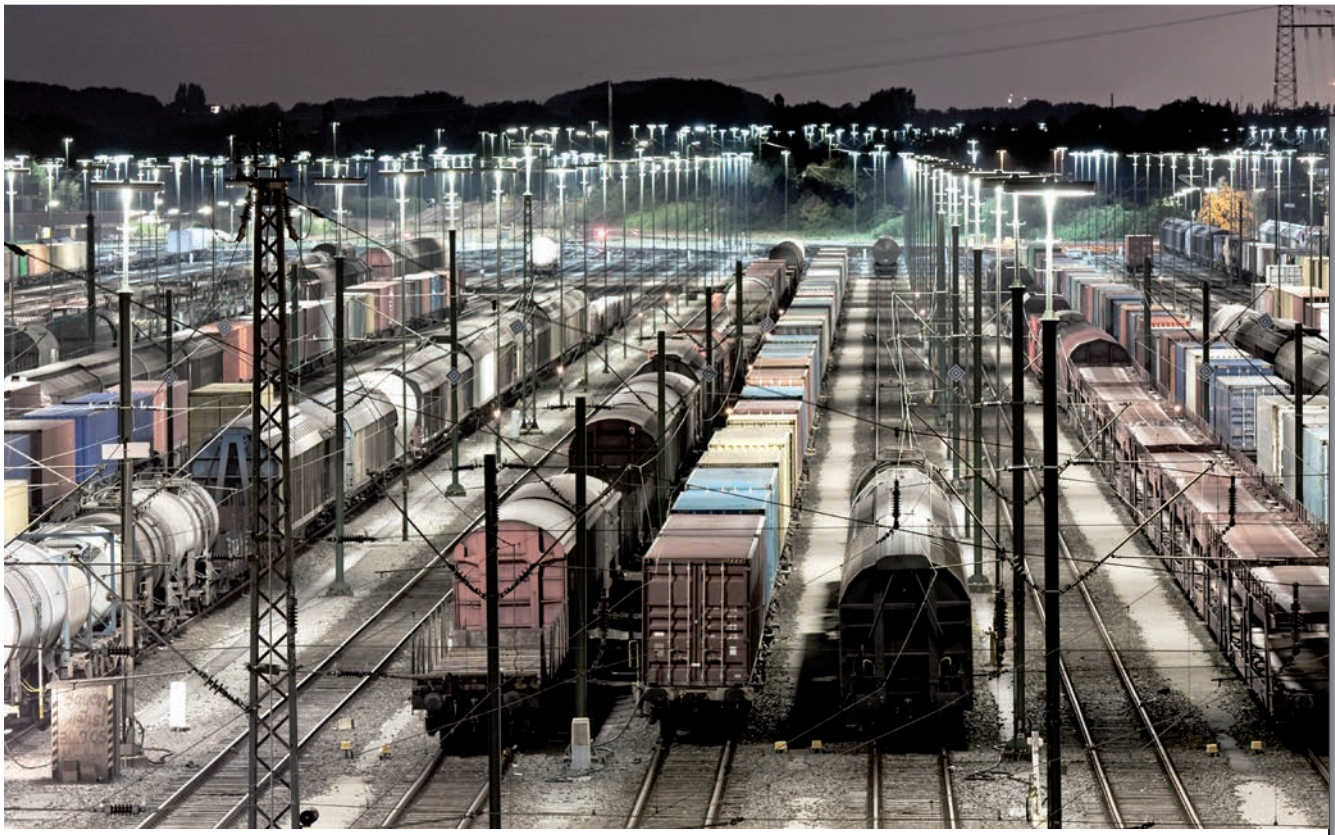
Sydac simulators for Karlsruhe

The new concept developed by Karlsruher Stadtbahn, the mass transit operator in the city of Karlsruhe, is rather special: Instead of passengers having to change from trains to streetcars, the trains themselves look after the changeover. The Karlsruhe transport company Albtal-Verkehrs-

Gesellschaft (AVG) uses specially-built vehicles capable of operating both as streetcars in town and on normal train tracks outside the city.

As part of a fleet modernization program AVG ordered 30 Flexity Swift trains from manufacturer Bombardier Transportation and also took out options on a further 45 units. In addition to supplying the braking systems, Knorr-Bremse is providing a further key system in the form of Sydac drive simulators. Using this technology, drivers will soon be able to practice operating on a stretch currently under construction that runs partly underground below a traffic-free pedestrian precinct in the city center.

To help with driver training, Sydac has supplied a full cabin simulator and four console simulators. This is an important European reference project for the company, as it is the first time it has produced simulators for vehicles with two different modes of operation and signaling systems. Particularly in the case of streetcars, drivers have to take into account other road users such as buses, cars and pedestrians – which calls for an extremely realistic simulation of the operating environment. To achieve this, the simulators combine a range of sophisticated Sydac technologies, including an environmental management system module and patented "Live 3D" technology with dynamic visual effects and a realistic extension of the field of vision. Combined with high-definition monitors, the original driver consoles and instruments from Bombardier Transportation incorporated into the simulators make for an extremely realistic training environment.



Equipment for "ÖBB cityjet"

It is no coincidence that one of the latest Desiro projects from Siemens bears the red and white colors of the Austrian flag, for it was Austrian Railways (ÖBB) that ordered 100 new Desiro trains during the year under review. Two key elements in the braking systems come from Knorr-Bremse.

The Desiro ML is a low-floor version of the successful Desiro platform. The 160 km/h, three-section electric multiple units come with 244 or 259 seats for urban or mainline operations respectively and will bear the name "ÖBB cityjet". Knorr-Bremse is responsible for the EP compact brake control system and the bogie equipment. As its name suggests, the former is distinguished in particular by its extremely compact design – for the first time ever the development engineers have succeeded in fitting an entire brake control panel under just one row of seats while still ensuring proper maintenance access.

The 100 Desiro ML trains constitute the first tranche of an order for a total of 200 trains. Under the terms of the current platform agreement, Knorr-Bremse will also automatically supply both systems if ÖBB realizes any further options. The first systems are scheduled for delivery to Siemens in mid-2014.

Systems for new metro trains in Rome

Spanish rail vehicle builder CAF is supplying 15 new six-car trains to the Italian capital for operation on metro line B1. Knorr-Bremse – having already supplied products to CAF on previous occasions – was able to win the contract for braking systems for the new vehicles during the year under review, and by the end of 2013 the first air supply, brake control and bogie components had already been delivered.

The components have not been combined into a standard product; rather, the braking system was designed to meet the customer's specific requirements for the vehicles concerned. The air supply modules, for example, are specially manufactured, and Knorr-Bremse has also supplied specially-designed traction-brake manipulators and pneumatic modules for controlling the cabin and pantograph equipment. Knorr-Bremse subsidiary Merak is responsible for supplying HVAC systems for the project.

Brake and door systems for Czech Railways' Railjet trains

During the year under review the rail systems division of Siemens AG received an order for seven seven-car Railjet trains from the Czech Republic. Czech Railways (ČD) is to use the Intercity trains to modernize its fleet and intends to operate them on cross-border routes. The idea is that the Railjet trains will improve the quality of rail travel by offering better service and greater comfort and become a credible alternative to car or bus journeys on congested roads and highways. The trains are scheduled to go into service in 2015 on the Prague-Budapest line. The Knorr-Bremse Group is heavily involved in the project and will be supplying various systems.

Knorr-Bremse is equipping Railjet trains that will be used in cross-border operations between Prague and Budapest.

Knorr-Bremse GmbH in Mödling, Austria is supplying complete sets of braking equipment for the cars and bogies that will bring the new high-speed trains to a safe halt from speeds of up to 230 km/h; and Knorr-Bremse subsidiary IFE is supplying entry systems including sliding steps. In principle these are the same components as have already been supplied to Austrian Railways (ÖBB) for 51 trains. The supply contract was signed in March 2013, and Knorr-Bremse was able to start delivery of the first systems within five months.

Knorr-Bremse supplies complete braking system for new UK Hitachi train

Starting in 2017, the UK's Great Western Main line is to replace its current rolling stock with Class 800 Intercity trains manufactured by Hitachi Rail Europe. In one of the biggest single orders in Knorr-Bremse's history, the Company is to supply complete braking systems for the first 600 vehicles. This acquisition of a new customer in the UK was the result of close collaboration between Knorr-Bremse sites in Britain, Germany and Japan, which between them came up with the right braking solution for the new train. The package includes the EP Compact electronic brake control system, bogie equipment and the air supply system with oil-free compressor.

With their top speed of 200 km/h the newly designed high-speed trains form part of the Intercity Express Program (IEP) and will initially replace the current Intercity 125 fleets on the Great Western Main line as well as those operating on the long-distance routes from London to destinations such as Aberdeen, Bristol, Cardiff and Edinburgh. In a second phase the new trains will also enter service on the East Coast Main line.

The Intercity Express program is a long-term project that involves demanding targets. The Knorr-Bremse braking system was selected because it offers exactly the right levels of safety, performance, reliability and technical compliance to suit the requirements of the new train – and also has low life cycle costs.

Employees at Knorr-Bremse Rail Systems UK in Melksham will be supporting Hitachi Rail Europe, not only for the initial supply and commissioning of the brake system, but also throughout the new trains' entire life cycle.

Third-generation brake control system for Thameslink

In the year under review, Knorr-Bremse Rail Systems UK drove forward the development of the third generation of the EP2002 distributed brake control system. The previous generations of

For the Thameslink project in the UK Knorr-Bremse is developing a new generation of the EP2002 braking system.

this sophisticated system have been sold for installation in metro cars and multiple units worldwide. In its third-generation guise, EP2002 is to be installed in the new multiple units that Siemens is building for the Thameslink extension program.

Thameslink is a 50-station mainline route running 225 kilometers north to south through London from Bedford to Brighton. Apart from the Underground and the West London line, this is the only railway line running across London rather than ending at a terminus. A major success ever since it first opened, for many years now Thameslink has been severely overcrowded, carrying more than 28,000 passengers in the morning peak. The Thameslink extension program is one of the largest rail infrastructure projects in the UK and will create capacity for more frequent and longer trains.

Siemens is to build a total of 1,140 commuter rail cars for Thameslink, based on the new Desiro City platform and running as eight- and twelve-car trains. Innovations in the third-generation EP2002 mean that for the first time these multiple units will feature a brake control system with two-stage emergency brake, as well as a PROFINET data communication and automation system. When the trains are in service, an Ethernet port will offer extended diagnostics options and real-time display of the status of all valves.

Hydraulic braking system for new streetcars in Istanbul

Istanbul already has a well-established streetcar network that plays an important role in the city's public transport system. Now the operator, Ulasim, has decided to develop and build its own modern streetcar fleet and has contracted Knorr-Bremse to design and supply the hydraulic braking system, including sanding system, as well as the pneumatic suspension and doors. An initial 18 vehicles are being equipped, but the manufacturer has taken out an option on a further 80. The vehicles were commissioned at the end of the year under review, and the first of the new streetcars will go into regular service during the first quarter of 2014.

Involvement of Knorr-Bremse in expansion of Ankara metro

In the biggest order ever received by the company from a European operator, Chinese manufacturer CSR Zhuzhou Electric Locomotive Co., Ltd. has been chosen to build more than a hundred trains for the metro system in the Turkish capital of Ankara. Knorr-Bremse is to equip the 108 three-car trains destined for service on three new metro lines in the city with complete braking systems (air supply, EP 2002 distributed brake control and bogie equipment).

Specially developed to meet the needs of the metro segment, EP2002 is modular in design and combines electronic and mechanical components into a single mechatronic unit. The 20 kg "smart valve" mounted on each bogie monitors all the required functions for the load-dependent emergency and service brake, the wheel flat protection system and the full range of self-testing functions. Once installed in the train, the modules are connected with each other via data bus, enabling the braking force on the axles to be varied according to the particular operating situation and a wide range of factors such as the availability of the dynamic braking system.

The 3-car trains, the first of which will go into service in January 2014, are being built by CSR Zhuzhou Electric Locomotive Co., Ltd. partly in Turkey and partly in China. Each of them carries more than 1,000 passengers and operates at speeds of up to 80 km/h. The use of local Turkish service engineers enables Knorr-Bremse to provide a high level of professional support during the initial product introduction phase.

Promising order from Russia for equipment for regional multiple units

In an important first step towards becoming a supplier for the Russian regional rail segment, Knorr-Bremse has received an order to develop and deliver complete direct and indirect braking systems, consisting of air treatment, brake control, adaptive wheel flat protection, sanding system, compressed air supply and bogie equipment, for numerous "Desiro RUS" regional multiple units.

By supplying "Desiro RUS" multiple units, Knorr-Bremse is taking its first big step in the Russian regional market.

The 38 Desiro trains, which started to be delivered by Siemens during the year under review, are intended primarily for regional operations in and around the southern Russian city of Sochi, which hosted the Winter Olympics in February 2014. The trains' top speed is 160 km/h and they can accommodate a total of 845 seated and standing passengers. Because the trains also connect to places relatively high up in the mountains, they are designed to cope with gradients of just over 4%, which was a considerable challenge for the developers of the braking system. All components are designed to operate at ambient temperatures down to -50 °C – the calipers even down to -60 °C. Vulnerable components and systems have been completely encapsulated to protect them from the impact of stones and lumps of ice.

After the Games had ended, operator RZD started to deploy some of the trains, together with a further 16 that had already been ordered, in other parts of Russia, including St. Petersburg and Moscow. RZD also placed an order for a further 1,200 Desiro RUS trains, which are being built by a joint venture between Sinara and Siemens with the name of "Ural Locomotives". By 2017 the trains' local content will be 80%. Knorr-Bremse is supplying complete braking systems for the first six five-section trains. As in future these components will be manufactured by the Russian-based joint venture Knorr-Bremse 1520 in Tver, Knorr-Bremse is also making an important contribution towards increasing the localization rate.

Extensive involvement in mass transit projects in Moscow

Knorr-Bremse is extensively involved in three major mass transit projects in Russia's capital – the new Aeroexpress trains that will shuttle between Moscow's three airports and the city center, modern low-floor streetcars and numerous new vehicles for Moscow metro.

In the case of the 25 Aeroexpress bilevel multiple units ordered from Swiss manufacturer Stadler, Knorr-Bremse is supplying the brake control system and bogie equipment. These will be installed in 16 four-car and nine six-car trains which the operator is purchasing to upgrade its fleet and expand its capacity. In recent years passenger volumes on the Aeroexpress lines have grown by almost 20% per year.

Moscow is also investing in its streetcar network. In mid-2013 Polish vehicle builder Pesa, in conjunction with Russian manufacturer Uralwagonzavod, received a major order for 120 new low-floor streetcars. In this case, the Knorr-Bremse Group is responsible for developing and supplying the hydraulic brakes and door systems. In addition to a demanding delivery deadline, the hydraulic components had to be winterized to temperatures down to -40 °C – which was a considerable challenge. Knorr-Bremse was able to deliver the first systems to the vehicle manufacturer on schedule in December 2013, and shortly afterwards preparations began for their commissioning in Moscow.

Knorr-Bremse also received a further order – this time for Moscow metro. The Company is to install compressors, block brake units and door systems in 328 new vehicles that were ordered from manufacturer Metrovagonmash during the year under review. It is also supplying control elements for the pneumatic suspension. In previous years Knorr-Bremse had already been involved in orders placed annually by the metro operator with a view to regularly modernizing its

fleet. Once again, during the year in question, the clinching factors in winning the order included the low overall cost, the high levels of service skills amongst local staff and Knorr-Bremse's ability to produce directly on location in Russia.

Equipment for Russian mainline passenger trains

Knorr-Bremse had a further opportunity to underline its ability to produce to GOST standards during the year under review when it was contracted to supply systems for a total of 330 mainline passenger cars ordered by the state railroad company RZD from manufacturer Tverskoy Vagonostroitelniy Zavod (TVZ) – a subsidiary of Russia's biggest manufacturer of locomotives and railroad equipment, CJSC Transmashholding.

The order covers 240 sets of bogie equipment for classic mainline passenger cars, 50 sets for bilevel cars and 40 for RIC passenger cars used on cross-border routes. The equipment consists of brake calipers and discs as well as a traction control system to ensure optimum friction between wheel and rail and help avoid wheel flats.

The bilevel and RIC cars are one-off orders placed by the operator with TVZ, whereas the contract for 240 classic passenger cars represents this year's order from an operator who purchases new rolling stock to a varying extent on an annual basis. The contractual partner for the development and production of the systems is the Group's Russian joint venture, "Knorr-Bremse 1520".

HVAC systems for Talgo trains in Russia

Merak is developing HVAC systems specially designed to meet the demands of the Russian market.

Russian state railroad operator RZD has placed an order with Spanish manufacturer Talgo for seven 20-car trains equipped with an automatic gauge changeover system. In combination with planned reductions in customs and border checks, the trains should significantly cut the time required to travel from Moscow to Kiev and Berlin. Knorr-Bremse subsidiary Merak is to equip the trains with special HVAC systems.

Merak is supplying a total of 126 units designed to the GOST standard, each with an output of 15.5 kW and 22.5 kW. As they will be positioned inside the cars rather than on the roof or below the sub-frame, it was a challenge to meet the compactness required for such a restricted installation envelope. Even more challenging was adaptation to GOST standards and to low ambient temperatures.

Talgo also intends to install Merak's HVAC units for its new series of at least 21 further trains (603 cars in all) for use in Kazakhstan. These trains are equipped with the latest technology, can run at 220 km/h, will be partially localized and have been specially designed by Talgo for the region's adverse meteorological conditions.

Talgo's automatic gauge changeover system was specially developed for the transition from the Russian to the European rail system. The train is able to switch gauge without stopping, avoiding the usual wait of several hours at the Belerus-Poland border for the wheelsets to be replaced. Soon a train journey from Moscow to Kiev will be reduced from the current 13 hours to a mere seven; and a trip to Berlin will be cut from 27 to 18 hours.

Further braking systems for Alstom order from Kazakhstan

Kazakhstan's state railroad company Kazakhstan Temir Scholy (KTZ) had already ordered 25 Type KZ8A double locomotives for freight operations, the first of which – complete with Knorr-Bremse braking systems – were delivered in December 2013. But during the year under review,

Kazakh joint venture EKZ also announced its intention to exercise the option on braking equipment for 175 further locomotives that it had secured at the time. For Knorr-Bremse this will represent yet another major order from the GOST market in 2014.

The KZ8A project represented a challenge for the Company, not least because of the need to design the systems and components for operating at very low ambient temperatures. Traditional materials quickly reach the limits of their capabilities at these temperatures, but in developing the systems for the KZ8A project Knorr-Bremse was able to draw on previous experience with Russian projects, for example with mainline passenger cars or the Sapsan high-speed train.

The Company had to develop new, cold-resistant plastics and elastomers that were essential for the extreme temperatures found in Kazakhstan. Much higher demands are also made on the tolerances of moving parts, as strong temperature fluctuations cause materials to expand and contract at differing rates.

At the heart of the braking systems for the double locomotives is the BP Compact brake control system including wheel flat protection. The new KAB60 control valve specially developed by Knorr-Bremse for use in Russian freight trains will also be used for the locomotives; and the bogies will be equipped with Type PEC7 winterized block brakes.

Equipping Vossloh locomotives for South Africa

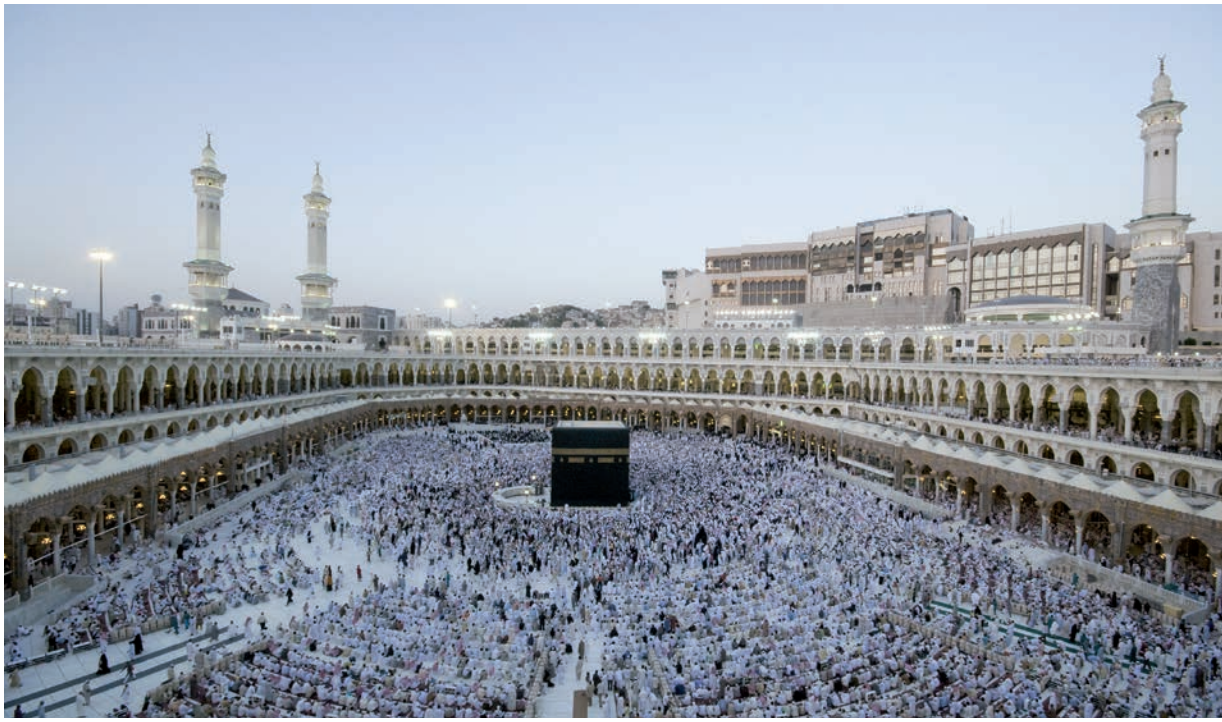
The Passenger Rail Agency of South Africa (PRASA) is currently expanding and upgrading its fleet, and during the year under review placed an order with rail vehicle builder Vossloh for 20 new EURO locomotives to pull its passenger trains. Knorr-Bremse is closely involved in the contract and is supplying the locomotives with braking systems. PRASA has also signed a declaration of intent for a further 50 locomotives for 2014.

While EURO4000 locomotives only have diesel engines, EURODUAL locomotives have both a diesel engine and a pantograph, enabling them to operate on electrified as well as non-electrified lines. Use of a single type of locomotive on the country's railroad system, which is only partly electrified, helps keep down investment, maintenance and operating costs. The new locomotives are also highly efficient, which makes them particularly suited for optimizing rail transportation in South Africa.

A contribution to greater efficiency is also made by the Knorr-Bremse braking systems installed in the locomotives, which have been specially adapted to the 1,067 mm gauge used in South Africa. Both types of locomotive are equipped with vacuum brakes, so that they can pull the cars with vacuum brakes that are still found on the country's rail network. Vossloh will be delivering the first locomotives in mid-2014 under a contract that runs till the end of 2016.

High-speed systems for desert conditions

This particular project provides a perfect example of the engineering expertise and reputation of the Knorr-Bremse Group. In what is one of the world's most challenging high-speed rail projects – the line from Mecca to Medina in Saudi Arabia – the operating company and vehicle manufacturer have opted for braking, door and HVAC systems from Knorr-Bremse for their new high-speed trains.

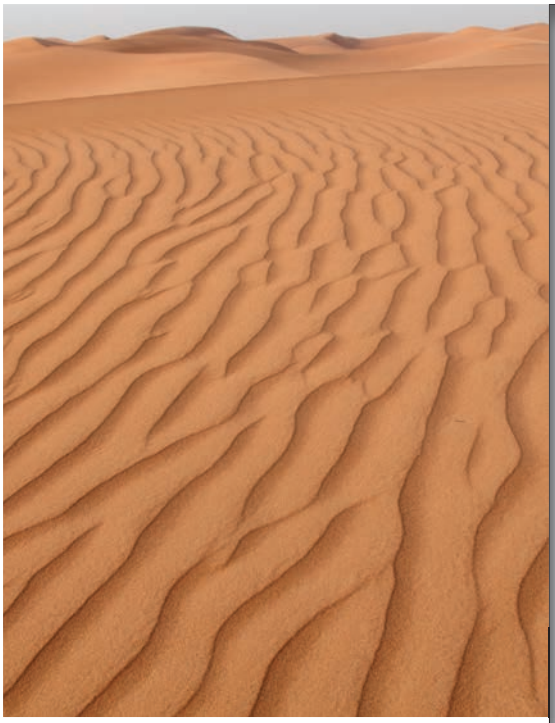


The new "Haramain High Speed Railway" between the two most sacred sites of Islam is a top priority project for Saudi Arabia. The most recent pilgrimage to Mecca alone attracted almost two million people, and the figures are set to increase, with forecasts predicting that the number of pilgrims could quadruple in the next ten years. That would leave the west of the country facing massive traffic and transportation problems. To prevent this happening, the plan is for pilgrims to be able to travel between the two cities and to Jeddah airport by train from 2017 onwards. The high-speed network across the desert will comprise 450 kilometers of track. The trains are to be designed for top speeds of 300 km/h, with a capacity of 8,000 passengers per hour in each direction.

Knorr-Bremse is demonstrating its development and systems competence as part of what is currently the world's most demanding high-speed project.

Operator Saudi Railways Organization (SRO) ordered 36 high-speed trains from Spanish rail vehicle builder Talgo, all based on the Talgo 350. 35 of the trains will comprise two power cars and 13 passenger cars, while a special VIP version will have just ten passenger cars. All of the systems to be provided by Knorr-Bremse are designed for tough desert conditions with special housings for example and use of particularly robust materials, not least to help them cope with the extreme differences in temperature.

The braking system comprises the ESRA electronic brake control unit including wheel slide protection, the EP Compact pneumatic brake control, the BP Compact brake pipe control unit, SL 20 screw-type compressors, steel wheels and Isobar brake pads. Spanish subsidiary Merak is responsible for supplying the HVAC systems. These are very compact, include self-regenerating sand filters and are installed both on the roof and inside the cars. And completing the picture, Knorr-Bremse's Austrian subsidiary IFE is developing and manufacturing the exceptionally pressure-tight Type DET-h1 sliding plug door systems, as well as the internal doors between the cars.



Commercial Vehicle Systems

Order for new single-cylinder compressor

While the first deliveries of a range of new commercial vehicles were taking place during the year under review, the leading manufacturers' development engineers were already turning their minds to the next generation of vehicles, which is slated for volume production towards the end of the decade. In the context of one such project launched by a major European manufacturer, Knorr-Bremse was commissioned to develop and produce a new single-cylinder compressor for buses and heavy duty trucks.

The main reason the order went to Knorr-Bremse was the fact that its water-cooled compressor only discharges very small qualities of oil – an increasingly important aspect for manufacturers. Less oil discharge means a reduction in the aerosols that can have a damaging impact on the downstream braking system.

Following the production launch for the new vehicles, Knorr-Bremse is expecting annual European sales of 18,000 to 20,000 vehicles equipped with the compressor. The vehicle is also to be marketed in Brazil at a later date.

Long-term agreement with major European vehicle manufacturer

During the year under review, Knorr-Bremse further strengthened its collaboration with a leading European commercial vehicle manufacturer by signing a long-term contract related to its entire product portfolio up to the year 2019. The agreement covers compressors, vibration dampers, electronic brake control units, disc brakes, brake cylinders and to some extent also air treatment systems and selected valves. The long-term contract marks the continuation of many years of close partnership between the two companies.

Knorr-Bremse in new Volvo and Renault platforms

Important key technologies for the new Volvo and Renault vehicle platforms come from Knorr-Bremse.

The aims of the new Volvo and Renault platforms are clearly defined: By combining even lower fuel consumption, excellent handling qualities, unique safety systems and enhanced driver comfort, the Group is determined to set new standards in the commercial vehicle market. And Knorr-Bremse is contributing key technologies to the new platforms. Deliveries started during the year under review.

The EBS7 system being supplied by Knorr-Bremse represents the latest generation of electronic braking systems. Like its predecessor, it incorporates ABS anti-lock braking, ASR traction control and the ESP electronic stability program into a single, all-embracing safety system. In the case of the vehicles being supplied to the BRIC states, for example, the anti-lock braking system is the latest ABS8 unit.

In addition to other technological improvements, the fact that the EBS7 control unit and the ABS8 unit are mounted on the vehicle chassis outside the driver's cab offers significant advantages. It not only creates more space in the cab but also reduces the amount of cabling required, as the vehicle frame already comes with multiple connections.

Knorr-Bremse is also supplying the EAC2 electronic air treatment unit with – for the first time on vehicles of this category – an integrated electronic parking brake and pedal units with in-built master cylinder. Knorr-Bremse is also equipping the new Euro VI engines for this platform with twin-cylinder compressors with and without clutch, as well as a new transmission and clutch

module for the optional twin clutch transmission. Another product being supplied by the Company is a new plastic four-channel valve for the pneumatic suspension – a first for commercial vehicles. Unlike in the past, it links together the valve blocks that are still mounted on each of the axles. It saves weight, is easier to install and – thanks to the use of plastic – corrosion-resistant.

New long-term agreements for EBS7 and Short NG3

In the year under review, Knorr-Bremse was able to conclude long-term agreements with a renowned major European OEM governing the supply of the EBS7 braking system and the new Short NG3 spring brake. Both agreements extend up to and including 2020. EBS7 succeeds the EBS5 systems previously installed by the manufacturer, while the new short spring brakes are destined for use in its heavy-duty trucks.

The new long-term agreements with a renowned European manufacturer cover supply of the EBS7 braking system and the new Short NG3 spring brake.

EBS7 brings together the ABS anti-lock braking system, ASR traction control and the EPS electronic stability program into a single, all-embracing safety system. One significant advantage of EBS7 is the fact that the control unit is mounted on the vehicle frame, freeing up more space in the cab. This also simplifies the vehicle's cabling system, as there are already multiple connections located around the frame.

With the Short NG3, Knorr-Bremse has added an extra-short spring brake measuring just 204 mm to its portfolio. While it can be customized for any brake application and braking force requirement, the new spring brake was primarily designed for use on the front axle. With its reduced length and the resultant drop in weight, it takes account of the ever smaller installation envelopes at the wheelend – i.e. hub, bearings and brake disc. The improved location of its center of gravity means that the NG3 also offers high vibration resistance.

Start of deliveries for DAF XF and CF series

The latest trucks from DAF – the XF and CF series – feature low operating costs, extreme fuel efficiency and high levels of driver comfort. Produced in large volumes for the European market, the vehicles are of great strategic significance for the Dutch manufacturer. Knorr-Bremse has contributed significantly to this platform, for which deliveries started during the year under review.

The company is supplying brakes, brake discs and handbrake valves. From the point of view of Knorr-Bremse, the most far-reaching innovation compared with previous vehicles is the change from conventional to electronic air control (EAC2.1) – a smart air management system that increases efficiency and cuts fuel consumption, thereby helping to protect the environment.

EAC2.1 incorporates the air dryer, pressure regulator and multi-circuit protection valve into a single unit that combines proven pneumatic components with smart electronics. Optimized regulation reduces the volume of air required for regeneration, and during the overrun phase excess energy is used to fill the braking system. On uphill gradients or during overtaking, EAC2.1 switches the compressor into neutral, thus reducing the burden on the engine during acceleration, enhancing fuel efficiency and reducing the operating costs of the DAF trucks.

iTAP with additional functions for Schmitz Cargobull

Knorr-Bremse has a long history of partnership with Schmitz Cargobull, the European market leader for trailers, semitrailers and bodies. In a joint project between the two companies the iTAP (intelligent Trailer Access Point) developed by Knorr-Bremse was further developed to in-

corporate a number of exclusive additional functions. During the year under review the first vehicles were equipped and tested with pre-series units.

In a joint development with Schmitz Cargobull Knorr-Bremse is adding exclusive functions to iTAP.

With iTAP, drivers can easily control a wide range of different functions on the trailer via a smartphone or tablet using a WLAN interface, and can also access information on trailer status. Amongst the functions it offers is adjustment of trailer height, and the information available includes data on the EBS electronic braking system. As part of a joint program of innovation, Schmitz Cargobull and Knorr-Bremse have developed a number of additional functions for iTAP – for example a weighing system, trailer angle monitoring and control of the hydraulic tailgate. The manufacturer has already presented the system at the world's biggest construction industry trade fair, Bauma, where it generated considerable interest amongst trade journalists and customers alike.

Orders for special-purpose vehicles from Dennis Eagle

Knorr-Bremse was also able to participate in developments in the UK commercial vehicle market in the year under review. Dennis Eagle, the leading manufacturer of all types of refuse collection vehicles, opted to source multiple systems from Knorr-Bremse. For all specifications of Dennis Eagle refuse collection vehicles Knorr-Bremse is to supply the EBS electronic braking system, which integrates not only ABS anti-lock brakes and the ESP electronic stability program, but also the lane departure warning system LDWS and the AEBS autonomous emergency brake system. Annual output of these special-purpose vehicles at Dennis Eagle stands at around 1,000 units.

The manufacturer had several reasons for switching from ABS-based brake systems to EBS: On the one hand there was the additional functionality available with EBS and the reduced complexity of the brake system as a whole. On the other, EBS makes for enhanced communication with other vehicle systems such as the retarder or hybrid drive system. In addition, as ESP is

mandatory in new vehicles of this kind it was considered easier to integrate this into an EBS platform than the earlier ABS braking system platform.

Start of production for new Nissan platform

The year under review saw the start of production for an all-new light truck developed for the European market by Nissan subsidiary Nissan Motor Iberica S.A. In response to demanding market requirements, the new model is equipped with the latest braking technology and numerous safety features. Knorr-Bremse was responsible for developing and supplying the braking system.

Along with ABS8 anti-lock brakes with integrated ESP electronic stability program, the scope of supply also includes the air supply system and the disc brakes complete with brake cylinders for the front and rear axles. With Knorr-Bremse as a competent system supplier, the Japanese parent company is aiming to boost its market share in Europe.

Two main arguments helped Knorr-Bremse secure the order: Firstly, the Company was in a position to help the manufacturer ensure the project ran on schedule. And secondly the Company was able to offer a system solution ideally geared to the requirements of the vehicle. That explains why Knorr-Bremse was involved in the system configuration and brake design process from an early stage, not only helping with the integration of the air disc brakes, but also providing comprehensive technical support throughout the project.

Additional distributor for trailer product portfolio in Turkey

In addition to its existing cooperation with MTD and GÜMAS, Knorr-Bremse began to work with a further distributor in Turkey at the start of the year under review. The company "Nevpa" has taken on the task of distributing the Company's trailer product portfolio to small and medi-

um-sized OEMs in Turkey. The new distributor possesses an excellent knowledge of the Turkish market and has good links, especially with small and medium-sized manufacturers.

Collaboration with this new partner enabled Knorr-Bremse to significantly strengthen its position in the Turkish trailer market in 2013 and considerably increase market share. As a result, the Company has decided to further develop its cooperation with Nevpa in 2014. As from the start of the year, the distributor is therefore including the Knorr-Bremse trailer disc brake in its portfolio, in addition to brake control products.

Electronic braking system for Goldhofer modular vehicles

Knorr-Bremse is launching a unique development project with special vehicle manufacturer Goldhofer.

Most commercial vehicles have had the EBS electronic braking system fitted as standard for years. However the system is not yet available for trailers of modular heavy trucks capable of carrying loads up to 400 t. During the year under review, Knorr-Bremse launched a unique project in conjunction with special vehicle manufacturer Goldhofer aimed at equipping the manufacturer's THP modular vehicles with EBS. This means that Knorr-Bremse EBS could soon become available across the entire Goldhofer product range. For Knorr-Bremse this is an important reference project, as Goldhofer is the global leader for special transport vehicles and leads the world in the implementation of special transportation tasks.

These special heavy-duty vehicles cannot be compared with conventional trucks. Goldhofer modular vehicles can be put together to make a wide variety of different vehicle combinations. They consist of sequences of up to eight linked trailers each of which is equipped with two, four or six axles and hydraulic axle compensation. Additional components such as goosenecks, drawbars, load bridges, turntables, etc. serve to ensure optimal adaptation to the requirements of each load and transport route. These features, plus the use of twin tires, mean that an EBS for such vehicles cannot be derived from traditional EBS applications.

The aim of the development project is to launch volume production of an EBS for Goldhofer THP modular vehicles during the course of 2015. Knorr-Bremse is able to draw on its decades of

experience with electronic braking systems, in particular the development of EBS for road trains, which usually consist of semitrailers with several linked trailers.

Expansion of partnership with Ford Otosan

In 2011 Knorr-Bremse received an order from Ford Otosan for electronic braking systems (EBS with ESP) and conventional brake control systems (ABS with ESP) for the new Cargo 1846T tractor unit. During the year under review the Company was able to further intensify its collaboration with the Turkish truck manufacturer when Ford Otosan commissioned it to develop and supply electronic braking systems for use on the entire range of Ford Otosan Cargo trucks. These completely redesigned heavy trucks are also sold on many markets outside Turkey.

Knorr-Bremse is supplying electronic braking systems for the entire Ford Otosan Cargo family.

Included in the order, in addition to EBS, are the AEBS autonomous emergency brake system and the LDWS lane departure warning system. Both these safety systems are to become mandatory for the Turkish market parallel to introduction of Euro VI. For this technology, Knorr-Bremse uses "sensor-data fusion" between a radar sensor and a camera attached to the windscreen. In combination they considerably enhance the performance of AEBS, with simultaneous data capture by sensor and camera increasing the quality of object recognition and greatly reducing the likelihood of false alarms. This gives the Knorr-Bremse data fusion system a crucial advantage over radar-only systems and makes a direct contribution towards greater road safety without disturbing the driver or other road users unnecessarily.

For the challenging task of developing the driver assist systems AEBS and LDWS Knorr-Bremse is able to draw on its extensive systems expertise and also the know-how of its North American subsidiary Bendix, which has been active in this area for many years. Delivery of the Knorr-Bremse products is currently slated for 2015.

Knorr-Bremse equips Dana tandem drive axles for KAMAZ

The KAMAZ 5490 is a long-haul tractor unit developed jointly by KAMAZ and Daimler for the Russian market. It features components from Daimler that have been specially modified by KAMAZ for operation in Russia and is designed to haul rigs with a gross vehicle weight of up to 44 t. Knorr-Bremse is supplying a number of components for the new truck.

The Knorr-Bremse products form part of the tandem drive axles being built for KAMAZ by supplier Dana in Pamplona, Spain. The axles are equipped with proven SN7 disc brakes from Knorr-Bremse. Volume production of the KAMAZ 5490 began in the second half of the year under review. Production forecasts range from 1,000 to 4,800 units per year. The new truck complies with the Euro V standard, which applies in Russia from 2014 onwards, and features low fuel consumption, a high payload, outstanding ride quality and an extensive range of safety systems.

Expansion of compressor production for new generation YAMZ Euro IV engine family

Several years ago the Yaroslavl Engine Plant (YAMZ), part of the GAZ Group, decided to develop an all-new family of engines whose four- and six-cylinder in-line units were to succeed the old V-type engines that had been installed in countless medium and heavy-duty trucks for the Russian market over the years. Connected to the YAMZ engines, Knorr-Bremse compressors provide the air supply for the braking system.

Knorr-Bremse supplies three different compressors to the engine manufacturer, all of which are developed and produced locally in Nizhny Novgorod: The 225 cm^3 LK3881 is connected up to

the four-cylinder YAMZ 534 and 536 engines, while the 500 cm^3 LP4870 is for the six-cylinder version of the YAMZ 536. The last member of the trio, the 500 cm^3 LP4851 compressor, is harnessed to the YAMZ 650 engine. Knorr-Bremse supplies 100% of the compressors for these engines.

The main OE customers for the 530 series engines are Minski Awtomobilny Sawod (MAZ), Uralaz, Pawlowski Awtobusny Sawod (PAZ) and GAZ (Gorkowski Awtomobilny Sawod). In the year under review, Knorr-Bremse already delivered just over 9,000 compressors to YAMZ, with more than 12,000 to follow in 2014. Thereafter, Knorr-Bremse expects to supply over 25,000 units per year.

Prizes/Awards

"Best Brand" for eighth year running

For the eighth year in succession readers of "lastauto omnibus", "trans aktuell" and "FERNFAHRER" chose Knorr-Bremse as "Best Brand" in the commercial vehicle industry in the "Brakes" category.

Once a year, readers of ETM's trade publications "trans aktuell", "lastauto omnibus" and "FERNFAHRER" select the "Best Brand in the Commercial Vehicle Sector" including component manufacturers and service providers as well as vehicle builders. The growing number of readers taking part – including long-distance truck drivers but also top commercial vehicle management and many repair shops – means that it offers a reliable indicator of perceptions of brands in the commercial vehicle sector. The choice on offer is a wide one, ranging from various categories of commercial vehicle to components and services.

In 2013 for the first time more than 10,000 readers responded to the poll – and for the eighth year running Knorr-Bremse came out top in the "Brakes" category, 13 percentage points ahead of its nearest rival – an even bigger lead than the previous year. The "Best Brand" awards are not just a question of brand profile – they also focus in particular on readers' assessment of brand value and the trust they put in the products manufactured by the winning companies.

Knorr-Bremse is very pleased at the assessment made by its customers in this important independent poll. Truck drivers and transport companies in particular appreciate the systems and components the company supplies to its customers. Its focus on ensuring active safety and efficiency throughout the entire life cycle of commercial vehicles, combined with decades of expertise in mechatronic control systems, are crucial elements in the positive image enjoyed by the Knorr-Bremse brand. Winning the award is an encouragement to the Company to continue to use its systems expertise to improve the safety and energy efficiency of commercial vehicles.

Environmental award for Knorr-Bremse KAMA

Sustainable business practices have long since become a central element in Knorr-Bremse's corporate philosophy – not just in Germany but at all Group sites. In early 2013 this commitment was rewarded when Knorr-Bremse KAMA LLC, a joint venture between Knorr Bremse AG and KAMAZ OAO (Russia), was announced to be one of the top 100 Russian companies in the field of environmental management. An independent social committee gave Knorr-Bremse KAMA LLC a high rating for its measures to minimize the environmental impact of its activities.

The award was made at a conference on "Ecology and Production. Development Prospects of Economic Instruments for Environmental Protection", which took place in St. Petersburg, Russia at the end of March 2013. The main focus of the conference was on how to improve government regulations and legislation in the field of environment protection within the Russian Federation. Participants examined current environmental issues facing industrial companies and

heard about the experience of other countries in the field. Manfred Kindermann, managing director of Knorr-Bremse KAMA LLC and Liliya Bilalova, environmental specialist at Knorr-Bremse KAMA LLC, accepted a certificate and a gold medal.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NORTH/SOUTH AMERICA.

In the North American rail sector, as well as major freight projects, the main focus was modernization of urban metro systems – including those in Washington D.C., Miami and Los Angeles. In the case of commercial vehicles, Knorr-Bremse subsidiary Bendix succeeded, amongst other things, in winning contracts for platforms operated by Kenworth, Peterbilt, Central Refrigerated Service, Saia LTL Freight and Comcar Industries. This record of sales successes in the year under review was rounded off by new orders from South America, especially Brazil.

Rail Vehicle Systems

Involvement of Technologies Lanka in major Bombardier project

Technologies Lanka Inc., based in La Pocatière, Canada develops, manufactures and sells a varied portfolio of products ranging from sliding door systems to HVAC control systems. In 2011 the company was acquired by Knorr-Bremse's North American subsidiary Knorr Brake Company and soon afterwards concluded a series of new agreements. During the year under review, a major order from vehicle manufacturer Bombardier was also received: Technologies Lanka is to equip 300 metro cars destined for New York City Transit with HVAC regulators and inverters.

From 2015 onwards the new R179 cars will transport passengers from one part of the city to another in much greater comfort than before. They are equipped with state-of-the-art technologies from Bombardier and also come with the latest efficient MITRAC drive system. The first cars are due for delivery in the third quarter of 2014 as part of a pilot phase, and delivery of the volume-produced cars is due to be completed by 2017.

Successes in the metro segment in Washington D.C. and Miami

Knorr-Bremse supplies braking and HVAC systems to more metros in Washington D.C. and Miami.

Knorr-Bremse has a long history of collaboration with Washington Metropolitan Area Transit Authority (WMATA), so it was no coincidence that the order received some years ago to supply braking and HVAC systems for 364 Kawasaki 7000 Series metro cars was the biggest in the history of Knorr Brake Company. During the year under review, WMATA activated some of the options it had secured at the time, and Knorr-Bremse will now be supplying braking and HVAC systems for these 164 cars as well. The new trains are intended to create additional transportation capacity for what is the second-biggest metro system in the US in terms of passenger numbers. By the year 2030 WMATA calculates that it will be carrying an average of one million passengers per day.

The braking systems are being developed at the Group's North American site in Westminster, with Knorr-Bremse's Spanish subsidiary Merak designing and developing the HVAC systems and its North American division, Merak North America, responsible for their production. The year under review saw the first two prototype cars and a training vehicle delivered to the operator, with the official hand-over of the first two 7000 Series cars to WMATA taking place in early January 2014. Volume production of the Knorr-Bremse systems for the new cars will begin in 2014. WMATA still holds options for an additional 220 of the 7000 Series cars.

Another market success story for Knorr-Bremse in North America came from Miami, where Knorr Brake Company received an order for braking and HVAC systems for 136 new AnsaldoBreda metro cars. Deliveries are slated to begin in 2014 and will run over the following three years.

Follow-up order from Los Angeles

For many years Los Angeles County Metropolitan Transportation Authority (LACMTA), operator of one of the biggest mass transit networks in North America, has been expanding its capacity and modernizing its fleet at regular intervals. In this context, LACMTA placed an order for 78 multiple units with Kinkisharyo International, the US subsidiary of Japanese vehicle builder Kinki Sharyo back in 2012, and Knorr-Bremse supplied braking, door and HVAC systems. During the year under review, LACMTA changed some of the further options it held into firm orders.

This represents a substantial follow-up order for Knorr-Bremse's North American subsidiary Knorr Brake Company, which will be supplying braking, door and HVAC systems for the addi-

tional 97 new vehicles. By the end of 2013/early 2014 Knorr Brake Company had already delivered the first subsystems for installation in the two prototype trains. The delivery period for the new trains starts in 2014 and is scheduled to end in 2016. The possibility of a further follow-up order cannot be excluded, as LACMTA holds an option for a further 60 multiple units from Kinkisharyo International.

Long-term contracts with locomotive builders

During the year under review, Knorr-Bremse subsidiary New York Air Brake (NYAB) signed comprehensive long-term contracts with two leading locomotive manufacturers.

The agreements essentially give NYAB preferred supplier status for braking systems, assuring high market share and substantial sales over the next few years. In addition, both agreements provide incentives for application of Knorr-Bremse/NYAB equipment on upcoming new projects, and for development and supply of new products.

Orders for LEADER AutoControl from two major operators

In the year under review, two major North American railroad operators placed orders for LEADER AutoControl, the new functionality of the LEADER system from Knorr-Bremse subsidiary New York Air Brake (NYAB): Norfolk Southern and Union Pacific.

The driver information version of LEADER continuously analyses consist information, track profile, and locomotive data and provides engineers with real-time prompts to improve energy efficiency and control of in-train forces. The new AutoControl energy-saving functionality can

be compared to cruise control in an automobile. It is initiated by the locomotive engineer once the train reaches at least five miles per hour and will then handle the train and maintain the appropriate speed profile for the route. AutoControl uses the LEADER algorithms to send throttle and dynamic brake commands to the Train Control Device, resulting in automatic actuation of the commands. AutoControl does not command the air brake but will continue to prompt the engineer when the air brake is required. When the train approaches its destination, the system prompts the engineer to disengage it and take active control of the train again.

Depending on the topography of the track, the new functionality can save 2-5% of fuel in addition to the driver information system's saving of 8-12%, enabling customers to fully capitalize on LEADER's potential. NYAB is to commence deliveries of LEADER AutoControl to Norfolk Southern in the first quarter 2014, with deliveries to Union Pacific to start in the third quarter.

VV1000-T oil-free compressors for heavy duty locomotives

The year under review saw the market launch of the new VV1000-T oil-free compressor, with Knorr-Bremse's North American subsidiary New York Air Brake (NYAB) delivering the first units for installation in heavy duty locomotives at two of the leading rail freight companies in the region.

VV1000-T rounds off the top end of the Knorr-Bremse Group's range of oil-free compressors. The essential advantage of this joint further development by NYAB and the Center of Competence Air Supply (CoC AS) in Munich is the fact that the compressed air is completely oil-free. This not only makes the unit safer and more eco-friendly, as oil is no longer discharged onto the locomotive or into the track bed, but also ensures that no oil-based aerosols penetrate the braking system to reduce its operating life.

The CoC AS and NYAB designed the VV1000-T compressor specifically for operation at low temperatures and extended its service intervals to eight years – an industry first. At 78 decibels it is significantly quieter and is also much lighter than competing products. 18 of the new compressors have been installed at two of North America's biggest rail freight companies, and NYAB has received commitments for an additional 115. The compressors are manufactured in Watertown, New York State.

In summary, the VV1000-T represents a quantum leap in technology for heavy haul railroads and locomotive builders, providing them with significant advantages in safety, reliability, lower life cycle costs, cold weather performance, efficiency and ease of maintenance – all while contributing to a "greener" environment.

Extensive orders in rail freight segment

Large numbers of freight train operators use braking systems manufactured by Knorr-Bremse subsidiary New York Air Brake (NYAB). Global deliveries by the company during the year under review included more than 20,000 DB-60 control valves for freight cars and almost 2,000 CCB locomotive brake control systems.

Most DB-60 control valves were ordered by North America's biggest freight car manufacturer, Trinity Rail Group (TRG). The 7,000 valves supplied by NYAB to TRG represent a market share of around 55%. 3,017 and 1,650 DB-60 control valves were supplied to freight car owners TTX and CIT Rail respectively, which equates to a market share of around 60% for both customers

together. GE ordered 1,033 systems (approx. 90% market share), 1st Union ordered 900 units (approx. 80%) while car owner Cliff Mines ordered 700 DB-60 control valves. In addition to these North American freight car owners, NYAB was also successful with sales of the DB-60 in Saudi Arabia, where Saudi Railways Organization (SRO) equipped 100 new flat cars with the system.

NYAB also received extensive orders for the locomotive equipment. In addition to 755 CCB brake control kits supplied to the Knorr-Bremse plant in Suzhou, China, the company delivered a total of 1,120 CCB brake control systems (CCB II, CCB26 and CCB II-P) to customers including virtually all the major North American operators such as Norfolk Southern, Burlington Northern Santa Fe (BNSF), Union Pacific, CSX Transportation, Kansas City Southern (KCS) and Canadian National (CN). After a gap of some years, Amtrak (National Railroad Passenger Corporation) is now once again a NYAB customer for locomotive brake control, having recently ordered 70 new Siemens passenger locomotives equipped with NYAB CCB II-P systems, of which NYAB has already delivered 25 systems. CCB customers outside North America during the year under review included BHP Billiton in Australia, Saudi Railways Organization (SRO) and operators in Brazil and South Africa.

Equipment for electric multiple units in Argentina

Knorr-Bremse is supplying the complete braking system for new electric multiple units in Argentina.

Knorr-Bremse is supplying braking systems for a major order received by CSR Sifang Locomotive and Rolling Stock from the mass transit operator in the Argentinian capital of Buenos Aires. The electric multiple units will operate on the Sarmiento and Mitre urban lines at speeds up to 100 km/h. In what is the Chinese vehicle builder's biggest single order for a rail project in South America, a total of 409 cars consisting of 25 nine-car, 30 six-car and four single-car trains will be supplied.

The contract was concluded between Knorr-Bremse and CSR Sifang Locomotive & Rolling Stock in the summer of the year under review and covers the entire braking system – air treatment, brake control and bogie equipment. The design of the trains was finalized shortly after the contract was signed, and less than three months later Knorr-Bremse delivered the first components for installation. The first electric multiple units are expected in Buenos Aires from February 2014 onwards, and following successful acceptance runs, will go into service less than a year after the contract was signed.

First volume production order for COMORAN from Brazil

Traditionally the main functionalities of a brake control system have been brake actuation and monitoring, determining vehicle speed and wheelset diagnostics. Now, through an ingenious combination of additional sensors and smart leverage of existing interfaces, the COMORAN system is adding to these.

In the full version the system enables the real-time monitoring of axle bearings, gears and wheels and can identify critical conditions such as derailment. COMORAN uses vibration analysis to monitor the state of axle bearings and reports their condition either to an on-board storage medium or online to a central server. Combined with trend analysis to determine residual lifetime, this enables the condition-based maintenance of components, without compromising either availability or safety.

In the year under review, Knorr-Bremse received the first order for this system from the Passengers Suburban Authority (CENTRAL) in Rio de Janeiro. CENTRAL is equipping 60 of its 90 new four-car trains from CNR Changchun Railway Vehicles with COMORAN, replacing the derailment

detectors formerly used in such trains. On top of this, Knorr-Bremse is supplying the complete braking system for all 90 trains. Optimized by a software update, COMORAN now also features a new test module and special hand-held diagnostics units for greater convenience.

Brake, door and HVAC systems for metros in Rio de Janeiro and São Paulo

Knorr-Bremse is supplying multiple systems and components to two major Brazilian metro projects. For the new metro trains for São Paulo the company was commissioned to equip the braking and entrance systems for line 4 and the braking and HVAC systems for line 5. This was followed by an order for the braking and entrance systems for the new vehicles for the metro in Rio de Janeiro, where Group subsidiary Sigma will also be supplying the HVAC systems.

In São Paulo and Rio de Janeiro new metros are being equipped with systems from Knorr-Bremse.

The project in São Paulo includes the extension of line 4, for which the operator has ordered 15 six-car sets from vehicle builder Hyundai Rotem Korea. Knorr-Bremse Asia Pacific is handling the development and production of the braking systems, and the entrance systems are being supplied by Group subsidiary IFE-Victall in Qingdao, China. The Knorr-Bremse components are to be delivered in 2014 and 2015. For Knorr-Bremse this project is something of a tradition, as the Company was responsible for supplying the braking and entrance systems for the original metro line.

For the new electric multiple units for the metro in Rio de Janeiro, Knorr-Bremse is supplying vehicle manufacturer Alstom with brake control units and air supply systems. Alstom was commissioned by operator SuperVia to build 80 four- and eight-car trains to add to the existing fleet on its 270-kilometer network. SuperVia currently provides some 540,000 rides per day, although passenger numbers are set to rise to one million in the course of 2015.

In addition, Knorr-Bremse is supplying the brake control and air supply units for the 15 Trensurb electric multiple units that Alstom is building for the city of Porto Alegre.

And for the metro in Belo Horizonte, Knorr-Bremse is supplying the entire braking system for ten trains being built by CAF.

Commercial Vehicle Systems

The Bendix eTrac automated air pressure transfer system improves traction and facilitates drive-off.

eTrac at Kenworth and Peterbilt

For drivers of tractor units and trucks with only one driven axle it is a familiar problem: As they drive off on a slippery surface or a slope they can easily lose traction and find their wheels spinning. In such situations many tractors have systems that enable the driver to manually transfer pressure from the undriven to the driven axle, thereby improving traction. Now the Bendix eTrac automated air pressure transfer system produced by Knorr-Bremse's North American subsidiary Bendix enables this transfer process to take place automatically. Since the year under review, the system has been commercially available with automatic traction control as an option on 6x2 Class 8 tractors and trucks from both Kenworth Truck Company and Peterbilt Motors Company.

The Bendix eTrac air transfer system fully automates the traditional manual air pressure transfer process and reacts in a split second to low-traction events. Partial emptying of the bellows on the non-driven rear axle increases the axle load and thus the traction of the driven axle. As this delivers performance comparable to that of a 6x4 tractor, it enables more freight to be hauled and improves fuel efficiency. But there is another way the system can reduce fleet operating costs: Use of eTrac means fleet managers can replace more of their traditional 6x4 tractors with lighter 6x2 ones. The lack of a second drive axle reduces the tractor's overall weight by roughly 225 kilograms.

This was not the only success recorded by the Bendix eTrac system during the course of the year. The magazine Heavy Duty Trucking also singled the system out from several hundred products as one of its Top 20 in 2013 in recognition of the new standards it sets in terms of innovation, maintenance costs, safety and efficiency.

Order for Bendix from Central Refrigerated Service

Temperature-controlled trucks in the Central Refrigerated Service fleet are a common sight on US roads – the company operates a fleet of almost 2,000 tractors and 3,400 trailers, with around 95% of the freight consisting of foodstuffs. Precisely because such products have to be transported rapidly and, above all, reliably under temperature-controlled conditions, high safety standards are essential. In the year under review 100 new Peterbilt tractor units ordered by the fleet operator were equipped with Bendix Wingman Advanced – a collision mitigation technology. The latest addition expands the active safety and braking technologies provided to the fleet from Knorr-Bremse subsidiary Bendix. According to Central Refrigerated Service, safety is their number one priority and they have been consistently impressed by the game-changing active safety technology from Bendix.

Bendix Wingman Advanced, built on the foundation of Bendix ESP technology, delivers active cruise control with braking features, along with collision mitigation technology. Using a radar sensor mounted at the front of the vehicle, Bendix Wingman Advanced monitors the gap between the truck and the vehicle in front and delivers a warning if this narrows too quickly. If necessary, it also intervenes actively, braking the vehicle to help drivers potentially avoid rear-end collisions or at least reduce their severity.

Bendix systems for Saia LTL Freight

Saia LTL Freight, based in Johns Creek, Georgia (USA), has once again chosen Bendix technologies for 331 new Volvo trucks added to their fleet. A regional "less-than-truckload" leader, the fleet was recognized by the American Trucking Association's Safety Maintenance council with

first-place honors for its outstanding safety record. The new truck order involves 331 new Volvo vehicles equipped with a variety of Bendix safety technologies, including: the Bendix ESP electronic stability program, Wingman Advanced collision mitigation technology, ADB22X air disc brakes, the AutoVue lane departure warning system and the Bendix BlindSpotter side object detection system.

Bendix is the first North American brake system manufacturer to make a full-stability solution widely available to the commercial vehicle market. ESP was first introduced in early 2005, and in 2013 Bendix achieved total sales of more than 250,000 systems. The Wingman Advanced system, built on the foundation of Bendix ESP technology, delivers active cruise with braking features, along with collision mitigation technology. Using a radar sensor mounted to the front of the vehicle, it delivers both warnings and active interventions to help drivers potentially avoid rear-end collisions or at least to reduce their severity. Also radar-based, the BlindSpotter side object detection system alerts drivers to vehicles or objects in the driver's "blind spot". AutoVue LDW is a vision-based system that alerts the driver when a commercial vehicle begins to move toward an unintended lane change.

Less-than-truckload freight is defined as freight in which the individual units weigh less than 150 pounds (approx. 68 kilograms). Saia LTL Freight is one of the top ten carriers in the LTL sector in the United States, covering 34 states through a network of 147 terminals.

Order for Bendix from Comcar Industries

Comcar Industries is equipping its 500 new ProStar trucks with safety technology from Bendix.

Founded in 1953 as a cement-hauling business, today Comcar Industries – with a workforce of more than 4,500 professionals – has 52 strategically positioned locations dedicated to the transportation and distribution of any type of commodity within the 48 contiguous U.S. states. In the year under review, Comcar added 500 International ProStar trucks to its fleet, all of which are being equipped with the ESP electronic stability program and Wingman Advanced collision mitigation technology from Knorr-Bremse subsidiary Bendix. Bendix is also supplying the AS-IS air dryer as an important element of the vehicles' braking systems.

A family-owned business, Comcar readily puts into practice its corporate value of safety. That is one of the reasons the fleet decided some time ago to introduce a comprehensive "zero defects" culture that extends to every task, action and decision within the company. By opting for ESP and Wingman Advanced, Comcar has not only realized a quick ROI, but – more importantly –has extended its commitment to help ensure the safety of its professional drivers and of everyone on the highways.

The fleet also chose the AS-IS air dryer for the new trucks, to ensure clean, dry air to reservoirs, valves and other downstream components, with a view to increasing the life of the air brake system, helping reduce maintenance costs and preventing system freeze-up in harsh on-road environments.

New orders for Bendix from R&J Trucking

In the past, R&J Trucking – one of the largest bulk commodity hauling companies in the United States – installed numerous Bendix safety systems on its vehicles. According to the company, having full stability systems has helped prevent costly rollover accidents over the last five years. Now 100 additional new trucks ordered by R&J from Peterbilt are to be equipped by Knorr-Bremse's American subsidiary with its ESP electronic stability system, Wingman Advanced collision mitigation technology and high-performance ADB22X air disc brakes. In addition, all of the company's trailers purchased since late 2011 have been equipped with the Bendix TABS-6 Advanced trailer stability system.

The R&J fleet includes over 550 company-owned trucks and more than 1,000 trailers, 70% of which are currently equipped with Bendix full-stability and collision warning systems. However, the company's declared aim moving forward is to include such systems on 100% of its trucks. R&J Trucking already has a well-rounded mix of modern Bendix technologies that help keep its drivers safe. And during the year under review it also further expanded its use of Bendix products with the addition of Bendix air disc brakes for all new trailer purchases.

Significant rise in ABS sales in South America

In 2012, advance purchases in the run-up to introduction of the Euro V emissions standard had caused a slump in the Brazilian market, but the year under review saw sales pick up again. The new ABS regulation also gave a significant boost to sales of ABS units. Knorr-Bremse benefited disproportionately from this growth and was able to expand its share of the South American market.

The start of the year under review had seen Brazil – South America's biggest automobile market – introduce new legislation requiring new commercial vehicles to be fitted with anti-lock braking systems. During the course of the year, manufacturers had to demonstrate that 40% of their vehicles were equipped with ABS, and by the end of 2014 fleet coverage has to be 100%. This meant that Knorr-Bremse Brazil experienced a surge in demand – not just for its existing ABS8 system but also for its ability to supply ABS systems that are customized to the particular applications involved.


JADE RESTAURANT
翡翠茶餐廳
奶茶咖啡 海鮮小菜
馳名燒臘 晚飯宵夜
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In China in particular, Knorr-Bremse has been reaping the rewards of its long-established presence and is heavily involved in expansion of the country's transport infrastructure. This has taken the form of numerous projects involving high-speed trains, locomotives, metros and streetcars, but also close collaboration with Chinese and Asian commercial vehicle manufacturers. The regional sales success story is rounded off by important orders from Australia, India, Japan and other countries in the Far East.

Rail Vehicle Systems

Knorr-Bremse receives major orders from China to equip new high-speed trains with brake, door and HVAC systems.

Orders for 486 Chinese high-speed trains

The reform of the Chinese Ministry of Railways in early 2013 triggered a new wave of investment in railway infrastructure and rail transport. The Chinese rail vehicle industry is now expected to hit record output levels in 2014, and Knorr-Bremse has secured a substantial share of the business. In the year under review the Rail Vehicle Systems division obtained orders to supply brake equipment for an additional 486 high-speed trains as well as entrance and HVAC systems for some of the car-sets.

The country's state-owned railway operator, China Railways, placed large-scale orders for the new trains with three of the four Chinese high-speed train manufacturers: CSR Sifang Locomotive & Rolling Stock Co., Ltd., Changchun Railway Vehicles Co., Ltd. and CNR Tangshan Railway Vehicle Co., Ltd. All three vehicle builders have commissioned Knorr-Bremse's Chinese subsidiaries and joint ventures to supply the brake systems and bogie equipment for the total of 486 eight-car trains ordered.

These orders write the next chapter in Knorr-Bremse's success story in the Chinese high-speed segment: In March 2005 the Company won its first order relating to a high-speed train in China, for the CRH1. Just a few months later this was followed by another substantial order to equip the CRH5 high-speed trains. Then, in 2009, Knorr-Bremse and its partners secured what at the time was the biggest order in the history of the Company to equip the CRH3 series.

Today, including joint ventures, the Knorr-Bremse Group has a total of 13 production plants in China. As a result, it not only meets the high localization requirements in the Chinese market but can also ensure its customary high standards of quality. Both of these factors were the key to securing the recent orders. Another extremely important factor was that Knorr-Bremse can meet the very tight schedule as well as providing the appropriate technical support through its locally-based engineers and service staff.

Major orders from Chinese metro segment

Knorr-Bremse systems are being used in the new metros in various Chinese cities.

Ever since the late 1970s Knorr-Bremse has maintained close business contacts with China and has always regarded the Chinese rail sector as an important market. The company received its first order to equip a Chinese metro with braking systems in 1990, and in 2011 celebrated delivery of systems for its 10,000th Chinese metro car. Over the years it has established and steadily consolidated a lead position in the expanding Chinese market. During the year under review the Company received orders for braking systems for more than 1,700 metro cars, HVAC systems for 450 and door systems for 264.

Three major brake projects are destined for the cities of Dalian, Beijing and Shenzhen. Knorr-Bremse is to equip 228 cars for use on metro lines 1 and 2 in Dalian and 270 cars for lines 4 and 10 in Beijing. Further orders from Shenzhen are for a total of 426 cars for lines 2, 3 and 5. In addition the Company is supplying braking systems for 210 cars in Shanghai, 174 in Nanjing, 162 in Nanchang and 132 in Ningbo.

In the case of line 3 in Qingdao and R2 in Dongguan, Knorr-Bremse is also responsible for developing and manufacturing HVAC systems, so that 144 cars for Qingdao and 120 cars for Dongguan are being supplied with all three systems. In addition the Company is supplying HVAC systems for 138 cars for line 2 in Wuxi and for 48 cars for line 7 in Beijing.

Simulator for metro line 7 in Shanghai

The last few years have witnessed a sharp rise in demand for simulators in the Chinese rail transport market. Fierce competition between numerous providers, however, has made this a tough environment in which to do business. In the year under review, Knorr-Bremse scored a milestone achievement by securing a prestigious order in this segment: The Company is developing and supplying to Shanghai metro line 7 an SMC full cab simulator replicating the Bombardier platform

With this order, the strategy of offering high quality simulators at reasonable prices has begun to pay dividends. Through regular incremental progress with this concept, over recent years the Company has successfully raised its profile in the Chinese market for simulators. Following a tender project lasting almost three years and comprehensive evaluation of the quotations submitted, the operator finally awarded the contract for the simulator to Knorr-Bremse.

Orders for commuter trains from Hong Kong

The Special Administrative Region of Hong Kong on the south coast of China has embarked on the extensive expansion of its public mass transit and regional transportation network. Numerous projects are already ongoing within the metropolis, including a new east-west route centered on the Shatin to Central Link. The first phase of the project is a tunnel extending from Tai Wai near the town of Shatin to Hung Hom in the south of Kowloon, where the track intersects with the West Rail line. Phase two will comprise a link from Hung Hom to the financial and trading district of Hong Kong. In the year under review, Knorr-Bremse was commissioned to

develop braking systems for the commuter trains that will operate on these lines. Vehicle manufacturer Hyundai Rotem is supplying 333 cars that will run as 37 nine-car sets.

Another order from Hong Kong relates to the Hong Kong Express Rail Link (XRL) from Guangzhou to Hong Kong via Shenzhen. This 26-kilometer section of track connects Hong Kong to China's 16,000-kilometer high-speed network. Knorr-Bremse is to supply the braking systems for the eight 9-car sets from Sifang Locomotive and Rolling Stock that will operate on this route.

Extensive streetcar orders from China

For the first time Knorr-Bremse is also equipping streetcars in China with braking systems.

In the past, Knorr-Bremse has been particularly successful in the Chinese high-speed and metro segments, but the receipt of major orders for hydraulic braking systems for streetcars enabled the Company to further broaden its product portfolio in China during the year under review. Medium-sized cities, in particular, are keen to avoid having to invest in considerably more expensive metro systems and are increasingly looking to streetcars as effective and eco-friendly public transport options.

The biggest single order was for line 1 in Suzhou and involved 18 streetcars being built by CSR Nanjing Puzhen Rolling Stock, for which Knorr-Bremse is supplying not only hydraulic braking systems but also door systems. And the Company is also delivering braking systems to another project by the same manufacturer involving a total of 15 streetcars for operation on various lines in the city of Nanjing. Furthermore Knorr-Bremse is supplying bogie equipment for vehicles ordered from Bombardier by the streetcar operators in both Suzhou and Nanjing.

These are not the only contracts signed by Knorr-Bremse in this segment. For example the Company is supplying braking systems for twelve low-floor streetcars being built by AnsaldoBreda for the coastal city of Zhuhai; and hydraulic braking systems from Knorr-Bremse have also been ordered by CNR Tangshan Railway Vehicle Co., Ltd. for six streetcars for the city of Liupanshui.

More than 40 Chinese cities are currently preparing to build streetcar lines and are planning to lay more than 2,000 kilometers of track by the year 2020. Knorr-Bremse has been quick to respond to this trend and has prepared the ground by further expanding its local presence in the Chinese market and developing the capability to support its products throughout their entire life cycle from production and systems technology right down to project management and servicing. Since early 2014, the Company's Suzhou plant has also had its own assembly line for electro-hydraulic sub-assemblies and hydraulic brake calipers as well as a local team of experts on hand to support Chinese colleagues on upcoming projects.

Major orders for braking systems for Chinese locomotives

State investment is the main driver of growth in the Chinese rail market, with the authorities planning new lines and routes in virtually every market segment. These are usually for spectacular projects such as high-speed trains or ambitious metro networks, but even the country's normal rail network for passenger and freight transportation is becoming increasingly dense, with new lines being added and the capacity of existing ones expanded. During the year under review, Knorr-Bremse secured a large number of orders for braking systems in this market – for a total of almost 1,000 new locomotives.

The orders cover almost a dozen different types of locomotive being built by the two biggest Chinese manufacturers, CSR Zhuzhou Electric Locomotive and CNR Dalian Locomotive. Knorr-Bremse is equipping a total of 997 locomotives – 609 for CSR and 388 for CNR – all of which will be delivered over the coming years to the state-owned railway company of the People's

Republic. The biggest single order from CNR involves equipment for 268 Type HXD3C six-axle 7,200 kW electric locomotives and the biggest from CSR ZELC is for 260 eight-axle 9,600 kW locomotives.

Order for Chinese IC trains

Intercity trains are used in China to provide rapid rail links between important cities within urban conglomerations. One such link runs from the southern Chinese city of Guangzhou via Dongguan to Shenzhen. During the year under review the state railroad operator ordered a number of Intercity trains for this route from CSR Sifang Locomotive & Rolling Stock Co., Ltd. The eight-car CRH6-200 and CRH6-160 trains will have top speeds of 200 km/h and 160 km/h respectively.

Six of the CRH6-200 and three of the CRH6-160 trains are being equipped with braking systems by Knorr-Bremse, and in one of the CRH6-160 trains, door systems from the Knorr-Bremse Group are also being installed. Following a first order for CRH6-200 trains in 2012, the latest orders represent an opportunity for the Group to expand and strengthen its product base in this market. CSR Sifang Locomotive & Rolling Stock is responsible for developing the trains, and CSR Nanjing Puzhen Rolling Stock will produce them at the CSR Guangdong Jiangmen factory.

HVAC systems and bogie equipment for Kuala Lumpur metro

As one of Asia's fastest growing cities, Kuala Lumpur is experiencing a huge increase in private traffic and associated environmental pollution. Now the Malaysian capital has launched one of South East Asia's biggest local public transport projects in a bid to make the city and surrounding region more attractive. The first and largest element in the development plan involves building a new 51-kilometer metro line – the SBK line – linking the suburbs of Sungai Buloh in the North West and Kajang in the South East with the city center.

Siemens has received an order for 58 driverless metro trains, for which Knorr-Bremse Rail Vehicle Systems is supplying the bogie equipment and Knorr-Bremse subsidiary Sigma the HVAC systems. The 58 four-section trains are due to go into service on the SBK line at the end of December 2016. The Knorr-Bremse systems are slated for delivery in the course of 2014.

An additional order has been secured for the extension of the Ampang line, to which the operator is adding almost 18 kilometers of track with twelve new stations. The 20 six-section light rail vehicles operating on the line are to be supplied by vehicle builder CSR Zhuzhou Electric Locomotive, and Knorr-Bremse is responsible for the braking systems.

Braking systems for Singapore metro

Official statistics put the population density of Singapore at over 7,000 inhabitants per square kilometer, so it goes without saying that public transport plays an essential role in the city state. Operators SMRT Corporation and SBS Transit are currently implementing a program of massive expansion of the metro network, with part of the main focus on extending the East-West line, the Tuas West Extension. As passenger volumes on the North-South and East-West lines grow, additional vehicles are going to be required, for which Knorr-Bremse is developing and supplying the braking systems.

The new C151B trains are being built by a joint venture between CSR Qingdao Sifang and Kawasaki Heavy Industries. The 132 cars for 22 six-section trains have a chassis made of an alumi-

num alloy. Delivery of the first trains is slated for the second quarter of 2015 and at appropriate intervals Knorr-Bremse will supply the joint venture with the braking systems.

Order for Hyderabad light rail vehicle system

Knorr-Bremse is developing and supplying the braking systems for the new metro in Hyderabad, India.

With almost seven million inhabitants, the city of Hyderabad in central India is not only the fourth-biggest on the subcontinent – it also exercises such a strong pull on the surrounding region that it is rapidly developing into a major urban conglomeration. As with all major cities in India, it was therefore only a matter of time before the authorities began to consider constructing a light rail system. In fact, work on the system started some years ago, and last year Knorr-Bremse was selected to develop and manufacture braking systems for the trains.

A total of 57 three-car trains have been ordered from Hyundai Rotem's current vehicle platform. They will run on three metro lines: line 1 between Miyapur and LB Nagar, line 2 from Jubilee Bus Stand to Falaknuma, and line 3 from Nagole to Shilparamam. The entire network adds up to 72 kilometers of track and 66 stations. Trains will run at top speeds of 80 km/h and each line is designed to carry up to 50,000 passengers per hour. The city authorities and the train operator have designed the system to take into account the restricted space available in Hyderabad, with all the lines running above ground on stilts. Phased opening is planned for the period from 2014 to 2017.

This order follows many successful years for Knorr-Bremse in the Indian metro segment. Systems manufactured by the company can be found in many parts of the country – some of them even in vehicles built by Indian manufacturers – for example in Delhi, Kolkata, Mumbai and Bangalore.

Use of LEADER DSE at Rio Tinto

Australian mining giant Rio Tinto plans to operate the first completely driverless trains from mid-2014, a concept known as AutoHaul. Integral to AutoHaul is LEADER technology in the form of a Driving Strategy Engine (DSE). LEADER DSE is a software product developed by Knorr-Bremse subsidiary New York Air Brake (NYAB). During the year under review, NYAB signed the agreement for Phase II of the project with train builder Ansaldo and delivered the first software packages for the innovative train control system. The LEADER DSE software forms part of Ansaldo's Automatic Train Operation and Automated Train Protection systems. The project involves the first driverless operation of a heavy freight train anywhere in the world.

The basis for NYAB's contribution to the project is the globally established LEADER smart driver information system, which is based on a unique measurement and control technology that enables fuel efficiency to be optimized, train journey times managed more efficiently and in-train forces reduced. Operating in real time, LEADER measures the dynamics of the train and calculates a driving strategy that increases overall train-handling efficiency. Fuel savings range between 8% and 12%, and in-train forces are reduced by up to 50%.

The Rio Tinto application has now taken this capability and evolved it from an advisory system to one that takes over complete control of the train. The core system software already operates the necessary active communication with railroad network management and locomotive control systems. Since the system takes over complete control of the train, the safety standards and technical requirements have to be much stricter, and for this reason the entire software program is currently being revised in line with CENELEC standards.

Equipment for Australian iron ore trains

In the year under review, Knorr-Bremse subsidiary New York Air Brake (NYAB) won major orders through Knorr-Bremse Australia for braking systems on new freight cars and locomotives. The customer is mining group BHP Billiton, which has equipped 1,300 new iron ore cars with NYAB's EP-60 overlay brake system. NYAB also supplied locomotive head end EP-60 braking systems with CCB II computer-controlled brakes for 27 new diesel locomotives from Electro Motive Diesel (EMD) that will haul these wagons. BHP Billiton is using this equipment for trial and evaluation purposes as it is considering upgrading the entire fleet of 4,600 wagons to EP-60 as part of its plan to increase iron ore capacity from 188 to 250 megatons per year.

Mining company BHP Billiton is equipping 1,300 new iron ore cars with the EP-60 braking system.

The EP-60 electro-pneumatic brake system enables the brakes on long trains to be applied and released along the entire train simultaneously. The system electronically transmits the air brake signal from the locomotive to the brake control units on the cars. The brake signal reaches every car at virtually the same time, so that the brakes are applied on each car simultaneously. EP-60 with Wire Distributed Power (WireDP) makes it possible to operate multiple locomotives within a single long train. NYAB's CCB II electronic air brake system has best-in-class reliability, with the longest overhaul period, resulting in low life cycle costs. The benefits of the system include consistent braking performance, shorter stopping distances, reduced in-train forces and lower fuel consumption – all powerful sales arguments for trains that transport millions of tons of iron ore.

Prizes/Awards

Suzhou plant named "Best Supplier" by Shanghai metro

Shanghai metro Operation Corporation (SMOC) has recognized Knorr-Bremse's site in Suzhou, China, as one of its top suppliers. At the annual SMOC Suppliers' Day, the title of "Best Supplier" was awarded to the Company in recognition of the uncomplicated and efficient support it had given SMOC in the context of various overhaul projects on countless metro lines in Shanghai. The support was particularly valuable because the projects had to be implemented at very short notice.

First opened in 2005, the Knorr-Bremse plant in Suzhou is now the Group's most important site in China. Following several extensions it has become the biggest supplier to the Chinese rail market, producing, amongst other things, brake control systems, bogie equipment, air supply units and hydraulic components. In order to expand its aftermarket activities it has also set up its own service center on a site measuring some 1,800 square meters and built up a team of specialists to offer aftermarket support.

Accreditation of Suzhou site as Enterprise Technology Center

Since 2013, the city of Suzhou has been assessing major companies against a range of criteria in a bid to encourage them to improve the organizational structure of their research and development departments and drive forward investment in this area. The criteria include an effective and integrated in-company innovation system, excellent conditions for research, development and testing – and actual investment in R&D.

Any company meeting these exacting criteria is accredited by the city authorities as an "Enterprise Technology Center". In December of the year in question the Knorr-Bremse site in Suzhou achieved this coveted status.

Commercial Vehicle Systems

Order from JAC for delivery of ABS

JAC is an important Chinese automobile manufacturer with a full range of independent brand vehicles. Products include light, medium and heavy-duty trucks, MPVs, SRVs, sedans, bus chassis, buses, engines, gearboxes and other key components. After more than 40 years of development, JAC now has an annual production capacity of more than 700,000 complete vehicles and 500,000 engines and is ranked amongst the top 10 companies in the Chinese auto industry.

As the country's second-biggest light truck manufacturer (annual production around 250,000 units), JAC has been cooperating since the beginning of 2013 with Knorr-Bremse Commercial Vehicle Systems China (Knorr-Bremse CVS China) on an ABS application for a newly-developed light-duty truck platform. Following successful negotiations with JAC, Knorr-Bremse CVS China has been nominated as the exclusive supplier of ABS for series production of this new truck platform.

Exclusive supplier of disc brakes to SIH

SIH nominates Knorr-Bremse as exclusive supplier of air disc brakes for its heavy-duty trucks.

SAIC-IVECO HONGYAN Commercial Vehicle Co., Ltd. (SIH) is a joint venture between SAIC IVECO Commercial Vehicle Investment Co., Ltd. and Chongqing Machinery & Electronics Holding (Group) Co., Ltd. As one of the leading heavy-duty truck manufactures in China, SIH initiated air disc brake application testing with Knorr-Bremse Commercial Vehicle Systems China (Knorr-Bremse CVS China) on heavy-duty tractors from 2012 onwards, and in 2013 nominated Knorr-Bremse CVS China as the exclusive supplier of air disc brakes for this platform.

In a bid to tackle quality problems and reduce customers' complaints, SIH also decided to change to a new clutch servo supplier for all its platforms. Following a strategic competition for the contract, Knorr-Bremse CVS China emerged as the winner and was nominated as the clutch servo supplier by SIH. This means that in 2014 Knorr-Bremse will take a 60% share of clutch servo applications at SIH.

Knorr-Bremse wins Japanese contract for EBS5

In a major success story for Knorr-Bremse, a well-known Japanese truck company that had been equipping its vehicles with Knorr-Bremse ABS systems has decided to switch to a full EBS system and opted to install Knorr-Bremse's EBS5 in several versions of its latest truck and trailer platform.

The system was specially designed for the requirements of the vehicles concerned, and development work was completed by the end of the year under review. The vehicles to be equipped with the Knorr-Bremse EBS5 system will be manufactured in Japan from the summer of 2014 onwards, with the first deliveries scheduled for fall of the same year. Knorr-Bremse is currently expecting to equip some 6,700 vehicles per year.

EBS5 was developed at various Knorr-Bremse sites in Europe, with Knorr-Bremse Japan partly responsible for the design and finalization of the applications. The control units are produced at Knorr-Bremse's facility in Hungary, with other components coming from sites in Germany.

Active safety systems' debut in South Korean commercial vehicle market

The commercial vehicle division of Hyundai is expecting the newly developed HMC bus to meet with a very positive response in the marketplace, with sales figures to match. For two of the

bus's key safety systems, Hyundai has opted to rely on the experience and expertise of Knorr-Bremse. The Company is supplying both the autonomous emergency brake system (AEBS) and the lane departure warning system (LDWS) for the new overland buses. Winning the order for these two systems marks Knorr-Bremse's entry into the safety systems segment of the South Korean commercial vehicle market. Hyundai also intends to equip the buses with the EAC electronic air treatment system.

For its new buses, Hyundai has opted for AEBS and LDWS safety systems from Knorr-Bremse.

At the same time the order is significant for a different reason: It provides Knorr-Bremse with a strong platform from which to obtain future projects in South Korea, where AEBS looks set to become mandatory in new commercial vehicles in the near future. Start of production for the new HMC buses is scheduled for 2015.

Daimler India places order for its heavy truck platform

Knorr-Bremse has received a landmark order in India to supply pneumatic braking systems for Daimler India's new heavy truck platform, which has been designed for the entire Asian and African market. By the year 2020, Daimler intends to sell 290,000 such vehicles in these two regions. Under the umbrella of Daimler Trucks Asia, the trucks will be developed and manufactured by Mitsubishi Fuso Truck and Bus Corporation (MFTBC) and Daimler India Commercial Vehicles India (DICV).

Key growth drivers are the export markets in Asia and Africa (in particular Kenya and Zambia), which Daimler is addressing with an extended product range aimed at expanding its market share. Since May of the year under review the DICV production plant in Chennai has been making five versions of the new truck platform which are destined for export under the FUSO brand name. The Knorr-Bremse systems are being produced at the Company's Indian plant in Pune.

Mandatory ABS in India: new opportunities for Knorr-Bremse

The Indian government is determined to improve safety on the country's roads and make the anti-lock braking system (ABS) mandatory for the majority of commercial vehicles. From October 2014 onwards, ABS will be required for buses above 5 t and trucks above 12 t. Manufacturers have asked the government authorities for more time, citing a lack of time for homologations, and implementation of a regulation for all applicable models is now expected by mid-2015. Until now, ABS has only been legally required in India for certain applications (e.g. tractors) and only 5% of vehicles registered in the country are equipped with this system. The new mandatory regulation offers Knorr-Bremse in India the chance of an annual production volume totaling approximately 100,000 systems.

At a later stage the regulation will also become mandatory for commercial vehicles with gross weights of between 3.5 and 12 t. Thanks to the new plant for the Commercial Vehicle Systems Division in Pune, Knorr-Bremse has the necessary infrastructure to immediately respond to rapidly rising local demand for ABS systems.


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SERVICE.

Good service should be customized, targeted and cost-effective – a requirement that Knorr-Bremse is able to meet in large measure, thanks to its regional presence, superbly trained workforce and close collaboration with local partners. Since the year under review, Knorr-Bremse RailServices has been operating as an independent division with even greater competences and responsibilities. And the Commercial Vehicle Systems division has similarly been working hard on offering even better and more reliable service to its customers.

Rail Vehicle Systems

Knorr-Bremse has merged its entire global service activities under the RailServices brand.

High-speed trains, streetcars, metros or light rail vehicles, locomotives or freight cars – during the lifetime of a rail vehicle (which can be up to 40 years) a wide range of services are required to keep fleets running as effectively as possible. But just as every fleet operator has his own particular profile, so, too, his needs for maintenance, overhaul, modernization and repair of vehicles and systems are unique. Under the RailServices brand Knorr-Bremse has merged its entire portfolio of global service activities with a view to providing an optimum, customized service package adapted with maximum flexibility to all its customers' needs.

The aim of the brand is to achieve the status of "service partner of choice", and the strategy is to make the Group's global competence available at local level in a form that is adapted to the specific system and culture involved – and to do so throughout the entire life cycle of the vehicle. In a total of 24 service centers worldwide, highly skilled specialists ensure across-the-board availability of products and services. They have at their disposal the types of modern assembly equipment and test rigs that are also used by original equipment manufacturers. Following overhaul, products leave Knorr-Bremse in an as-new state with a warranty similar to that given on a new product.

As safety-critical subsystems, brakes call for a particularly high level of specialization and experience, and no one can meet these requirements better than the original equipment manufacturer. The service offered by Knorr-Bremse in this respect is unique in terms of performance, quality, local availability and delivery reliability. It is based on modern logistics concepts and consistent supply chain management.

At the same time RailServices has been working on further adapting its product portfolio to further maximize customer benefit. In the field of logistics, "kitting" or "boxing" combined with reliable spare part availability, just-in-time delivery and proactive obsolescence management have been extended to further local markets. And on-site maintenance support and training of local personnel designed for specific customer requirements are also available. If a rapid response is called for, experts are available at all times.

In addition to extending the product range, the focus during the year under review was also on expansion of local service. With this in mind, Knorr-Bremse acquired SWT Swedtrac Sverige AB, a highly experienced Swedish train maintenance specialist in the spring. And since the fall of last year, the setting up, in the wake of an acquisition, of a new company – Knorr-Bremse RailServices (UK) Ltd. – with two service centers near Glasgow and one at Milton Keynes has strengthened its presence in the UK market.

Whether the issue concerns Knorr-Bremse braking, HVAC or access systems – RailServices customers can rely on a contact person to coordinate everything at Knorr-Bremse. And it has lately become possible to call on the expertise of an engineering department specially set up for RailServices. This is an important factor in fulfilling RailServices' ambition to become "service partner of choice", as standard solutions seldom work when standardized products have to be adapted to an existing system. RailServices is also working on supplying modernization to customers with systems that have already been officially approved.

Overhaul of valves for AAE

AAE (Ahaus Alstatter Eisenbahn AG), based in Switzerland, is one of Europe's leading freight car leasing companies. A broad range of products and a fleet consisting of more than 25,000 units

mean that AAE can offer solutions for a huge number of different transportation tasks. Maintenance and inspection of the freight cars is carried out independently by partner repair shops throughout Europe. For this reason, AAE formed a strategic partnership with Knorr-Bremse for overhaul of braking components in its fleet – control valves, relay valves and load-proportional valves – as part of the planned inspection process.

Thanks to its logistics for partner repair shops throughout Europe, Knorr-Bremse can ensure maximum availability of the AAE fleet. The basis for the high degree of flexibility required by AAE is the needs-based production of overhauled valves in each individual specification. The valve required is put together from the individual components of the used valves that have been de-installed and sent back. All this is completed to the same industrial standards as for Knorr-Bremse OE manufacture. In conjunction with professional planning by AAE, the right valve in the right specification is available throughout Europe in the right place and at the right time.

Good atmosphere in UK trains

It takes a fully operational and regularly maintained HVAC system to ensure that rail passengers and train crews can enjoy clean air and a pleasant on-board atmosphere. Knorr-Bremse Rail Systems UK maintains a highly specialized service center for rail HVAC systems in Burton-on-Trent which serves customers located in the UK and Ireland. In the year under review this Knorr-Bremse subsidiary secured a series of major orders for HVAC system overhauls.

In Burton-on-Trent Knorr-Bremse operates a highly specialized site for HVAC-related services.

These included overhauling the cab HVAC systems on the entire fleet of 350/185 Siemens Desiro trains, whose braking systems are also to be upgraded at the Knorr-Bremse Melksham facility. Work on these multiple units operated by South West Trains and First Group is scheduled for completion in 2016. In addition, the saloon and cab HVAC systems for 16 three-car Class 333 units from Northern Rail are being overhauled, as well as a further 360 saloon HVAC units on the 39 Class 165 diesel multiple units of Chiltern Railways. These "Chiltern Turbos" serve the busy London to Birmingham route and the work will be completed in 2015.

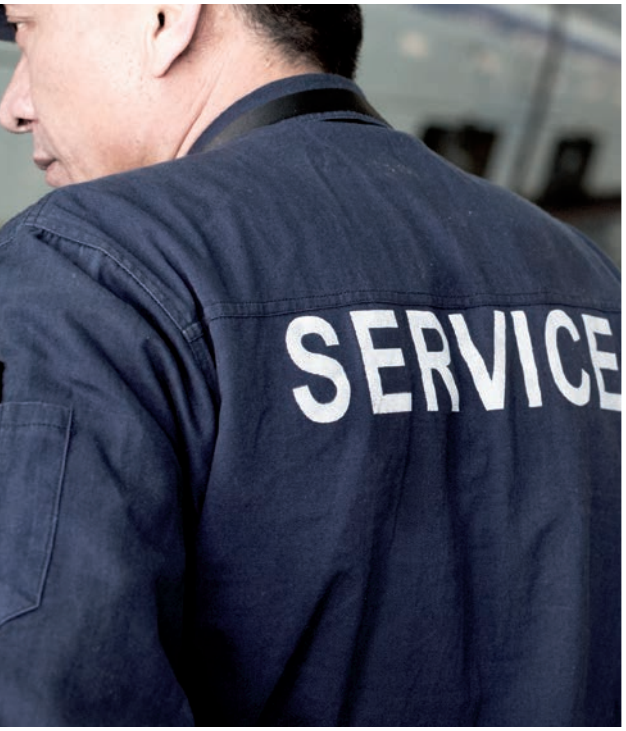
In 2013 Knorr-Bremse overhauled a total of 80 Sigma HVAC systems and boilers installed in Class 171 diesel multiple units for Bombardier. In addition, Knorr-Bremse was commissioned to overhaul the HVAC system including the hydrostatic drives in 80 Class 158 Express Sprinter diesel multiple units run by ScotRail, the First Group subsidiary that operates almost all of the passenger train services in Scotland.

Currently the HVAC systems on a further 120 Class 442 Gatwick Express trains are being overhauled and upgraded by Knorr-Bremse. The upgrade will deliver increased heating capacity with a higher rated compressor as well as WLAN access via Power line Communication (PLC).

Continuation of brake system overhaul for UK Desiro fleet

In one of its largest ever overhaul programs, Knorr-Bremse Rail Systems UK continued with its work on the Siemens Desiro multiple units in 2013. The overhaul of 45 Class 444 units run by South West Trains was completed in the year under review. The equipment overhauled included screw compressors, EP98 brake control, dump valves, bogie brake equipment, pressure switches and levelling valves. These units, which had already won a reputation for outstanding reliability, operate on the busy routes between London and destinations in the south-west of England.

The current phase of the overhaul program covers 127 four-car Class 450 Desiro electric multiple units (also operated by South West Trains) as well as 51 three-car Class 185 diesel multiple



units run by First Group on intercity routes in the north of England. The Knorr-Bremse facility in Melksham in the south-west of England can overhaul the braking system of an entire train in the space of one week. In the course of 2014 a similar scope of overhaul will be carried out on 30 Class 350/1 electric multiple units run by London Midland. These four-car Desiro units run on the West Coast Main line, one of the UK's most important north-south rail links.

Knorr-Bremse RailServices for UK rail leasing companies

In August 2013 Knorr-Bremse Rail Systems UK acquired the train maintenance, repair and upgrade company Railcare. The move saw Knorr-Bremse in the UK launch a new company, Knorr-Bremse RailServices UK, and take over operations at the former Railcare facilities at Wolverton, near Milton Keynes and Springburn near Glasgow. These facilities joined the other three Knorr-Bremse operations already established in the UK at Burton in the Midlands and Corsham and Melksham in the South West of the country.

Knorr-Bremse's acquisition of the Railcare business means it now has the ability to carry out large-scale refurbishment projects on rail vehicle fleets in the UK. Since the launch of RailServices, all three of the major UK rail vehicle leasing companies have entrusted Knorr-Bremse with extensive modernization work.

Around one-third of the Class 156 diesel multiple units in Britain are leased to operators by Angel Trains. Knorr-Bremse has been commissioned to overhaul and modernize all 42 of these two-car sets with completion by 2016. For 96 Class 165/166 Angel Trains diesel multiple units, the company is to overhaul the bodywork and convert the cars to offer access to persons with reduced mobility. These two- and three-car sets are operated as "Thames Turbos" by First Great

Western and "Chiltern Turbos" by Chiltern Railways. The project will take up to five years to complete. In the course of 2014, Knorr-Bremse will also complete the same scope of activity for Angel Trains on twelve Class 153 and 156 "Sprinters" – diesel multiple units operated by Abellio Greater Anglia and London Midland.

For leasing company Eversholt Rail, RailServices is handling servicing work on the underframe equipment and bogies of ten Class 318 electric multiple units and sleeper cars that form part of the Caledonian Sleeper on the London to Scotland route.

Leasing company Porterbrook has also commissioned RailServices with the modernization of its entire fleet of Class 319 electric multiple units, a total of 86 four-car trains that operate between Bedford and Brighton on the south coast. Refurbishment is to include installation of HVAC systems and will take five years to complete. Also for Porterbrook, Knorr-Bremse is to modernize 277 Class 158/159 "Express Sprinter" diesel multiple units. Work on these two- or three-car units will be completed in 2017. In addition, RailServices is also overhauling other multiple units and cars for Porterbrook.

RailServices in the UK is overhauling a large fleet of electric multiple units for leasing company Porterbrook.

Brake overhaul for Swedish double-decker trains

X-40 multiple units in Sweden recently underwent a major overhaul, which posed a double challenge for the team responsible. Not only was the project complex in terms of logistics and inventory management, but it needed to be carefully synchronized with upgrade work being carried out by the vehicle builder Alstom, which was also ongoing at the time. The project involved removing, overhauling and finally re-installing and testing the brake components on a total of 42 regional double-decker car sets operated by SJ AB, and on a further twelve replacement bogies. The team was able to carry out this maintenance work on two of the regional electric multiple units per week.

This team performance was made possible by operating a twin-shift system at the depot in Solna (Stockholm) for disassembly, assembly and testing of the brakes and also in Lund for the overhaul process, with a night-time shuttle service transporting the parts by truck in both directions between the two sites. Within the same period the team was also obliged to draw up large amounts of documentation. For example the engineers at the depot needed to record the new brake configuration for every completed train and in Lund the components used for every single brake unit. The logistics team put together special boxes of parts for each bogie, which not only reduced transportation costs but also provided optimum support for the production process at the depot. As a result, despite the very limited space available and other work running in parallel, they were able to successfully complete the project on time.

Modernization of Kiev metro

The Ukrainian capital's metro system consists of three lines that intersect with one another in the city center. Around 67 kilometers long in total, it transports more than 500 million passengers annually. The five-car trains used on the lines are painted in Ukraine's national colors of blue and yellow.

Knorr-Bremse is upgrading the braking systems of a total of 95 cars. This involves fitting them with oil-free compressors, EP Compact lite brake control units (with electronic load correction and pneumatic load limitation) and axle brake calipers. It is not only the operator who will benefit from the new smaller, lighter and more powerful braking systems: These low-noise, low-vibration brakes will give the passengers a more comfortable ride as well.

Three-year contract with Union Pacific

During the year under review, Knorr-Bremse's American subsidiary New York Air Brake signed a three-year contract with Class 1 railway company Union Pacific for valve maintenance and spare parts supply for its freight fleet. Union Pacific operates the biggest rail network in the USA – amounting to more than 50,000 kilometers and running across the entire western part of the USA from the Pacific coast to Chicago and New Orleans.

Retrofit solution for US brake control systems

NYAB is offering the CCB-26 brake control system as a retrofit solution for the American market. The components fit exactly into the installation envelope of the previous systems.

Low-horsepower locomotives, typically shunting locos, commonly see decades of active service, which means they often have to rely on outdated air brake systems. Maintenance of these systems is time-consuming and requires spare parts that are often hard to find. The CCB-26 system from Knorr-Bremse subsidiary New York Air Brake (NYAB) offers railroads in the American market a brake control solution that fits into the same installation envelope as older standard systems – including even the driver's brake valve.

This retrofit solution can be equipped with interfaces to existing remotely-operated locomotive systems. Self-diagnostics combined with the modular design reduce average repair time to less than 20 minutes. NYAB calculates that switching to the CCB-26 system cuts repair costs to 75%, with an overall drop of 38% in life cycle costs compared to previous standard systems. In the year under review, NYAB delivered 1,220 brake control systems from the CCB family in North America, including large numbers of CCB-26 systems to Norfolk Southern Railway. NYAB is also pursuing opportunities to sell CCB-26 systems to other Class 1 Railroads.

Service agreement with Canadian Pacific

In 2013 New York Air brake signed a three-year service contract with Canadian Pacific for the supply of spare parts and pneumatic hoses as well as maintenance of brake valves. Canadian Pacific Railway operates more than 22,000 kilometers of track in Canada and the north of the USA.

Extensive refurbishment in Canada

Canadian Knorr-Bremse subsidiary Technologies Lanka is currently modernizing a total of 125 bilevel cars for operator GO Transit. With a 390-kilometer network, GO Transit is the regional transport operator for Greater Toronto, carrying some 187,000 passengers on an average working day. These double-decker cars built by Bombardier in the 1980s are mainly being fitted with new electronics including complete door systems, low-voltage power supplies and battery chargers, HVAC control panels and web-based car-status monitoring systems.

Technologies Lanka has partnered with CAD Railway Industries to handle the actual on-car installation work. The refurbishment was planned in close cooperation with the customer and covers approximately one-quarter of the Go Transit fleet of bilevel cars. In the year under review the first eight cars were completed, with this extensive refurbishment program slated to continue until 2017.

Maintenance of Indian express trains

The Indian state railway company has decided only to use OEMs for the maintenance of its express trains. Knorr-Bremse has already equipped more than a thousand passenger cars for Indian Railways' two most prestigious trains – the Shatabdi Express and the Rajdhani Express – with modern axle brakes. The cars are based on a model from Alstom LHB and are built in Indian

factories. Knorr-Bremse currently has a three-year agreement for an initial 193 cars covering not only routine maintenance but also repairs and preventive maintenance.

Strengthening of Merak Jinxin field service

In response to the wish of Chinese fleet operators for local support to include air conditioning, Knorr-Bremse has strengthened the field service provided by its Merak Jinxin joint venture. With support from Knorr-Bremse's international network, reaction times have been reduced and service procedures optimized. Access for service personnel to technical manuals has also been improved.

Supporting Chinese customers over development and service

After placing major OE orders for braking, door and HVAC systems for Chinese mainline and suburban trains in recent years, the focus of manufacturers and operators is increasingly turning to product support from Knorr-Bremse. Vehicle builders are interested in drawing on the company's expertise for the joint development of customized systems such as HVAC systems for the planned high-speed route from Lanzhou to Urumqui, which crosses high mountains and arid deserts, or for Wuxi metro, which has to offer passengers consistent temperatures in its trains.

In a bid to find value-for-money service, operators like to turn to Knorr-Bremse's expertise and use obligatory condition assessment to avoid unnecessary work. Instead of immediately sending in all components for overhaul, Knorr-Bremse specialists examine the units right down to the lowest component level to determine whether any wear and tear can be identified. This helps reduce costly downtimes.

Local service by Knorr-Bremse Railway Technologies (Shanghai)

Knorr-Bremse Railway Technologies (Shanghai) is a wholly-owned subsidiary of Knorr-Bremse Spain. Its activities are mainly focused on supplying the two companies Merak (Spain) and Sigma (Australia) with complete HVAC systems and delivering components to Merak Jinxin Air Conditioning Systems (Wuxi). At the same time the company operates in the Asian growth market as a supplier of local technical services. With its highly-motivated team of employees the service division of Knorr-Bremse Railway Technologies, which is independent of the production division, offers customers comprehensive technical and engineering advice and support.

HVAC systems for rail vehicles have to be extensively adapted to the vehicle systems if all the requirements of the supply contract are to be fulfilled, and on-site technical support plays an extremely important role in this, ensuring customer satisfaction by ascertaining that the equipment is fully functional before it goes into service.

The services on offer from Knorr-Bremse Railway Technologies include technical support for initial commissioning at home and abroad, software engineering and fault tracing as well as engineering support for equipment validation and conformity testing by third parties. In an ESD-compliant repair center Knorr-Bremse Railway Technologies also carries out maintenance and overhaul of PCBs for the local Chinese market.

Commercial Vehicle Systems

Customers expect to receive high quality and optimum service over the full product life cycle. At Knorr-Bremse, everything – from the development of a product to its use in the vehicle and its servicing – is geared to providing just that. In the commercial vehicle sector, Knorr-Bremse has launched a program called Active Service that brings together comprehensive aftermarket solutions for the trade, workshops, fleet managers and drivers, enabling operational and business processes to function efficiently and economically in every respect. Active Service is built around products manufactured to original equipment standard and a focus on three criteria: safety, quality and economy. In the year under review, activities were centered on the reorganization of aftermarket operations and the launch of the new Alltrucks joint venture.

Both of these activities illustrate how Active Service can adapt to the growing complexity of commercial vehicles and serve up an ideally tailored service concept for each individual customer and every application. Alltrucks acts as the base for a new service concept for commercial vehicle workshops, which stand to benefit from the combined expertise of the three partners Robert Bosch GmbH, Knorr-Bremse Systeme für Nutzfahrzeuge GmbH and ZF Friedrichshafen AG. As a result of the reorganization, Active Service now also brings together all of the relevant disciplines, including the newly created remanufacturing function, under the aftermarket management umbrella.

Knorr-Bremse has enhanced and improved the tried and tested aspects of Active Service, including technical training courses for more in-depth, practice-oriented know-how; telephone and online support for efficient service procedures; and new logistics concepts that make for shorter repair times and greater vehicle availability. Online services such as technical information or the product catalog can be called up fast, easily and at any time, including all service-relevant details.

Despite an increasingly diverse portfolio, product harmonization – for example in the shape of the new guide and seal kit that is compatible with many different disc brakes – has made it possible to cut inventory costs and reduce tied-up capital, while at the same time ensuring product availability when servicing is required.

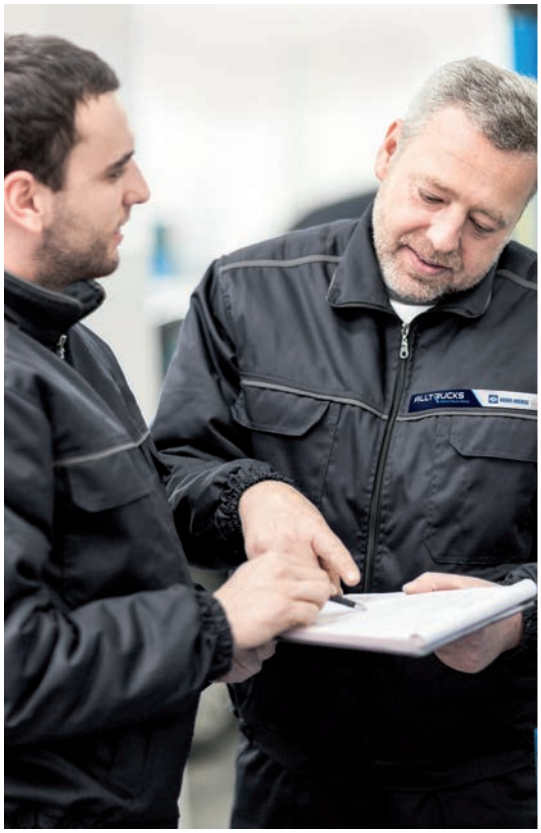
Foundation of new cross-brand repair shop concept Alltrucks

Knorr-Bremse, Bosch and ZF are offering a joint cross-brand repair shop concept for trucks.

During the year under review the three leading automotive and commercial vehicle suppliers Bosch, Knorr-Bremse and ZF pooled their expertise to form Alltrucks GmbH & Co. KG. Set up with the prior approval of the antitrust authorities, the Munich-based joint venture operates as a full provider of maintenance services to repair shops for all brands of truck.

Alltrucks is initially employing a workforce of around ten at its headquarters. Affiliated repair shops are supported with a technical hotline, extensive training provisions, diagnostic systems and workshop equipment. At the same time Alltrucks supports and promotes the development of its repair shop partners through a quality management system. The involvement of Bosch, Knorr-Bremse and ZF as partners in the business means the focus is very much on technical competence for all brands. Alltrucks is initially rolling out the concept in Germany, and then step by step in other countries with a view to establishing it throughout Europe in the medium term.

In order to explain the advantages of the new concept to potential customers, the three parties to the joint venture each held an information event in different parts of Germany. In early November



Knorr-Bremse invited customers to Berlin, where representatives of the Company underlined the particular advantages of a cross-brand approach to commercial vehicle maintenance.

New Supply Center – improved availability and delivery reliability

In addition to introducing a system of direct deliveries of spare parts for the Russian market, Knorr-Bremse has improved its logistics for central and southern European customers as well. In May of the year under review, the new Regional Distribution Center at the freight transportation center in Augsburg started up operations. In May it began serving the Italian aftermarket, followed by the French aftermarket in the fall.

With the opening of this supply center, which covers an area of 3,000 square meters and offers space for more than 5,000 palettes, Knorr-Bremse has consolidated its operations in the European aftermarket. In collaboration with a long-standing logistics partner it has succeeded in further improving storage and transportation costs, and customer-friendly opening times have enhanced availability and delivery reliability. During the course of 2014 Knorr-Bremse also intends to begin deliveries to Austria and the Benelux states from the Center.

Harmonization and expansion of service portfolio

The ability to respond rapidly and effectively is the key to an attractive service offer. This includes being capable of covering as many service cases in the field as possible with a manageable number of aftermarket products. In line with this principle, Knorr-Bremse has been further rationalizing and expanding its aftermarket portfolio.

During the year under review it focused mainly on the guide and seal kits for disc brakes. In the past, the number of different kits held in inventory had been steadily increasing, the reason being the growing number of disc brakes using different guides and seals. The result was that repair shops were forced to stock increasing numbers of such kits. By harmonizing its aftermarket kits, Knorr-Bremse aims to reverse this trend. The Company has developed a guide and seal kit that is compatible with a wide range of disc brakes and whose performance equals or even surpasses the maximum requirements of original kits. The number of kits required to be held in inventory at every level of service has been dramatically reduced – in most cases the new kit can be used for all applications.

Knorr-Bremse also took a similar approach when it came to harmonizing the service kits for its compressors. The spread of compressors in many different applications had, over the years, resulted in a similar increase in the number of different service kits. Since the year under review the Company has been producing these kits on the basis of repair requirements: If in a specific case there is a need for additional work, then the required parts and components are included in the kit.

Parallel to this harmonization process Knorr-Bremse also added an additional standard air dryer cartridge to its service portfolio. For the first time the company is offering a cartridge with a G1¼-inch thread for the European market.

Premium Partner for Eco Performance Award

The Eco Performance Award is presented annually to companies that operate particularly sustainably in the goods and private haulage industry. It has the scientific support of the Depart-

ment of Logistics Management at the University of St. Gallen, Switzerland, whose role is to guarantee a well-based scientific evaluation of all applications. The Award is endowed as an independent seal of quality by DKV Euro Service. Since the year under review, the Knorr-Bremse Group, in its role as a Premium Partner, has been contributing important new ideas for the further development of the Award. One of the aims is to honor companies that have made a particular effort to promote sustainability in road transportation. Various sources put the share of global carbon dioxide emissions from logistics operations at between 14% and 23%.

The Eco Performance Award is presented to companies with particularly sustainable road operations.

Dr. Stephan Weng, Member of the Executive Board at Knorr-Bremse Systeme für Nutzfahrzeuge GmbH, will in future contribute his expertise in the fields of efficiency improvement and fuel saving to the collective work of the award jury. The award is presented annually in two categories: one for small and medium-sized companies (less than 50 trucks) and another for large companies (more than 50 trucks).

It is no coincidence that Knorr-Bremse supports the Award. On the one hand the Group generates logistics activities in both the OE and aftermarket segments; and on the other hand the Company possesses crucial expertise in improving the efficiency of commercial vehicles. Moreover, economic, social and environmental aspects have always formed part of Knorr-Bremse's understanding of corporate responsibility.

Optimizing and standardizing spare parts packaging

In the past, all sites within Knorr-Bremse's European manufacturing network organized their own packaging, with the result that individual packages destined for the European aftermarket differed considerably in terms of dimensions and design. With a view to developing uniform

packaging sizes based on Knorr-Bremse's own Corporate Design, the Company therefore launched a project to optimize and standardize individual packages for the European aftermarket – the main objective being to enhance customer benefit.

To try out the new processes and packaging interfaces in the international aftermarket, a pilot project based on the new concept and involving some 80 different products divided into five different packaging sizes was launched for the air treatment product family.

Knorr-Bremse has now defined a total of some 50 packaging sizes covering the full spectrum of around 12,000 spare parts. Over the next two years, this standardized system will be phased in for each product group for the entire European aftermarket.

Expansion of web shop for commercial vehicle systems

Knorr-Bremse customers have 24/7 access to Knorr-Bremse Commercial Vehicle Systems' on-line product catalog. The division uses the website to list details of every single product including aftermarket-relevant details. The secure on-line ordering process – supported by a telephone hotline – makes the ordering of parts and components easier and faster. All the information and services on offer from Knorr-Bremse Systeme für Nutzfahrzeuge GmbH are brought together on its own website. During the year under review the range of on-line offers was further expanded.

Thus a dedicated micro-site for the iTAP trailer remote control has been created on the website. This represents a new departure for the Company and uses the advantages of smartphone apps to receive even better, simpler information and diagnoses from the vehicles or to modify important vehicle settings. There have also been innovations in the case of the ECUtalk trailer software, which is also available from the website. ECUtalk is a PC-based diagnostic program for electronic braking systems on trailers. Comprehensive information on the software is now available in 14 languages.

Change of logistics in Russian truck aftermarket

In future, Knorr-Bremse will be able to supply its Russian customers even faster with spare parts.

With a view to speeding up the supply of spare parts to its Russian customers, Knorr-Bremse has changed its logistic delivery processes for the Russian truck market. In the past, parts were shipped via the Knorr-Bremse site in Kecskemét, Hungary to the spare parts warehouse in Moscow; now all European sites will deliver them via Knorr-Bremse's logistic distribution center in Passau, from where they will be taken by a regular shuttle service directly to Moscow for further distribution.

Existing transport links within the Knorr-Bremse Group's inter-company network and the processes at the Passau site generate synergies from which Knorr-Bremse and its customers will benefit equally. With effect from 2014, some Russian customers will even receive the new standardized packaging that is used at all European sites. The packaging process will be carried out at the Moscow site.

New Bendix aftermarket friction products

In the fall of 2013, Knorr-Bremse subsidiary Bendix Spicer Foundation Brake LLC (BSFB) launched a new range of aftermarket friction products, expanding its offerings to meet the full range of customer requirements in terms of safety, performance and value. The new three-level aftermarket friction portfolio has been engineered to offer high-performance braking as well as affordable prices.

The three new performance levels are Bendix Basic Friction Bendix Advanced Friction and Bendix OE Friction. Together they form a comprehensive product set covering all applications in the North American market. Bendix Basic Friction is designed for use under normal operating conditions and stands for an attractive price/performance ratio.

Bendix Advanced Friction is intended for use in more demanding applications with higher weights and in steeper terrain. It also includes RSD solutions, making it the industry's first aftermarket friction certified for compliance with US reduced stopping distance requirements. A new product at this level, Bendix Advanced RSD, with Bendix friction code BA202R, changes the aftermarket friction landscape in the commercial vehicle industry. Previously, only OE aftermarket friction was certified as RSD compliant; now Bendix Advanced RSD also certifies as compliant but at a lower price.

Bendix OE Friction is the highest-performing option of the three, and includes solutions designed to exceed the RSD mandate with an extra safety margin and consistently deliver a stopping distance of 225 feet (68.58 m). It is engineered to meet the demands of OE certification and remains the only product certified for trucks above 52,000 lbs (approx. 23.5 t) to maintain the RSD compliance performance level.

Creation of Bendix Online Brake School

Knorr-Bremse's North American subsidiary Bendix Commercial Vehicle Systems is setting new standards in the field of training. Continuing its mission of providing the most up-to-date and in-depth training available to drivers, technicians, distributors, fleets and owner-operators, Bendix has created its own training portal – the Bendix Online Brake School. Thanks to the new e-learning facility, comprehensive customer training is available 24/7/365.

New training content is generally uploaded bi-monthly to ensure the school remains fresh and relevant. The web-based system gives employees – from trainees to skilled technicians – access to a comprehensive knowledge database enabling them to tailor the training to their own specific needs. The material available on the secure website is continuously expanding and ranges from five- to seven-minute video clips to a broad range of other training tools on all aspects of electronics and air brake maintenance. The website not only offers a wide range of interactive training in braking systems – it also contains a huge quantity of information on the entire Bendix product range. In addition the e-learning system offers training in related areas such as highway safety or the latest emissions regulations. A sophisticated password system enables customers and external individuals to access the portal as well.

The Bendix course material is covered in detailed documents, videos and other interactive presentation modules, allowing students to review the information at their own pace and on their own schedule. Knowledge checks at the end of each course measure what they have learned.

Further development of Middle Eastern aftermarket strategy

For many years the everyday scenario on the roads of the Middle East was dominated by aging commercial vehicles with purely pneumatic braking systems. Since the middle of the first decade of the millennium, however, fleet operators in the region have increasingly been asking for vehicles with electronic braking systems, and today such systems are commonplace. Knorr-Bremse was among the companies that benefitted extensively from this shift, through exports of electronic braking, air supply and clutch actuation systems.

With annual sales of commercial vehicles over 6 t topping 100,000 units, the Middle East is one of the fastest-growing regions in the world in this segment. In the year under review, Knorr-Bremse introduced and enhanced a whole series of measures to enable it to continue to participate extensively in this growth, which is also reflected in the aftermarket. Activities focused not least on improving the service support of the local sales network and responding to increasingly demanding requirements in terms of the availability of replacement parts. At the same time, the Company made every effort to create a denser network of local distributors and workshops and instruct them in the professional handling of Knorr-Bremse products.

New PIN procedure for maintenance work on Trailer-EBS

Trailer-EBS is the version of the EBS electronic braking system for trailers. A basic service requirement for the system is that repair shops should be able to check its functionality and, if necessary, replace entire modules. To do so, workshop personnel has to also modify the Trailer-EBS dataset or, if necessary, transfer it to a new unit. But because Trailer-EBS is a safety-critical system, it is essential to ensure that the repair shop employee concerned is properly trained for the task and that the service intervention is traceable. For this reason a Personal Identification Number or PIN is required for this sort of work, which is usually carried out using a laptop. Repair shop employees are only issued with a PIN after they have completed a specific training course at Knorr-Bremse.

This basic approach is to be retained, but Knorr-Bremse has now changed the PIN procedure in order to increase security yet further. The aim is to ensure that only properly trained employees carry out interventions on the trailer EBS module. Since the year under review, the PINs are no

longer issued for an unlimited period but rather have to be renewed every 36 months; all that is required is proof of attendance at the original personalized training session. This procedure is intended to prevent PINs being passed on to other employees who do not have the required training for servicing the Trailer-EBS and are not aware of the responsibility they bear.

Expansion of remanufacturing activities

Remanufacturing is the name given to a modern industrial reconditioning process and is often abbreviated to "reman". Apart from some spare parts that have been newly manufactured, it essentially involves an old product that has already gone through several life cycles. Unlike classical overhaul or repair, remanufacturing does not aim to prolong or maintain the life of the current product but rather to create an as-new product with a further useful life of its own.

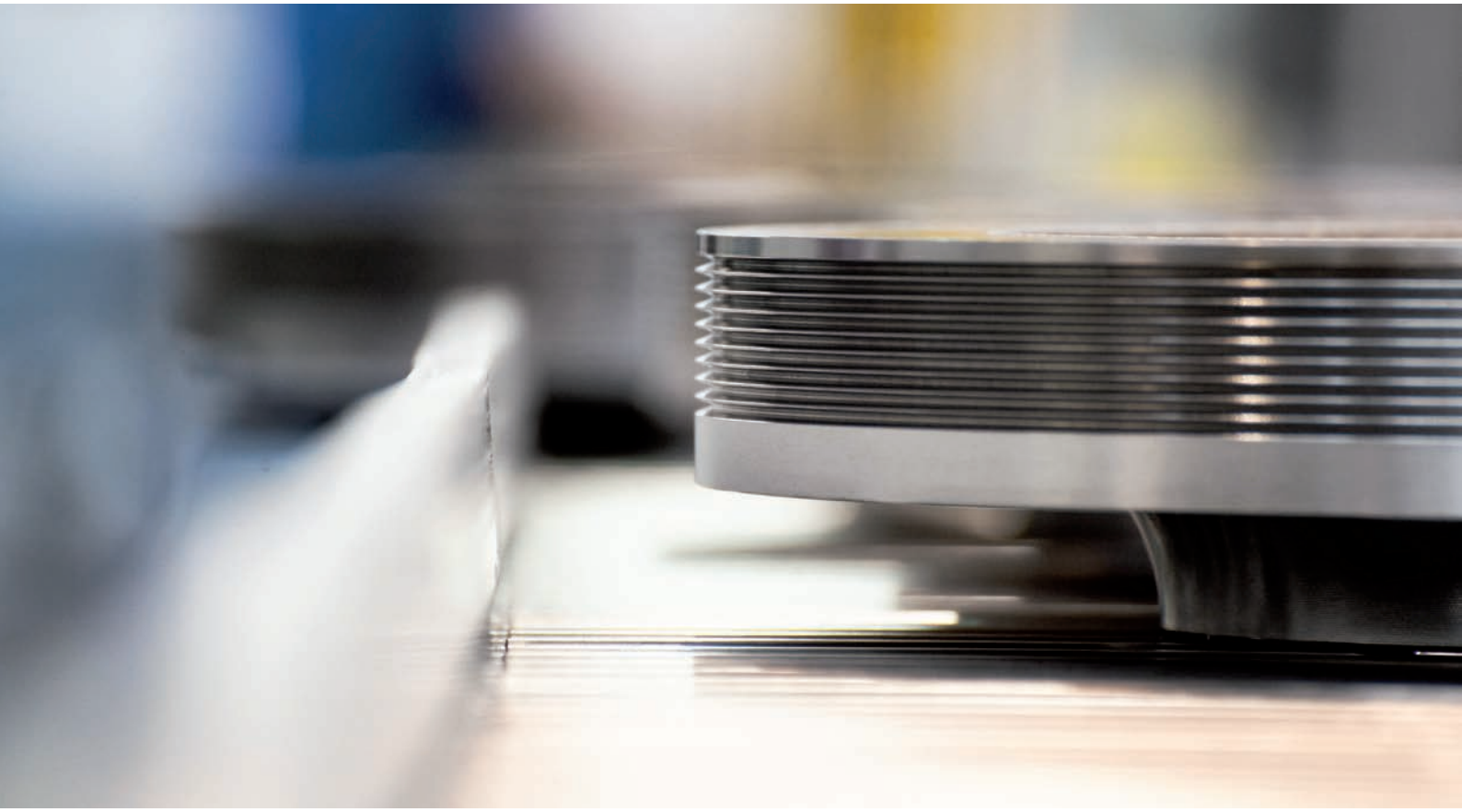
Components remanufactured by Knorr-Bremse meet the same quality standards as the OE product.

Knorr-Bremse has further strengthened its activities in this field and plans to massively expand its reman product portfolio. The value attached to this strategic growth area is reflected at organizational level: During the year under review Knorr-Bremse Commercial Vehicle Systems established its own separate remanufacturing business division. Other achievements during the year included optimization of reconditioning of EAC electronic air treatment, EBS (electronic braking system) modules and compressors. At the Knorr-Bremse site in Lisieux, France the Company opened a new production area and a line for compressor remanufacturing. In the USA, Knorr-Bremse's North American subsidiary Bendix celebrated the remanufacturing of the millionth brake block for drum brakes.

As the remanufacturing process regenerates an entire product and not just materials, it represents the highest form of recycling. One specific example is the remanufacturing of die-cast aluminum casings. Because the metal is not melted down for reuse, the highly energy-intensive process of pressure die-casting the casing is not involved. Compared with the entire value chain system for a new product, a reman product can save up to 98% of new materials.

At Knorr-Bremse the same industrial and quality standards apply to remanufactured products, with the result that they are of equal status with OE products, and reman customers are given the same warranty as for a new product. This is made possible partly by the fact that reassembly of the remanufactured products takes place on the same line as OE volume production, and exactly the same end-of-line tests are carried out.

In many cases the majority of individual parts can be remanufactured, so – despite the expense of returning old products, disassembling, cleaning, refurbishing and testing them – there are usually distinct price advantages for the customer. This makes the process particularly attractive to owners of older vehicles. Remanufacturing can make a significant contribution towards repair of such vehicles that is appropriate to their current value.



PRODUCTS.

Knorr-Bremse products never fail to impress with their high levels of performance, reliability and safety. They are not only constantly improved but also customized as much as possible to customer requirements – all over the globe. Completely new products also regularly see the light of day: 2013 saw innovations such as new valves for freight transportation in North America and Russia, or the Bendix Trailer Information Module, underline Knorr-Bremse's leading position in the market.

Rail Vehicle Systems

Safe braking even at extreme temperatures

Air brake systems produced by Knorr-Bremse for the European and American markets are usually designed for operating temperatures ranging between +80 °C and -40 °C. But with the opening up of the Russian market, components had to be produced to the GOST standard and function flawlessly at temperatures down to -50 °C – in some cases even lower. Knorr-Bremse used the opportunity to prepare other systems for such extreme temperatures as well.

One major challenge in the case of pneumatic brakes is winterization of seals. Natural rubber, for example, becomes brittle and splits at -40 °C, so it is essential to develop cold-resistant rubber compounds. In addition, the control parameters of the entire system have to be adjusted, as moving mechanical parts can develop increased resistance in extreme cold.

Knorr-Bremse's US subsidiary New York Air Brake is currently trying out rubber compounds for its brake control systems with a view to extending their sphere of use down to -46 °C. Rubber seals for operating temperatures of up to +100 °C are already in use for CCB II brake systems in the Australian market.

This year also saw the continuation of an innovative project for hydraulic braking systems aimed at extending the temperature range for operating urban mass transit vehicles from the current -30 °C/+50 °C to -45 °C/+55 °C. Individual components, units and the braking system are being checked for operation in this extended temperature range and – where necessary – modified and reassessed on the basis of appropriate testing.

Here, too, the main focus is on working with suppliers to identify suitable materials and seals. Temperature-related changes in braking system behavior – for example longer reaction times as a result of higher oil viscosity at low ambient temperatures – are compensated by improvements to pipe diameters and the selection of appropriate hydraulic oils.

All this means that Knorr-Bremse is able to offer customers electro-hydraulic braking systems that function reliably even under extreme climatic conditions, thereby extending the geographical scope for operating modern mass transit systems. New streetcars built by Alstom and PESA for Moscow are currently being fitted with such winterized electro-hydraulic braking systems from Knorr-Bremse.

Approval of Knorr-Bremse LL-brake blocks

LL-blocks can significantly reduce noise emissions from freight trains.

Environmental pollution in the form of noise emissions from rail transportation is being taken increasingly seriously, and as a result the building of a new railroad line or the expansion of an existing one is only possible if there is broad public support for such a project. But support is only forthcoming if trains can become noticeably quieter – which is why policymakers have called for existing rolling stock to be converted to using low-noise composite brake blocks by the year 2020. Organic LL-blocks are an attractive option for reducing noise emissions from existing fleets, as they enable operators to replace traditional cast iron blocks without having to modify the braking system. During the year under review, Knorr-Bremse received the approval of the relevant authorities for the LL-blocks manufactured by its Icer Rail joint venture.

Unlike the cast iron brake blocks that have been used on trains for decades, LL-blocks do not cause roughening of wheel running surfaces, which can give rise to wheel and track vibrations.

In combination with smooth rails, composite brake blocks can reduce the noise generated by the contact between wheels and rails by some 10dB(A) – in effect halving the perceived noise. However the difference only becomes audible if at least 80% of the cars in a freight train are equipped with such composite blocks. By entering this growing market, Knorr-Bremse hopes to benefit from the increasingly widespread use of LL-blocks.

One alternative to the LL-block is the so-called K-block. However, although both types use organic materials they are not comparable, as they have different coefficients of friction and therefore use compounds of differing hardness as well as different abrasive fillers. The manufacturing parameters such as mixing, molding time, molding temperature and hardening are also different. Moreover K-blocks have a high coefficient of friction and unlike LL-blocks cannot be retrofitted – they are designed for installation in new-build trains with new braking systems. A K-block of this type manufactured by Knorr-Bremse is currently undergoing approval testing.

When it comes to organic brake blocks, the company can draw on many years of experience. Icer is the manufacturer of friction materials with the longest and most extensive expertise in the field of organic brake blocks, and in the Icer Rail joint venture Knorr-Bremse is able to combine this with the systems expertise of a brake specialist.

LEADER for freight transportation on heavily used networks

For more than a decade the LEADER driver information system has been helping locomotive engineers to drive their trains in a way that uses less energy and causes less wear and tear. Al-

though LEADER was originally developed for use on particularly long and heavy freight trains that had little interaction with other trains, a version for passenger train operations, with their strict timetables, has also existed for some years. Knorr-Bremse has now sold more than 3,000 of each version, making it the global leader in driver information systems for rail vehicles.

Neither of these versions are entirely suited to freight operations on intensively used networks such as are found In Europe. A European freight train is not so free to operate independently of other trains as in the US, and is not as bound by the timetable as a passenger train. But as freight transportation accounts for a high proportion of a railway system's total energy consumption, energy savings inevitably have to be made – in order to reduce the operator's costs, make rail transportation more competitive compared with other transport modes and, not least, to protect the climate.

During the year under review Knorr-Bremse jointly developed a new version of LEADER in collaboration with leading rail freight companies. The topography of the landscape and the maximum speeds applying to different sections of the track are taken into account in advance so that an optimum speed can be maintained. Because a freight train requires large quantities of energy to start off after every unnecessary halt, this version of LEADER has an innovative interface to a master computer, making it possible to optimize operations on the entire network by slowing or accelerating individual trains as required. The new version of the system has been tried and tested on test runs in Germany and Sweden; its intuitive operation and reliable recommendations went down well with locomotive engineers. The system is scheduled to go into large-scale use with the first operators in 2014.

DB-60 II for North America – maintaining constant braking pressure even on downgrades

The new DB-60 control valve ensures more even braking throughout the entire train and reduces wear and tear of brake shoes and wheels.

Freight train operations in North America are on a different scale to European ones. A single train in the USA can be as much as three kilometers in length, with axle loads of up to 35 t when fully loaden. In this vast country, trains often have to negotiate steep downgrades, and it is not uncommon for the brakes to be applied for more than an hour.

During such lengthy braking the brakes need to maintain a constant pressure, but because every system loses a certain amount of air and standard valves do not allow recharging of individual brake cylinders, the engineer has to resort to gradually increasing the overall braking power applied. Reduced braking effort due to leakage on some wagons is compensated by brakes on others, causing excessive wear and other damage on those wagons. If the speed of the train cannot be adequately controlled on the grade, an emergency stop for the entire train may even be required. All this costs the operator time and money.

During 2013, Knorr-Bremse's American subsidiary New York Air Brake launched the new DB-60 II brake valve, which enables a constant pressure to be maintained by continuously recharging each individual brake cylinder. The result is even braking throughout the entire train and reduced wear on brake shoes and wheels. The braking system also has much higher safety reserves, even on steep downgrades and at low temperatures.

Available from the second quarter of 2014, the DB-60 II control valve represents a developmental advance of a kind that has not been seen for almost forty years in the North American market. Existing valves can be upgraded with the new feature.

Development of a new load-dependent brake valve for 1,520 mm gauge

At Knorr-Bremse Munich the final preparations have started for field testing of the first 50 new-

ly-developed valves for load-dependent braking systems. Knorr-Bremse's AKb1 load-dependent braking valve is designed for freight cars operating on 1,520 mm track and is capable of operating at temperatures between -60 °C and +60 °C. For short periods it can even operate at +80 °C or more.

Knorr-Bremse is preparing the first field tests for the newly-developed load-dependent freight car valve for 1,520 gauge.

The valve uses a sensor to calculate the pressure on the suspension of the bogie and then uses this data to regulate the brake cylinder pressure depending on the particular load carried by the freight car. In this way it ensures efficient braking distances and prevents wheel damage. Unlike other load-dependent braking systems, the AKb1 directly senses the pressure of the load on the central suspension of three-section bogies and continuously adjusts the pressure between the control valve and the brake cylinder itself. The advantage of this design lies in its simple, direct effect without the need for any additional reservoirs or load-proportional valves.

Any braking equipment installed directly in the bogie between sprung and unsprung masses is, of course, subject to very high mechanical stresses. To meet Knorr-Bremse's promise of creating a more reliable unit with twice the normal operating life, the engineers had to focus on robustness and durability as well as making the valve capable of functioning at extreme temperatures. Working together with RZD they were, for example, able to carry out vibration field-testing on freight trains that reproduced actual operating conditions at an early stage in the project.

Extensive testing under high mechanical stress and extreme climatic conditions at Knorr-Bremse's accredited testing center in Munich, as well as field testing on a test circuit operated by RZD confirmed the success of the design, which had benefited from invaluable input from experienced Russian engineers. Now that the valve has received the seal of approval of the Russian authorities, the development process can be rounded off with final field testing of 50 prototypes in Siberia, followed by final fine-tuning and completion.

Approval of KAB60 control valve for Russian rail market

After several years, the development process for the KAB60 control valve specially designed for 1,520 mm gauge track was completed on schedule during the year under review. The product – and associated manufacturing technology – has now been successfully tested, audited several times and approved.

Knorr-Bremse had been building an elaborate infrastructure for this project since 2007, analyzing customer requirements and the technologies available and agreeing the functional specifications with Russian railroad company RZD. First of all, sealants had to be developed for temperatures ranging from -60 °C to +80 °C, and then prototypes calculated at various stages of technology, designed and tested and industrial property rights secured for Knorr-Bremse. Production departments, including purchasing and quality assurance, were involved at a very early stage – with the result that both product technology and production process are highly efficient.

Conditions for freight transportation in Russia posed a considerable challenge for the control valve. The process of defining it and the potential for innovation, improvement and development was laid down by experts from Knorr-Bremse and Russian Railways. This made it possible to adopt an innovative design and incorporate cutting-edge technologies.

Both these factors have brought important advantages for the customer: Time between overhauls has been doubled; the valves are more reliable at extreme temperatures and when subjected to mechanical stresses; improved access makes them easier to service; and the valves offer a high degree of regulability, with reduced in-train forces. They also offer more precise

control of brake cylinder pressures and more rapid transmission of brake and release signals in long trainsets.

The process of developing and introducing the valve involved lengthy systematic testing procedures. Following exhaustive internal endurance and climatic tests, the first units were sent to Russia for further testing as early as 2010. Then, from 2011 onwards, they were extensively piloted under regular operating conditions, monitored by experienced and highly competent metrology experts from RZD institutes and central departments of Russian Railways. Independent state organs also examined the product and audited the production process. The end result is that a green light has now been given for volume production.

HVAC solution in China for thin high-altitude air and desert sand

The Lan-Xin high-speed route from Lanzhou to Urumqi in north-western China is one of the most challenging railroads in the world. Near the Qilianshan Tunnel it reaches an altitude of 3,858 meters above sea level – making it the highest high-speed line on the globe. Trains have to cross extensive mountain plateaus and deserts under intense heat from the sun, with temperatures in the Taklamakan Desert varying by up to 70 °C during the course of the day.

Knorr-Bremse joint venture Merak Jinxin Air Conditioning Systems in Wuxi, China, was commissioned to design a special HVAC system for the 250 km/h multiple units that operate on the line. In collaboration with the vehicle builder CSR Qingdao Sifang, Merak Jinxin developed a system that meets all the challenges of this route: high altitudes, intense solar radiation, extreme temperatures, sand and pressure waves. The roof-mounted units are initially being installed on a test train.

In the thin high-altitude atmosphere, electrical insulation has to be reinforced and fan output boosted. The intense solar radiation calls for all plastic parts such as cabling to be encapsulated in order to prevent damage from premature ageing. Furthermore the HVAC system has to be designed to cope with the extremely high temperatures that can develop in the passenger cars despite the very cool air outside. A heating system in the air intake protects roof-mounted equipment against snow and ice formation, and filters capture the fine desert sand as well as rainwater. The cooling fins of the heat exchangers have been designed with larger gaps between them in order to prevent sand from accumulating. When the train goes through a tunnel, strong pressure waves are generated. In order to protect passengers from any unpleasant pressure fluctuations, whatever the train's speed, and at the same time limit the noise generated by the HVAC units, Merak Jinxin has incorporated a combination of active and passive elements into the air interchange system.

HVAC systems for operation in thin high-altitude air require reinforced electrical insulation and high-performance fans.

12,000th EP2002 valve in China

EP2002 is Knorr-Bremse's brake control system for metros and multiple units. New metro trains in China are now almost exclusively being equipped with this technology – for example on the metro systems in Beijing, Guangzhou, Nanjing, Shanghai, Shenyang, Shenzhen and Tianjin. During the year under review, Knorr-Bremse's Chinese subsidiary Knorr-Bremse Systems for Rail Vehicles in Suzhou held a celebration to mark the 12,000th EP2002 valve going into service in the People's Republic. The prestigious customer event was also used to present new products for the Chinese market: oil-free compressors, hydraulic braking systems for low-floor light rail vehicles, and driver cab simulators from Knorr-Bremse subsidiary Sydac.

Commercial Vehicle Systems

Hat trick for Jochen Hahn – disc brake passes the test

Germany's MAN racing driver Jochen Hahn won overall victory in the FIA European Truck Racing Championship for the third time in succession. After 36 races in the 2013 season, Hahn still lagged eleven points behind his strongest rival Antonio Albacete in the European Championship. Only four races later, at the last race weekend in Le Mans, he managed to turn the situation in his favor – and the season ended with the defending champion being crowned again as the new champion.

It wasn't just Hahn who was overjoyed at winning the championship yet again. Knorr-Bremse, the racing driver's official sponsor since 2003, was equally delighted. Truck racing is a challenge not only for the driver but also, and above all, for the equipment used and the technicians behind it. Knorr-Bremse is at all times ready to assist Jochen Hahn's team in all matters concerning the high-performance disc brakes that reliably slow the five-ton truck as it hurtles towards the bends at speeds of up to 160 km/h.

Knorr-Bremse uses its collaboration with the Truck Racing Team and Jochen Hahn to gain insights into how brakes perform under grueling race conditions.

This partnership goes far beyond mere advertising purposes. Knorr-Bremse uses the collaboration to find out how the brakes perform in grueling racing conditions. The experience gained here provides valuable knowledge for use in series production. For Knorr-Bremse, subjecting braking systems from series production to extreme stress is highly instructive for further development and optimization purposes. As all the components in the racing vehicles in the European Truck Racing Championship must conform to current series production standards, Knorr-Bremse only uses series parts in collaboration with the Hahn Racing Team and not prototypes, as is often the case in Formula One, for example.

The successful collaboration has now been extended once more: Following the race weekend in Most (Czech Republic), the two sides signed a new two-year contract. Knorr-Bremse is proud of what is now a ten-year partnership with Jochen Hahn and of having contributed to his success. The company is keeping its fingers crossed for another successful title defense.

500,000th ADB22X disc brake at Bendix

Yet another chapter has opened in the success story of Bendix Spicer Foundation Brake (BSFB) – a joint venture between Knorr-Bremse's North American subsidiary Bendix Commercial Vehicle Systems and Dana Commercial Vehicle Products. Less than eight years after production of the Bendix ADB22X air disc brake first began, the 500,000th unit has been delivered.

This anniversary at the Bendix facility in Bowling Green, Kentucky is a result of growing demand for air brakes in the North American truck market, with annual production growing by a factor of more than five since 2009. In 2012 output stood at 250,000, whereas this figure has virtually doubled in the last 18 months alone.

The patented ADB22X is lightweight and offers a significant reduction in stopping distance combined with an extended brake system life. The combination of low maintenance costs and high safety performance also helps make the brake especially popular among customers.

Around 10% of Class 8 trucks are now equipped with air brakes, and Bendix is the clear market leader in this category, with the ADB22X accounting for over 90% of sales.

The particularly strong growth in production during the year under review is also partly due to the new regulations by the National Highway Traffic Safety Administration (NHTS), which call for tighter stopping distance requirements for trucks, which the new generation ADB22X disc brake already meets – and indeed surpasses. The new regulations have meant that industry-wide interest in the brake has increased, since it virtually eliminates brake fade with no degradation of stopping power.

In combination with other wheelend solutions from Bendix, the ADB22X help fleets comply with – and exceed – the statutory stopping distance requirements laid down by the NHTSA.

Production of 25-millionth disc brake in Aldersbach

The figure 25,000,000 is stamped on a small metal plate on a brake that was manufactured at the Aldersbach plant during the year under review. Both the figure and the plate commemorate a runaway success for the Knorr-Bremse Group: The previous year, global production of

disc brakes by Knorr-Bremse's truck division had passed the 25 million mark. Now, a year later, production at Aldersbach reached a similar milestone.

The success story that is the air disc brake began back in 1992, when small series production first began. In 1996 the brake was introduced on a large scale by the leading European truck manufacturers. Processes were then fine-tuned and technologies upgraded, with the result that within four years total production increased to 250,000 units. In September 2010 disc brake number 20,000,000 was celebrated.

Brakes are assembled in less than a minute on parallel assembly lines. On average only five days pass between receipt of the blanks and shipping of the finished brake. In the case of top-selling

products, the time required is even shorter. To ensure that such a large quantity of brakes is reliably delivered, logistics are organized according to the pull principle, with processes precisely synchronized from the materials flow from suppliers via internal transport routes right down to final delivery. This enables the plant to have a daily output of more than 8,000 brakes with minimal buffers and reduced handling stages.

The main reason for the success of the disc brake is the improved safety resulting from a stopping distance that is superior to that of a drum brake. This is guaranteed by a consistently high braking performance under all operating conditions and rapid response of the brakes combined with very good modulation. Other reasons are their low weight, even pad wear and greater ease of servicing, which reduces costs.

Volume production launched of TEBS feature: iLvl

iLvl is a new type of electronic air suspension with pneumatic backup for trailers.

The TEBS electronic braking system for trailers combines the electronic control system, pneumatics and some of the sensors into a single central module. It ensures even application of all the vehicle's brakes by adapting the braking command from the driver to the particular weight distribution of the trailer. In the fourth quarter of 2013 a new feature of this system went into volume production – the Intelligent Leveling Control System (iLvl). This is a new design of electronic air suspension with pneumatic backup for trailers. By changing the pressure in the air bellow the driver can rapidly and easily change the ramp height. Without iLvl he has to manually set the loading level using a valve. With the launch of volume production of iLvl the system will be installed in trailers belonging to virtually all Knorr-Bremse's European customers.

The benefit for the customer is not just confined to foodstuff transportation, where vehicles often have to dock at various different ramp heights. Rapid air venting enables iLvl to also take into account the safety aspect of tipper trucks. During tipping, the center of gravity of the rear axle can be lowered so that the load begins to tip and is emptied out at an earlier stage. The critical moment in which there is a danger of the entire vehicle rolling over is thus considerably reduced.

A further area of application for this feature is cross-border transportation. For historical reasons, various European countries have different permissible vehicle heights and the overhead clearance under bridges differs slightly. Using iLvl the driver can adapt the overall height of his vehicle and thus always ensure an overhead safety gap.

Parallel to the launch of series production of iLvl, Knorr-Bremse also virtually completed preparations for volume production of another TEBS feature during the year under review. With the help of the intelligent trailer access point (iTAP) drivers can even adjust the ramp height using a smartphone or a tablet with WiFi interface. An app is used to communicate with an electronic module that transfers the control commands via the CAN bus to the brakes and chassis management system.

As the data transfer is wireless, the overall complexity of the vehicle is reduced and at the same time efficiency and safety are increased. Thus, for example, the picture from a camera mounted at the rear of the truck can be automatically transmitted to the terminal device as soon as the reverse gear is selected. iTAP can also be used to control safety features such as anti-theft systems or safety interlocks on tanker road trains.

A software package also enables millions of public WLAN nodes in Europe to be used to automatically download location-related settings – for example the ramp heights of various ware-

house operators. As soon as the vehicle enters the site, iTAP and iLvl can set the trailer to the ramp height of that particular location without the driver lifting a finger.

90 years of air brakes for commercial vehicles

Back in 1920, when a truck-trailer combination drove off, it always had a brakeman on board whose job was to safely brake the trailer. In those days, trailer braking systems were not yet connected to the main truck. But in 1923 an innovation caused a considerable stir at the automobile exhibition in the Berlin Palace of Sport: a truck built by Horch that was equipped with a Knorr-Bremse braking system for both truck and trailer. For the first time this made it possible to brake vehicles that hitherto had had to be mechanically braked using the muscle power of the brakeman. In 2013 Knorr-Bremse celebrated the 90th anniversary of this air brake.

The automatic air brake ensures central, simultaneous and even braking for the tractor vehicle and trailers.

An automatic compressed air braking system throughout the vehicle ensured that both truck and trailer could be centrally braked simultaneously – and above all that the braking force was applied evenly. The compressed air required was generated, regulated and stored using a compressor, pressure regulator and reservoir. When the driver applied his foot to the brake pedal, he pressed against a spring and a regulation system enabled the braking force to be applied precisely to the individual front wheels – which hitherto had not had any brakes. The industry was immediately convinced of the advantages of the air brake, and the biggest names in the German commercial vehicle sector quickly began to make use of the Knorr-Bremse product. Customers included companies like Daag, Hansa-Lloyd, Krupp Bussing, Daimler and MAN.

The air brake was essential for the further development of commercial vehicles, as it made it possible to build faster vehicles with heavier payloads. The same applied to regulated braking of the front axles. In 1937, Knorr-Bremse supplied some 22,000 vehicle braking systems and 11,000 trailer units – which meant that around 80% of all trucks entering the market in Germany were equipped with Knorr-Bremse air brakes.

After the Second World War the company intensified its efforts to regain the ground it had lost in the truck brake segment as a result of the war. In 1955 Knorr-Bremse introduced an automatic load-dependent braking system and a rapid brake for truck-trailer combinations. As the use of compressed air spread, scope for further growth emerged. Thus, for example pneumatic suspension started to become increasingly important. With new compressors, Knorr-Bremse was able to establish a market position in a new segment.

Towards the end of the 1960s Knorr-Bremse became one of the very first companies to start developing an anti-lock braking system for commercial vehicles. This was a technology for which the Company was able to draw on its experience in the field of electronic traction control for rail vehicles. Up to this point, ABS developments had been confined to passenger automobiles, and nobody had yet dared to try to develop ABS for trucks because of the much more complicated conditions involved. Knorr-Bremse worked with Robert Bosch GmbH on developing the technology required, the Company's engineers carrying out pioneering work that still forms the basis of today's ABS systems. The experience and expertise the Company had acquired with the development of ABS in turn provided the basis for developing the EBS electronic braking system.

Another aspect of the air brake is the pneumatic disc brake. In 1992 Knorr-Bremse launched a first small-scale series in the market, and from 1996 onwards the major truck manufacturers included it as standard equipment. As application rates grew, so too did production figures, until up to three million disc brakes were being produced every year.

There are many factors that explain the success of the pneumatic disc brake – low weight, compact design, low hysteresis, even pad wear, reduced fading, improved serviceability and related cost savings – but the main one is improved safety: Compared with the drum brake previously used, the pneumatic disc brake significantly reduced stopping distances.

Within 90 years the air brake has developed into a highly complex system. Using the EBS and ABS, driver assist systems such as the ESP electronic stability program can now recognize critical situations and provide the driver with active support. The anniversary confirms the fact that Knorr-Bremse continues to develop safety-relevant innovations for an increasingly globalized world and promote mobility worldwide.

Preparations for mandatory ESP for trucks in Europe

With effect from November 1, 2014, all new EU vehicles in Europe must be fitted with an ESP electronic stability program. This requirement is part of a raft of measures introduced by the European Commission with the intention of improving traffic safety and halving the number of road deaths. It is estimated that equipping all trucks and coaches in the EU with electronic systems would save 500 lives per year and prevent 2,500 serious injuries.

ESP automatically stabilizes a vehicle in critical situations and significantly reduces the danger of skidding or roll-over. Selective intervention in individual wheel brakes and in the engine management system automatically corrects the direction of travel and speed in critical situations. Knorr-Bremse was also the first company to develop an ESP for articulated road trains and so-called EuroCombis.

Introduction of mandatory ESP will undoubtedly boost demand for the system in Europe, and Knorr-Bremse used the year under review to prepare itself for the new challenges this will bring. Preparations mainly took the form of extensive development activities required to simplify the application costs for the system and thus make it more easily adaptable to a wide range of customer requirements. This in turn is a prerequisite for Knorr-Bremse ESP to be able to cover a larger range of different vehicles.

Millionth drum brake at Knorr-Bremse KAMA

On November 15, 2013 Knorr-Bremse KAMA, the joint venture between Knorr-Bremse and Russian truck manufacturer KAMAZ, produced its millionth drum brake. It is not just this figure that is impressive but also the fact that, according to KAMAZ, not one of these brakes has proved faulty.

As drum brakes are particularly robust and reliable, they remain the preferred equipment for the extreme operating conditions in Russia.

Set up in the summer of 2008 in Naberezhnye Chelny, the joint venture is the exclusive supplier of braking systems to KAMAZ trucks. The millionth brake was a standard 400 mm brake and was installed on the truck assembly line at KAMAZ in an 8x4 tipper – a construction site vehicle capable of carrying loads of up to 18,500 kilograms.

The joint venture currently produces 43 different types of drum brake for the full range of vehicles from light to heavy duty trucks. Since November 2012 the plant has also been producing drum brakes for trailers produced by Russian manufacturer NEFAZ OJSC.

As drum brakes are particularly robust and reliable, they remain the preferred equipment for the extreme operating conditions encountered in Russia. Demand remains stable and in fact is growing from year to year, so that in 2013 Knorr-Bremse KAMA was able to produce more than 250,000 units. For 2014 the company is forecasting a slight further increase to 270,000 units per year. Given this steady rise in output, it is unlikely to be another four years before the plant in Naberezhnye Chelny produces the next million.

Improved portfolio in line with US regulations

Since August 2013, the newest round of stricter safety standards for stopping distances has applied in the North American truck market. Phase 1 of the Reduced Stopping Distance (RSD) regulations took effect in August 2011 for new three-axle tractors with Gross Vehicle Weight Ratings (GVWRs) up to 27 t (59,500 lbs). Now Phase 2 of the mandate has extended them to cover tractors with two axles, as well as heavy duty tractors with GVWRs above 27 t.

Knorr-Bremse subsidiary Bendix Spicer Foundation Brake LLC (BSFB) responded by investing huge efforts into developing more powerful braking systems. And despite the short timeframe after the introduction of the Phase 1 regulations, Bendix succeeded in bringing new RSD-compliant braking systems to market during the year under review.

The new regulations for the North American market call for the maximum stopping distance during emergency braking from 60 mph (96.6 km/h) to be reduced to 250 feet (approx. 76 meters). In tests, the various Bendix brakes actually delivered stopping distances of between 200 and 220 feet – significantly below the mandatory threshold. To meet the RSD Phase 2 requirements, the Bendix engineers built on advancements already developed for the first phase. Using the complex computer models developed for Phase 1, they succeeded in massively improving the effectiveness of the pneumatic brakes. Bronze bushings and heat-treated camshafts also made the new generation of drum brakes more wear-resistant. And close collaboration with the major North American vehicle manufacturers resulted in braking systems that can be perfectly integrated into their specific vehicle architecture.

SafetyDirect web portal for truck incident analysis

The Safety Direct web portal provides fleet operators with extensive data about their vehicles and video recordings of incidents.

In the year under review, Bendix Commercial Vehicle Systems LLC, the North American subsidiary of Knorr-Bremse, introduced SafetyDirect, a web portal that provides fleet operators with comprehensive feedback on their vehicles and helps them analyze severe occurrences. SafetyDirect provides video clips of incidents, enabling more accurate evaluation of the event.

Modern telematics routinely collect vehicle data from which specific events such as braking maneuvers or high-speed cornering can be identified. However, up till now these systems were not able to show what actually happened. This is where the new SafetyDirect web portal from Bendix comes in – a system unique in the industry.

SafetyDirect combines the vehicle data with video capture based on a cab-mounted camera. The in-cab camera installed on the windshield forms part of the Bendix AutoVue lane departure warning system. It provides a record of severe occurrences from ten seconds before they happen to ten seconds after. Fleet operators can then not only see what happened to their trucks on the road but also learn why. In addition, severe incidents trigger an instant e-mail message on a round-the-clock basis to the computers, smartphones or tablets of specific fleet staff.

The information provided by SafetyDirect also gives fleets the opportunity to develop targeted, ongoing driver education and training. SafetyDirect records data from the on-board safety systems as well as from the J1939 network. It then puts the data into a meaningful context in the form of charts showing distances from the vehicle ahead, for example, or cornering speeds. Fleet managers view this information on the web portal and deduce the necessary driver training measures.

Trailer Information Module new in market

As commercial vehicle trailers become increasingly sophisticated and attention focuses on operational efficiency, it is becoming more and more important to have access to reliable trailer information. It was to meet this demand for precise information that Knorr-Bremse subsidiary Bendix launched the Trailer Information Module (TIM) in the market.

This stand-alone system can be installed virtually anywhere on the trailer and is designed for compatibility with the two stability systems TABS-6 and Bendix TABS-6 Advanced MC. It enables drivers or technicians to access the most important information about the trailer – for example the ABS, rollover protection system, systems diagnostics or service intervals.

The driver can use the TIM display to check the relevant diagnostic codes and ring the workshop technician direct – enabling him to discuss what action to take at the scene of the problem itself. An independent internal power supply ensures that TIM continues to function even when the trailer is not connected to a tractor vehicle.

Low-cost exhaust brake for Asian market

When required, truck braking systems can activate the exhaust brake to strengthen the engine brake effect. When this happens, the exhaust brake valve closes and the engine slows down the vehicle by increasing its retarding force. During the year under review, Knorr-Bremse started to develop a new, low-cost version of the exhaust brake specially designed for the Japanese and South East Asian markets.

The number of parts has been drastically reduced from 65 on the original model to a mere 38 on the new development. But more than this – work has also started on improving the brake's performance by reducing air leakage from the shaft and friction during valve operation. Production of the first prototypes is scheduled for 2014.

Specially-developed products for Volvo in India

For many years, Knorr-Bremse has had close business ties with vehicle manufacturer Volvo that go beyond the two companies' collaboration in the European market. During the year under review this was demonstrated by two products specially designed by the company for Volvo: a new air treatment unit developed by Knorr-Bremse in India for the Volvo P-9103 platform destined for sale in Thailand, and also a compressor for the new Volvo-Eicher medium-weight trucks developed for the Asian market.

Volume production of the air treatment units for the P-9103 platform began in the summer of 2013, and some 8,000 are expected to be delivered during 2014. With minor modifications this extremely robust air treatment unit can also be used for the P-9218 platform, so the overall volume of deliveries is likely to increase further.

The compressor for Volvo-Eicher has a similarly robust design and is being manufactured by Knorr-Bremse in India in two sizes – 360 cm^3 and 225 cm^3. The 360 cm^3 version is available with or without an energy-saving system (ESS) that helps cut fuel costs by significantly reducing the power consumption of the compressor during the idling phase. The 225 cm^3 compressor was initially only available without ESS, but following the success of the 360 cm^3 version with ESS, Volvo-Eicher is now having it equipped with ESS as well.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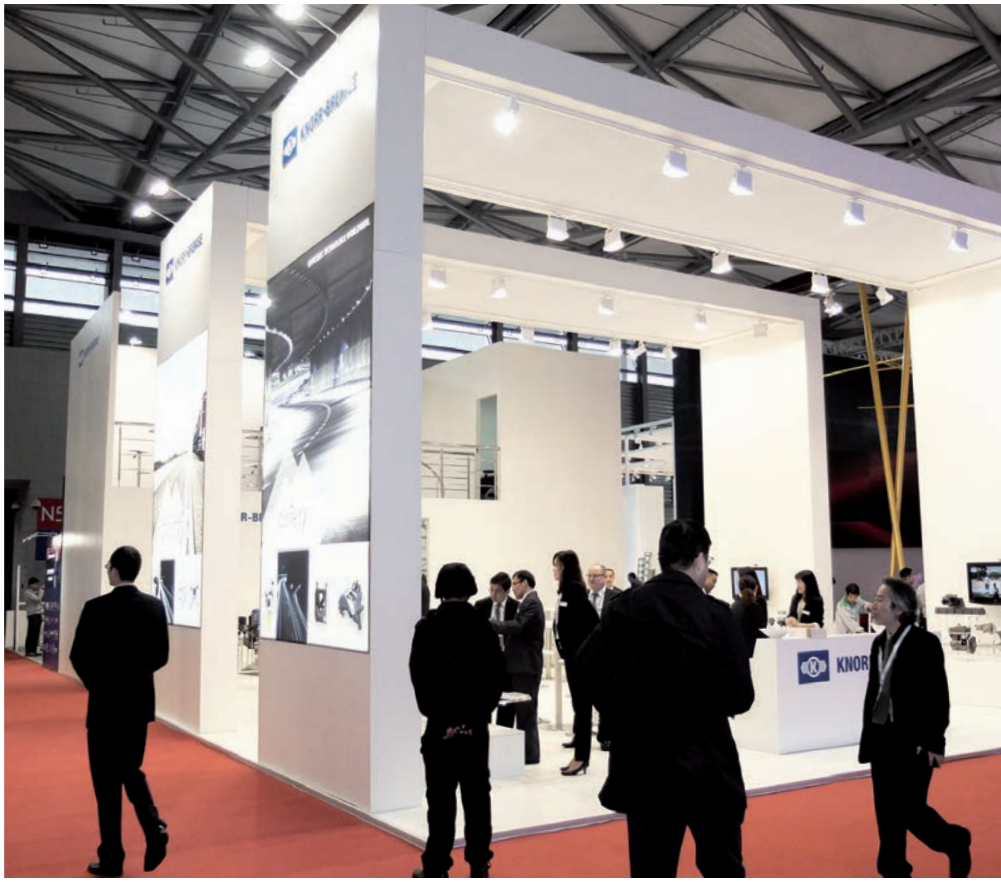

TRADE FAIRS.

Any company wanting to sell top-quality systems successfully worldwide needs to make the benefits of those systems clear to as wide a range of potential customers around the world as possible. In 2013 Knorr-Bremse, as a global player, again attended numerous trade fairs in the rail vehicle and commercial vehicle sectors, comprehensively demonstrating its systems expertise and technological excellence.

Rail Vehicle Systems

Eurasia Rail, Istanbul, March 2013
Because of its location at the meeting point of Europe and Asia, Turkey's rail traffic market has a unique role to play. The same is true of the Eurasia Rail trade fair, held in Turkey's Istanbul Expo Center (IFM): Now the world's third-largest fair for rail vehicles, it showcases rail equipment, systems and service providers for both the European and Asian markets. In addition to Knorr-Bremse, Eurasia Rail 2013 attracted a further 286 exhibitors from 25 different countries.

UITP World Congress and Mobility & City Transport Exhibition, Geneva, April 2013
Demand for exhibition space among manufacturers and service providers in the public transport industry remains high. Space at the UITP World Congress in Geneva, for example, was virtually fully booked many months before the fair. 326 companies ultimately took part in the event, which drew in almost 26,000 industry visitors. During the fair Knorr-Bremse customers enjoyed an interesting and varied evening at an event held at the CERN Globe of Science and Innovation. Guests were picked up by tram from the trade fair and given a guided tour of the exhibition at the Globe accompanied by live music and refreshments.

Railtex, London, April/May 2013
During the year under review the UK's biggest trade fair for rail technology once again served as a meeting point for the international rail industry. At the focus of Knorr-Bremse's stand was an outsize screen showing the Company's extensive portfolio of products, with a special emphasis on the local services offered in the UK. Also on display were the newly developed Z300 monitoring and control system for rail vehicles and a further development of the internationally proven EP2002 distributed brake control system.

RailLog, Busan, June 2013
RailLog, in the South Korean city of Busan, is the country's only rail transport trade fair and one of the few in Asia where, in addition to classical product presentations, the focus is also on logistics. In 2013 it was used by 158 exhibitors to showcase their products. Almost 22,000 visitors came to the event to find out about the latest innovations and trends. The Knorr-Bremse stand focused on advanced applications for braking high-speed trains, including the eddy current track brake.

EXPO 1520, Moscow, September 2013
2013 marked the fourth edition of EXPO 1520, the International Salon of Rolling Stock and Rail Technologies. The fair continues to grow in popularity, with exhibitors from two new countries – Denmark and Israel – making their debut in 2013. Knorr-Bremse used the opportunity presented by the fair to launch its KAB60 control valve, which was specially developed and approved for the Russian rail vehicle market, and its new load-sensitive brake valve.

IREE 2013, New Delhi, October 2013
The Indian rail transportation market is one of the fastest growing in the world, which meant there was considerable interest amongst Indian rail specialists in the event, which took place in New Delhi. The aim of the trade fair is to present solutions for the Indian rail market and highlight the challenges it will face in the future. Knorr-Bremse and some of its subsidiaries were amongst the exhibitors.

Trako, Gdansk, October 2013

Eastern Europe's leading rail vehicle fair Trako, held in the Polish city of Gdansk, celebrated its ten-year jubilee in 2013. The Knorr-Bremse stand served as an important meeting place for a large number of Knorr-Bremse customers and players in the railway industry. Knorr-Bremse received the "Ernest Malinowski Award" at the fair for its LEADER Driver Advisory System. The Award is presented every two years for the most interesting products and technical innovations in the rail industry.

AusRail PLUS, Sydney, November 2013

AusRail PLUS is the biggest rail-specific trade fair in the southern hemisphere and takes place annually, alternating between Sydney and Perth. During the year under review the event was held in the Sydney Convention and Exhibition Centre and attracted more than 350 exhibitors. It offers an excellent forum for decision-makers to discuss technological developments and investment opportunities. In addition to representatives of Australian rail operators, visitors included decision-makers from the transport authorities of the country's various states.

Metro China, Beijing, November 2013

The Metro China trade fair in Beijing is one of the biggest and most prestigious exhibitions for rail technology in China. On a floor space of more than 18,000 square meters the event covered all aspects of the industry from planning and construction design right down to operation and maintenance. Knorr-Bremse's exhibition stand focused on solutions specially designed for the Chinese market.

Commercial Vehicle Systems

Heavy Duty Aftermarket Week, Las Vegas, January 2013
The eighth Heavy Duty Aftermarket Week also took place in 2013. The fair's organizers and exhibitors – including the Knorr-Bremse subsidiary Bendix – not only presented their aftermarket products and solutions to visitors during the fair's official opening times, but also used the opportunity to network and conduct important business negotiations on an individual basis after hours. The fair also included the Heavy Duty Aftermarket Dialogue, an information event where top speakers gave presentations on topics such as services and the outlook for the market.

Mid-America Trucking Show, Louisville, March 2013
The annual Mid-America Trucking Show (MATS) is one of the biggest and busiest meeting places for the world's commercial vehicle industry. In the year under review the fair was again an excellent opportunity for visitors to learn about the issues facing the industry. Each year MATS attracts more than 70,000 visitors and 1,000 exhibitors from the USA and elsewhere. Among the highlights were panel events for industry visitors, and a working breakfast staged by the Heavy Duty Manufacturers Association, which included a guest presentation by a well-known manager from the OE sector. The fair also featured almost four days of supplier press events, live demonstrations and seminars, all giving a very practical perspective on the latest innovations in the truck market.

Technology & Maintenance Council Annual Meeting and Transportation Technology Exhibition, Nashville, March 2013
More than 300 exhibitors took advantage of the Transportation Technology Exhibition – held in parallel with the Annual Meeting of the Technology & Maintenance Council (TMC) – to present to visitors their latest products for enhancing truck safety and efficiency. Exhibits also included new models of medium and heavy trucks, alternative drive systems, safety and IT products, and services. During the event Bendix again hosted a joint working meal for industry decision-makers, featuring well-known speakers from the areas of politics and business. A series of panel events with major US fleet operators was also held to discuss business matters and other industry-specific concerns.

Auto Shanghai, Shanghai, April 2013
With more than 2,000 exhibitors, Auto Shanghai is one of the most frequented automobile trade fairs in China. During the year under review Knorr-Bremse took part in the event for the first time, presenting products for the Chinese and Asian market. The Company also held its first major press conference in China, which generated considerable interest amongst customers and members of the media.

Trost Schau, Stuttgart, April 2013
In 2013 around 270 companies exhibited their workshop equipment, spare parts, accessories and workshop concepts and services at the Trost Schau fair, the theme of which was "Welcome on Board". This event at Stuttgart's exhibition center gave workshop employees the opportunity to learn about the latest workshop equipment through promotions and live demonstrations. Highlights included live diagnostics performed directly on the vehicle, workshop equipment, and technology for wheel mounting, air conditioning servicing and wheel alignment.

Comtrans, Moscow, September 2013

The biggest international trade fair for the commercial vehicle industry in the reporting year was Comtrans in Moscow. Covering a total area of 70,000 square meters, the fair was a chance for around 25,000 Russian and international visitors to learn about the latest developments in the industry, and build and maintain important business contacts. The theme of Knorr-Bremse's stand at the fair was "A global presence enables local solutions", emphasizing the fact that the company operates its own local production facilities in Russia. The stand also highlighted the safety features of a number of Knorr-Bremse commercial vehicle technologies.

Wessels und Müller, Osnabrück, September 2013

As in previous years, more than 180 exhibitors presented their latest products and shared practical experience with industry specialists. The 40,000-plus visitors who attended are clear evidence that the fairs' combination of practical demonstrations and information-sharing events works for the industry. This format makes the workshop fair in Osnabrück an ideal opportunity to learn about the latest developments and new technologies on the market.

CARAT-Leistungsmesse, Kassel, October 2013

The CARAT-Leistungsmesse in Kassel is a biennial event for automotive suppliers. In 2013 it attracted more than 200 manufacturers and dealers who came to the fair to present to visitors their latest automotive products, technologies and solutions. This fair is notable for the depth of detail that it provides: Suppliers of automotive spare parts, consumables and equipment, workshop chemicals, tires, wheels and accessories are all on hand to provide in-depth information about their products. In addition to its G2.2 Electronic Braking system (EBS) for trailers, here Knorr-Bremse also presented the SN7 brake generation, the ProTec S brake pad retaining system, and Electronic Air Control 2 (EAC2).

PV Automotive, Hanover, October 2013

The PV Automotive trade fair took place in Hanover for the fifth time in 2013, once again serving as a meeting place for the independent car and commercial vehicle industry. The focus was therefore on workshop equipment, tools, diagnostic technology, workshop systems and services. A wide range of leading companies unveiled their latest innovations and provided visitors with comprehensive information on them.

COPARTS, Frankfurt, November 2013

At this fair in Frankfurt in November, well over 200 manufacturers and service companies provided first-hand information on the latest services, workshop equipment and solutions for the automotive parts market. It was also an opportunity for COPARTS associates, industry partners and service providers to discuss possibilities for expanding and streamlining their business. At this fair too, the focus was on presenting information in a practically relevant way: Manufacturers gave live demonstrations of the latest workshop equipment and diagnostic methods, for example for repairing wheel rims, flushing gearboxes and servicing air conditioning systems.

Solutrans, Lyon, November 2013

France's biggest commercial vehicle trade fair is attended not just by all the big truck brands, but also by numerous suppliers of axles, brakes, tires and other accessories. Other very popular areas at the fair apart from the classic exhibition stands included the special equipment and services zones. Together with its subsidiaries, Knorr-Bremse presented solutions for the worldwide commercial vehicle market at Solutrans.

Consolidated Financial Statements

1 Principles and methods

The consolidated financial statements have been drawn up in accordance with generally accepted accounting principles, complying with the accounting requirements of the German Commercial Code (HGB) and additional statutory provisions. Figures in the consolidated financial statements are shown in thousands of euros (TEUR). Certain items on the balance sheet and in the statement of income are combined for the sake of greater clarity. These items are explained separately in the Notes to the Consolidated Financial Statements.

Accounting and valuation

The financial statements of the companies included in the consolidated financial statements are prepared according to uniform principles of accounting and valuation applied to the Group. For the purposes of consolidation according to the equity method, any valuations in the financial statements of the associated companies that deviate from the uniform principles applied to the Group are retained.

Purchased intangible assets are valued at acquisition cost less scheduled depreciation; additional depreciation is taken where necessary.

Fixed assets are recorded at acquisition or production cost, less scheduled depreciation in the case of items subject to wear and tear; additional depreciation is taken where necessary. Depreciation on fixed assets is generally applied using the linear method, based on useful life. In the case of German companies included in consolidation, additions prior to January 2008 and after January 2009 are for the most part depreciated using the declining balance method, switching over to the linear method as soon as the latter results in higher depreciation. Minor fixed assets are depreciated to the maximum extent permissible under the respective countries' tax provisions.

Interests in affiliated, associated and related companies and miscellaneous investments are stated at cost or, in the event of a probable sustained diminution in value, at fair value (where the latter is lower). Materials and supplies are carried in inventories at the lower of average acquisition cost or replacement cost. Provision against realization risks is made where necessary.

Work in process and finished products are stated at production cost, but in no case higher than the projected sales revenues less any costs accruing prior to sale. Production cost includes direct cost of materials and labor, as well as production overhead. A reasonable allowance is made where there is a risk of a decline in inventory values. Receivables are stated at their nominal value, less any necessary provisions against specific debts. Receivables bearing no or low interest are stated at their net present value. General charges have been made to cover the general credit risk.

Other assets are stated at the lowest of average acquisition cost, net present value or fair value.

Earnings or disbursements prior to the balance sheet date are shown as prepaid income or prepaid expenses where they represent revenues or expenses for a certain period after the balance sheet date.

Foreign currency items are valued at the rate existing at the transaction date or – if less favorable – at the rate at the balance sheet date. Where foreign currency items have been hedged, they are valued at the corresponding hedging rate. Where the remaining term is one year or less, foreign currency items are valued at the mean spot rate at the final balance sheet date.

Rate-hedging and option transactions are performed selectively and exclusively for hedging purposes. Wherever possible, financial derivatives covering assets, borrowings, open contracts or transactions with a high probability of closure are bundled together as single items for valuation purposes ("macro hedges").

Accrued liabilities include reasonable and sufficient allowance for all perceivable risks and any contingent liabilities. Accruals are valued in accordance with § 253 (1) and (2) of the German Commercial Code (HGB), whereby use has been made of the options for retention of control laid out in § 67 (1) clause 2 and (3) clause 1 of the Act Introducing the German Commercial Code (EGHGB). Transfers to accrued liabilities are made using the net method. In Germany, pension plan accruals and similar commitments are set up according to actuarial principles based on realistic assumptions. Assumptions included in the calculations include future salary increases and future pension adjustments, as defined in § 16 of the German Law on Occupational Pensions (BetrAVG), as well as assumptions relating to staff turnover. The calculations are based on the biometric reference values devised by Klaus Heubeck (mortality tables RT 2005 G). The following parameters were used to calculate pension plan accruals in Germany:

Interest rate:	4.90% p.a. (2012: 5.06%)
Salary increases:	3.00% p.a. (2012: 3.00%)
Annuity trend:	1.50% p.a. (2012: 1.50%)
Fluctuation:	1.80% p.a. on average (2012: 1.80%)

Pension plan accruals are determined using the modified discount value method. Our foreign subsidiaries cover pension plans and similar commitments by accruals that are calculated according to principles similar to those used in Germany. Only in the United States of America are pension plans and similar commitments of major significance to the net worth, financial position and results of the Group. Here the projected unit credit method has been used, based on an interest rate of 5.68%.

Liabilities are stated at their settlement value.

Consolidated companies

In addition to Knorr-Bremse AG, 20 German and 106 foreign subsidiaries over which Knorr-Bremse AG can exert a direct or indirect controlling influence are included in the consolidated financial statements.

Investments in three German and one foreign company are shown in the consolidated financial statements as investments in associated companies. Seven foreign subsidiaries have not been included in consolidation because of their minor significance in relation to the net worth, financial position and results of the Group. Two German companies are not shown as associated companies, but instead are stated at acquisition cost.

During fiscal year 2013, the Group founded the following companies, which are included in consolidation:

Knorr-Bremse RailServices (UK) Ltd., Melksham, Wiltshire/United Kingdom
Knorr-Bremse Raylı Sistemler Turkey Sanayi ve Ticaret Limited Şirketi, Ankara/Turkey
Knorr-Bremse 1520 OOO, Burashevskoe/Russia
SWT Swedtrac C&W AB, Solna/Sweden
SWT Swedtrac Produktion AB, Solna/Sweden

SWT Swedtrac Svarv AB, Solna/Sweden
SWT Swedtrac Sverige AB, Solna/Sweden
SWT Swedtrac Svets & Smide AB, Solna/Sweden
SWT Swedtrac System AB, Solna/Sweden
SWT Swedtrac Teknikresurs AB, Solna/Sweden
SWT Swedtrac Trafik AB, Solna/Sweden

The following companies have been renamed:
Microelettrica Heine (Suzhou) Co., Ltd., Suzhou/China
(formerly Heine Resistors (Suzhou) Co., Ltd., Suzhou/China)
Knorr Brake Company LLC, Westminster, Maryland/USA
(formerly Knorr Brake Corporation, Westminster, Maryland/USA)

The following companies have been merged, wound up or sold:
Freios Knorr Argentina S.A., Buenos Aires/Argentina
IFE-Tebel Australia Pty. Ltd., Granville/Australia
Knorr-Bremse RUS OOO, Nizhny Novgorod/Russia
Sociedad Española de Frenos, Calefacción y Señales S.A., Getafe/Spain
Techtrain Associates Limited, Doncaster/United Kingdom
Westinghouse Brakes Australia Pty. Ltd., Concord West/Australia

This means that compared to the previous year, the number of companies included in consolidation has increased by seven foreign companies. On the following pages, a detailed list of affiliated and associated companies appears in a separate breakdown of the Group's shareholdings.

The above-mentioned changes in the scope of consolidation had no significant impact on the Group's net assets, financial position and operating results. The newly consolidated companies caused the balance sheet total to increase by TEUR 19,101.

Principles of consolidation

Until December 31, 2009, the book value method was used to consolidate investments in subsidiaries. This entailed offsetting book values against the value of our interests in the shareholders' equity of the subsidiaries at the time of the initial consolidation. Companies were included in consolidation at the date of acquisition or at the balance sheet date. Since fiscal year 2010, investments in subsidiaries have been consolidated using the revaluation method. This entails reporting shareholders' equity at the value corresponding to the market value of the assets and borrowings to be included in the consolidated financial statements. Companies are included in consolidation at the date of acquisition. Since 2002, any resulting goodwill has been capitalized in compliance with GAS standards. Scheduled depreciation is applied on the basis of operational considerations relating to useful life; within the Group, this may not exceed 20 years. The useful life of goodwill is determined using the subsidiaries' longer-term, strategic business models.

Wherever possible, a negative goodwill resulting from the consolidation in investments is released for the year in which it arises, as permitted by German commercial law and accounting standards.

Associated companies are consolidated using the equity method, with goodwill generally included as part of the cost of acquiring interests in associated and related companies. Associated companies

acquired prior to January 2010 were consolidated at the date of acquisition or the balance sheet date. As from fiscal year 2010, companies are included in consolidation at the date of acquisition.

Our share in the annual results of companies consolidated in accordance with this method, including amortization on goodwill, is shown in the statement of income under Financial results.

Receivables and liabilities between consolidated companies are netted. Unrealized intercompany profits resulting from intercompany trade in goods and services are eliminated in the consolidated statements. In the consolidated statement of income, revenues from intercompany sales and other intercompany income are offset against the corresponding expenses.

Foreign currency translation

The individual financial statements of the foreign companies included in consolidation are translated into euros at the mean spot rate at the balance sheet date, with the exception of shareholders' equity, which is translated into euros at the historic rate. Income statement items are translated into euros at the mean rate. Any resulting translation difference is reported under Group equity and noted in the statement of changes in group equity.

Deferred taxes

Deferred taxes as defined under §§ 274 and 306 of the German Commercial Code (HGB), resulting from temporary differences between the amount stated in the tax accounts of individual group companies and the amount stated in the consolidated balance sheet (including differences arising as a result of accounting and valuation adjustments or during the consolidation process), are netted wherever possible, in accordance with legal requirements. In the individual balance sheets prepared according to the uniform principles of accounting and valuation applied to the Group ("Financial statements II"), the option to capitalize assets to the amount of probable tax relief in the following years is used in individual cases. The calculation of deferred taxes is based on the tax rates that are expected to be valid at the time of their realization.

Deferred taxes on losses carried forward are capitalized in individual cases, where there is sufficient probability that the tax benefits can be realized. At each balance sheet date, the book value of deferred tax assets is reviewed and, if necessary, adjusted as appropriate.

2 Changes in intangibles, fixed assets and investments

Acquisition or production cost

Additions to purchased fixed and intangible assets amounted to TEUR 181,392 in fiscal year 2013. This figure includes investments in the amount of TEUR 159,463.

In EUR thousands (TEUR)	Carried forward Jan. 1, 2013 *)	Additions *)	Reclassifications *)	Disposals *)	
Industrial property rights/trademarks	293,991	6,905	262	(927)	
Goodwill	293,387	15,321	0	(705)	
Purchased intangibles	**587,378**	**22,226**	**262**	**(1,632)**	
Land, equivalent rights to real property, and buildings, including buildings on land not owned	319,226	29,693	66,148	(10,146)	
Technical equipment and machinery	535,705	32,126	31,684	(13,703)	
Other equipment, plant and office equipment	477,526	32,735	17,386	(29,690)	
Advances to suppliers and construction in progress	128,384	64,612	(115,480)	(737)	
Fixed assets	**1,460,841**	**159,166**	**(262)**	**(54,276)**	
Investments in affiliated companies	7,466	0	42,149	(3,514)	
Investments in associated companies	3,451	639	0	(857)	
Miscellaneous investments	77,186	31	(42,149)	(11,875)	
Investments	**88,103**	**670**	**0**	**(16,246)**	
Intangibles, fixed assets and investments	**2,136,322**	**182,062**	**0**	**(72,154)**	

*) valued at acquisition or production cost

	Currency differences *)	Balance Dec. 31, 2013 *)	Accrued depreciation/ amortization	Net value Dec. 31, 2013	Net value Dec. 31, 2012	Depreciation/ amortization during the fiscal year
	(7,382)	292,849	(234,644)	58,205	71,051	17,761
	(19,694)	288,309	(216,146)	72,163	68,871	10,755
	(27,076)	**581,158**	**(450,790)**	**130,368**	**139,922**	**28,516**
	(13,538)	391,383	(132,402)	258,981	186,858	7,623
	(17,307)	568,505	(368,504)	200,001	194,138	47,218
	(17,806)	480,151	(362,072)	118,079	115,229	41,551
	(5,313)	71,466	(5,965)	65,501	122,172	243
	(53,964)	**1,511,505**	**(868,943)**	**642,562**	**618,397**	**96,635**
	(1,650)	44,451	(77)	44,374	4,672	0
	0	3,233	0	3,233	3,451	0
	(3,988)	19,205	(4,244)	14,961	61,104	0
	(5,638)	**66,889**	**(4,321)**	**62,568**	**69,227**	**0**
	(86,678)	**2,159,552**	**(1,324,054)**	**835,498**	**827,546**	**125,151**

3 Intangibles

This heading includes primarily the acquisition of goodwill, patents, rights to the use of names and trademarks, and IT software. IT software and goodwill account for the majority of additions.

Any goodwill resulting from the consolidation of investments is subject to scheduled depreciation over a period of not more than 20 years. Other intangibles are subject to scheduled depreciation over periods of between three and 10 years.

All intangible assets have a limited useful life.

4 Fixed assets

Movements of fixed assets are presented in the compilation on the preceding pages. To take technical and economic factors into account, scheduled depreciation was applied to acquisition costs.

5 Investments

Investment movements are set out in the compilation above. The companies Alltrucks Verwaltungs GmbH, Munich/Germany and Alltrucks GmbH & Co. KG, Munich/Germany, both newly founded in 2013, were valued using the equity method.

Miscellaneous investments consist of miscellaneous loans (TEUR 12,975), long-term investments (TEUR 1,837) and investments in other companies (TEUR 149).

List of shareholdings

1 Consolidated affiliated companies	Share in capital in %
Albatros GmbH, Munich/Germany	100.0
Anchor Brake Shoe Company LLC, West Chicago, Illinois/USA	100.0
BCVS Canadian Holdings LLC, Anjou, Quebec/Canada	100.0
BCVS Mexican Holdings LLC, Cd Acuña, Coah/Mexico	100.0
Bendix Commercial Vehicle Systems LLC, Elyria, Ohio/USA	100.0
Bendix CVS Canada Inc., Anjou, Quebec/Canada	100.0
Bendix CVS de Mexico SA de CV, Cd Acuña, Coah/Mexico	100.0
Bendix Spicer Foundation Brake Canada, Inc., Kingston, Ontario/Canada	100.0
Bendix Spicer Foundation Brake LLC, Elyria, Ohio/USA	80.0
Bost Ibérica S.L., San Fernando de Henares/Spain	100.0
BSFB Holdings, Inc., Elyria, Ohio/USA	100.0
Comet Fans S.r.l., Solaro, Milan/Italy	100.0
Dr. techn. Josef Zelisko Ges.m.b.H., Mödling/Austria	100.0
Freinrail Systèmes Ferroviaires S.A., Reims/France	100.0
Hasse & Wrede CVS Dalian, China Ltd., Dalian/China	70.0
Hasse & Wrede GmbH, Berlin/Germany	100.0
Heine Resistors GmbH, Dresden/Germany	100.0
IFE-ČR a.s., Brno/Czech Republic	100.0
IFE North America LLC, Westminster, Maryland/USA	100.0

1 Consolidated affiliated companies (continued)	Share in capital in %
IFE-Tebel Technologies B.V., Leeuwarden/The Netherlands	100.0
IFE-VICTALL Railway Vehicle Door Systems (Qingdao) Co., Ltd., Qingdao/China	59.0
IGE-CZ s.r.o., Brno/Czech Republic	100.0
Kalmar Tågkompetens AB, Kalmar/Sweden	100.0
KB Gamma Beteiligungs GmbH, Munich/Germany	100.0
KB Lambda Beteiligungs GmbH, Munich/Germany	100.0
KB Media GmbH Marketing und Werbung, Munich/Germany	100.0
KB Omikron Beteiligungs GmbH, Munich/Germany	100.0
KB Sigma Beteiligungs GmbH, Munich/Germany	100.0
Knorr-Amabhiliki (Pty.) Ltd., Kempton Park/South Africa	74.0
Knorr Brake Company LLC, Westminster, Maryland/USA	100.0
Knorr Brake Corporation Canada Holdings Ltd., Montreal, Quebec/Canada	100.0
Knorr Brake Holding Corporation, Watertown, New York/USA	89.3
Knorr Brake Ltd., Kingston, Ontario/Canada	100.0
Knorr Brake Realty LLC, Westminster, Maryland/USA	100.0
Knorr Brake Truck Systems Company, Watertown, New York/USA	100.0
Knorr-Bremse 1520 OOO, Burashevskoe/Russia	60.0
Knorr-Bremse / Nankou Air Supply Unit (Beijing) Co., Ltd., Nankou/China	55.0
Knorr-Bremse Asia Pacific (Holding) Ltd., Hong Kong/China	100.0
Knorr-Bremse Australia Pty. Ltd., Granville/Australia	100.0
Knorr-Bremse Benelux B.V.B.A., Heist-op-den-Berg/Belgium	100.0
Knorr-Bremse Beteiligungsgesellschaft mbH, Munich/Germany	100.0
Knorr-Bremse Brake Equipment (Shanghai) Co., Ltd., Shanghai/China	100.0
Knorr-Bremse Braking Systems for Commercial Vehicles (Dalian) Co., Ltd., Dalian/China	100.0
Knorr-Bremse Brasil (Holding) Administração e Participação Ltda., Itupeva/Brazil	100.0
Knorr-Bremse CAFF Systems for Commercial Vehicles Chongqing Ltd., Chongqing/China	66.0
Knorr-Bremse CARS LD Vehicle Brake Disc Manufacturing (Beijing) Co., Ltd., Daxing/China	50.0
Knorr-Bremse Commercial Vehicle Systems Japan Ltd., Tokyo/Japan	80.0
Knorr-Bremse Fékrendszerek Kft., Kecskemét/Hungary	100.0
Knorr-Bremse Ges.m.b.H., Mödling/Austria	100.0
Knorr-Bremse India Pvt. Ltd., Faridabad/India	100.0
Knorr-Bremse Investment GmbH, Munich/Germany	100.0
Knorr-Bremse IT-Services GmbH, Munich/Germany	100.0
Knorr-Bremse KAMA Systems for Commercial Vehicles OOO, Naberezhnye Chelny/Russia	50.0
Knorr-Bremse Nordic Rail Services AB, Lund/Sweden	100.0
Knorr-Bremse Pensionsgesellschaft mbH, Munich/Germany	100.0
Knorr-Bremse Polska SfN Sp. z o.o., Warsaw/Poland	100.0
Knorr-Bremse Rail Systems Italia S.r.l., Campi Bisenzio/Italy	100.0
Knorr-Bremse Rail Systems Japan Ltd., Tokyo/Japan	94.0
Knorr-Bremse Rail Systems Korea Ltd., Seoul/South Korea	100.0
Knorr-Bremse Rail Systems OOO, Moscow/Russia	100.0
Knorr-Bremse Rail Systems (Burton) Ltd., Stretton, Burton upon Trent/United Kingdom	100.0
Knorr-Bremse Rail Systems (Machining) Ltd., Melksham, Wiltshire/United Kingdom	100.0
Knorr-Bremse Rail Systems (UK) Ltd., Melksham, Wiltshire/United Kingdom	100.0
Knorr-Bremse RailServices (UK) Ltd., Melksham, Wiltshire/United Kingdom	100.0

1 Consolidated affiliated companies (continued)	Share in capital in %
Knorr-Bremse Railway Technologies (Shanghai) Co., Ltd., Shanghai/China	100.0
Knorr-Bremse Raylı Sistemler Turkey Sanayi ve Ticaret Limited Şirketi, Ankara/Turkey	100.0
Knorr-Bremse SA Holding Company (UK) Ltd., Melksham, Wiltshire/United Kingdom	100.0
Knorr-Bremse S.A. (Pty.) Ltd., Kempton Park/South Africa	75.0
Knorr-Bremse S.R.L., Bucharest/Romania	100.0
Knorr-Bremse Sistemas para Veículos Comerciais Brasil Ltda., Itupeva/Brazil	100.0
Knorr-Bremse Sistemas para Veículos Ferroviários Ltda., Itupeva/Brazil	100.0
Knorr-Bremse Sistemi per Autoveicoli Commerciali S.p.A., Arcore/Italy	100.0
Knorr-Bremse System för Tunga Fordon AB, Malmö/Sweden	100.0
Knorr-Bremse Systeme für Nutzfahrzeuge GmbH, Munich/Germany	80.0
Knorr-Bremse Systeme für Nutzfahrzeuge Pensionsgesellschaft mbH, Munich/Germany	100.0
Knorr-Bremse Systeme für Schienenfahrzeuge GmbH, Munich/Germany	100.0
Knorr-Bremse Systeme für Schienenfahrzeuge Ibero Holding GmbH, Munich/Germany	100.0
Knorr-Bremse Systèmes pour Véhicules Utilitaires France S.A., Lisieux/France	100.0
Knorr-Bremse Systems for Commercial Vehicles India Pvt. Ltd., Pune/India	100.0
Knorr-Bremse Systems for Commercial Vehicles OOO, Moscow/Russia	100.0
Knorr-Bremse Systems for Commercial Vehicles Ltd., Bristol/United Kingdom	100.0
Knorr-Bremse Systems for Rail Vehicles (Suzhou) Co., Ltd., Suzhou/China	100.0
Knorr-Bremse Systemy dla Kolejowych Środków Lokomocji PL Sp. z o.o., Cracow/Poland	100.0
Knorr-Bremse Systémy pro užitková vozidla ČR s.r.o., Stráž nad Nisou/Czech Republic	100.0
Knorr-Bremse Technology Center India Pvt. Ltd., Pune/India	100.0
Knorr-Bremse Ticari Arac Fren Sistemieri Limited Şirketi, Istanbul/Turkey	100.0
Knorr-Bremse US Beteiligungs GmbH, Munich/Germany	100.0
Knorr-Bremse US Investment GmbH, Munich/Germany	100.0
Knorr-Bremse Vasúti Jármű Rendszerek Hungária Kft., Budapest/Hungary	100.0
Knorr-Bremse Verwaltungsgesellschaft mbH, Munich/Germany	100.0
Maquiladora de Acuña SA de CV, Cd Acuña, Coah/Mexico	100.0
Merak Jinxin Air Conditioning Systems (Wuxi) Co., Ltd., Wuxi/China	51.0
Merak Knorr Climatización S.A., Buenos Aires/Argentina	100.0
Merak North America LLC, Westminster, Maryland/USA	100.0
Merak Sistemas Integrados de Climatización S.A., Getafe/Spain	100.0
Microelettrica do Brasil Comercialização e Importação de Produtos Eletromecânicos Ltda., Barueri, São Paulo/Brazil	90.0
Microelettrica Heine (Suzhou) Co., Ltd., Suzhou/China	100.0
Microelettrica Power Devices (Pty.) Ltd., Johannesburg/South Africa	100.0
Microelettrica Power (Pty.) Ltd., Johannesburg/South Africa	74.0
Mircoelettrica Scientifica (Pty.) Ltd., Johannesburg/South Africa	100.0
Microelettrica Scientifica S.p.A., Buccinasco/Italy	100.0
Microelettrica USA LLC, Randolph, New Jersey/USA	100.0
MSA Electroteknik Sanayi ve Ticaret Limited Şirketi, Şerifali, Istanbul/Turkey	100.0
M.S. Resistances S.A.S., Saint Chamond/France	51.0
New York Air Brake Company LLC, Watertown, New York/USA	100.0
Oerlikon-Knorr Eisenbahntechnik AG, Niederhasli/Switzerland	100.0
Sigma Air Conditioning Pty. Ltd., Granville/Australia	100.0
Sigma Coachair Group (China) Co., Ltd., Changzhou/China	100.0

1 Consolidated affiliated companies (continued)	Share in capital in %
Sigma Coachair Systems (US) Inc., Chicago, Illinois/USA	100.0
Sigma Transit Systems Pty. Ltd., Granville/Australia	100.0
Skach Ges.m.b.H., Mödling/Austria	100.0
STE Schwingungs-Technik GmbH, Klieken/Germany	100.0
SWT Swedtrac C&W AB, Solna/Sweden	100.0
SWT Swedtrac Produktion AB, Solna/Sweden	100.0
SWT Swedtrac Svarv AB, Solna/Sweden	100.0
SWT Swedtrac Sverige AB, Solna/Sweden	100.0
SWT Swedtrac Svets & Smide AB, Solna/Sweden	100.0
SWT Swedtrac System AB, Solna/Sweden	100.0
SWT Swedtrac Teknikresurs AB, Solna/Sweden	100.0
SWT Swedtrac Trafik AB, Solna/Sweden	100.0
Sydac Ltd., Manchester/United Kingdom	100.0
Sydac Pty. Ltd., Granville/Australia	100.0
Technologies Lanka Inc., La Pocatière, Quebec/Canada	75.0
Unicupler GmbH, Niederurnen/Switzerland	100.0
Westinghouse Platform Screen Doors (Guangzhou) Ltd., Guangzhou/China	65.0
Westinghouse Platform Screen Doors Ltd., Walsall/United Kingdom	100.0

2 Associated companies valued using the equity method	Share in capital in %
Alltrucks GmbH & Co. KG, Munich/Germany	33.3
Alltrucks Verwaltungs GmbH, Munich/Germany	33.3
Icer Rail S.L., Pamplona/Spain	50.0
Webasto Kiekert Bustüren GmbH (in liquidation), Karlsfeld/Germany	50.0

3 Affiliated companies not included in consolidation	Share in capital in %
Black River Air Logistics Company LLC, Watertown, New York/USA	100.0
Di-Pro LLC., Fresno, California/USA	100.0
KB Investment UK Ltd., Chippenham/United Kingdom	100.0
Metco Technical Consulting AG, Zug/Switzerland	100.0
Sigma Coachair (UK) Holdings Ltd., Newhall Swadlincote/United Kingdom	100.0
Sigma Transit Systems (Taiwan) Co., Ltd., Taipei/Taiwan	100.0

4 Associated companies valued without using the equity method	Share in capital in %
Megalith Grundstücksverwaltungsgesellschaft mbH & Co. Vermietungs KG, Mainz/Germany – Deutsche-Anlagen-Leasing GmbH holds majority voting rights	100.0
Sanctor Grundstücks-Vermietungsgesellschaft mbH & Co. Objekt Marzahn KG, Düsseldorf/Germany – Deutsche-Immobilien-Leasing GmbH holds majority voting rights	99.0

6 Inventories

	2013 TEUR	2012 TEUR
Materials and supplies	200,135	198,088
Work in process	63,278	54,989
Finished products, merchandise	216,147	195,072
less advances received on orders	(200,218)	(177,738)
Total	**279,342**	**270,411**

7 Receivables and other assets

	2013 TEUR	2013 TEUR	2012 TEUR
	Remaining term more than 1 year	in total	in total
Accounts receivable, trade	2,168	758,261	663,928
Other assets	15,161	111,241	100,237
Total	**17,329**	**869,502**	**764,165**

8 Cash and cash equivalents

This item includes cash at bank, checks and cash on hand.

9 Prepaid expenses

Group prepaid expenses amounted to TEUR 17,659 (2012: TEUR 15,507).

10 Deferred taxes

At the balance sheet date, deferred tax assets amounted to TEUR 60,668 (2012: TEUR 53,533). No deferred tax liabilities were reported for the current or previous years.

In compliance with the legal requirements, deferred tax assets and liabilities are stated at the netted amount.

Of the deferred tax assets, TEUR 36,739 (2012: TEUR 26,235) relate to deferred taxes on individual balance sheets of group companies and TEUR 23,929 (2012: TEUR 27,298) relate to consolidation entries affecting net income. Deferred tax assets on individual balance sheets result primarily from temporary differences in accrued liabilities, receivables and other assets. Deferred tax assets relating to consolidation adjustments are primarily the result of eliminating unrealized intercompany profits. Deferred tax liabilities relate solely to deferred taxes on individual balance sheets of group companies.

At individual company level and at Group level, deferred taxes are stated at the projected tax rate in the respective countries at the time of realization. Tax rates range from 0% to 40%, while the rate on consolidation activities is approx. 35%.

11 Capital stock

The capital stock of Knorr-Bremse AG is divided up into 2,600,000 bearer shares, each with a nominal value of EUR 26. Stella Vermögensverwaltungs-GmbH and KB Holding GmbH, both based in Grünwald/Germany, have informed Knorr-Bremse AG that directly or indirectly, they hold a majority interest in Knorr-Bremse AG.

12 Capital reserves

Capital reserves are unchanged from the previous year. Like the legal reserve, they are subject to the restrictions of § 150 of the German Corporation Law (AktG).

13 Retained earnings

In addition to the legal reserve, Retained earnings include the accumulated earnings of the companies included in consolidation, where these have not been distributed. Furthermore this heading reflects all Group items that exert an influence on shareholders' equity.

The legal reserves amounted to TEUR 8,640 (2012: 8,607). The statutory reserves increased to TEUR 7,151 (2012: TEUR 7,147). Miscellaneous retained earnings amounted to TEUR 568,808 (2012: TEUR 519,761) at the balance sheet date.

14 Pension plan accruals

Pension plan accruals are valued in accordance with § 249 (1) of the German Commercial Code (HGB) in conjunction with § 67 (1) clause 1 of the Act Introducing the German Commercial Code (EGHGB).

	2013 TEUR	2012 TEUR
Pension plan accruals	208,175	202,202

As at year-end 2013, there is no longer a shortfall in cover for pension funds in the United Kingdom (2012: TEUR 6,862).

15 Other accrued liabilities

	2013 TEUR	2012 TEUR
Provisions for taxes	97,520	81,394
Miscellaneous accruals	669,250	639,598
Total	**766,770**	**720,992**

The taxation provisions include projected income tax payments for the year under review or, where the fiscal year diverges from the financial year, an income tax charge allocated on an accrual basis. Tax charges are also shown for preceding assessment periods. Miscellaneous accruals relate primarily to warranty and product liability commitments, personnel costs, restructuring activities, anticipated losses on contracts and other risks in connection with current operations, as well as invoices outstanding.

16 Liabilities

	2013 TEUR	2013 TEUR	2012 TEUR
	Remaining term less than 1 year	in total	in total
Accounts payable, banks	**115,002**	**130,570**	**132,915**
Accounts payable, trade	**561,853**	**562,855**	**471,346**
Other liabilities:			
Liabilities from accepted bills	1,299	1,299	700
Miscellaneous liabilities	83,447	84,570	89,322
(thereof for taxes)	(22,731)	(22,731)	(22,626)
(thereof for social security)	(11,989)	(11,989)	(11,940)
	84,746	**85,869**	**90,022**
Total liabilities	**761,601**	**779,294**	**694,283**
(thereof with a remaining term of more than 5 years)		(14,055)	(6,020)

17 Contingencies and miscellaneous financial commitments

	2013 TEUR	2012 TEUR
Warranties	8,471	9,025
Guarantees	15,728	14,643
Leasing commitments	175,419	210,230

The Knorr-Bremse Group has entered into leasing contracts primarily for office buildings and production facilities in which the leased asset is assignable to the lessor. These off-balance-sheet leasing transactions represent an alternative form of finance to borrowing. Commitments associated with these leasing agreements are carried under Miscellaneous financial commitments and amount to TEUR 175,419; maturities range from one year or less (TEUR 29,650), to between one and five years (TEUR 80,339), to over five years (TEUR 65,430). The agreements do not include any unusual termination or renewal options.

Thanks to the risk management system in place, the risk of a claim arising on contingent liabilities is rated as minimal.

18 Other operating income

Other operating income consists primarily of gains on currency exchange, income from the reversal of reserves, income from disposals of fixed assets and rental income. The heading also carries gains on currency differences amounting to TEUR 43,228 (2012: TEUR 40,052).

Income relating to other accounting periods in the amount of TEUR 32,957 (2012: 30,362), generated primarily from the reversal of reserves, is also shown under Other operating income.

19 Cost of materials

	2013 TEUR	2012 TEUR
Expenditure on materials, supplies and merchandise	2,044,566	2,095,331
Expenditure on services purchased	116,361	104,926
Total	**2,160,927**	**2,200,257**

20 Personnel expenses/staff

	2013 TEUR	2012 TEUR
Wages and salaries	729,356	703,439
Statutory social welfare contributions and expenses relating to pensions and employee benefits	178,048	158,024
Personnel costs	**907,404**	**861,463**
(thereof for retirement benefits)	(37,680)	(22,312)
Average number of employees during the fiscal year	**Number**	**Number**
Wage earners	8,285	8,507
Salary earners	9,550	9,186
Apprentices	187	177
Total	**18,022**	**17,870**

21 Depreciation

	2013 TEUR	2012 TEUR
Depreciation and amortization on purchased intangibles and on fixed assets	125,151	159,840

In addition, rental and leasing expenses totaling TEUR 61,905 (2012: TEUR 56,764) were incurred during the reporting period.

22 Other operating expenses

Other operating expenses consist primarily of maintenance costs, direct sales costs, legal and consulting fees, commissions, travel expenses and miscellaneous administrative expenses.

Other taxes for the Group amount to TEUR 16,896 (2012: TEUR 18,499).

Expenses resulting from foreign exchange fluctuations during the fiscal year amounted to TEUR 46,424 (2012: TEUR 44,197).

The fee paid to the independent auditors, KPMG AG Wirtschaftsprüfungsgesellschaft and their affiliates, amounted to TEUR 435 for fiscal year 2013. Of this, TEUR 413 was paid out for audit services and TEUR 22 for other services.

23 Financial results

	2013 TEUR	2012 TEUR
Miscellaneous interest and similar income	11,711	13,608
Interest and similar expenses	(15,671)	(17,231)
(thereof for discounts on accruals)	(10,726)	(10,876)
Income from associated, affiliated and other companies	(826)	(657)
Total	**(4,786)**	**(4,280)**

24 Taxes on income

Taxes on income and earnings amounted to TEUR 180,924 (2012: TEUR 168,432), and included deferred taxes in the amount of TEUR 10,764 (2012: TEUR 7,696).

25 Net income

	2013 TEUR	2012 TEUR
Net income	**366,704**	**295,027**
Minority interests in earnings of consolidated subsidiaries	(50,623)	(40,220)
Retained earnings brought forward from the previous year (after distribution of dividends)	85,018	107,924
Transfers to retained earnings	(117,868)	(121,713)
Unappropriated consolidated net income (Knorr-Bremse AG unappropriated retained earnings)	**283,231**	**241,018**

26 Financial derivatives

Financial instruments are not held for trading purposes.

Underlying transactions and their derivatives are bundled together as single items for valuation purposes ("macro hedges"). These bundled derivatives are netted out without affecting net income wherever the respective impact on income of the underlying transaction (hedged item) and the related hedge offset each other (net hedge presentation method).

Forward exchange and option transactions are performed purely and exclusively in order to hedge current and future foreign currency payables and receivables from the sale and purchase of goods and services and the elimination of exchange rate risk for selected assets. The aim of hedging operations at Knorr-Bremse is to reduce the risks posed by foreign exchange fluctuations to the ordinary course of business. Currency hedging is based on the volume of open commitments arising or expected to arise from core business activities. Maturities are based on the lifespans of the underlying business transactions, whereby highly probable transactions are hedged over a rolling three-year planning period. Because the conditions and parameters of the hedges match those of the hedged items, any payment flows or changes in value are offset in full. The Knorr-Bremse Group uses forward exchange contracts, currency options, interest rate swaps and cross currency swaps as hedging instruments.

Not included in the hedging report are forward exchange derivatives with a nominal value of EUR 2.5 million. Financial instruments amounting to EUR 662.2 million in total (representing hedged risks) are included in macro hedges. Of this amount, EUR 238.0 million is attributable to the hedging of assets (micro hedges), EUR 30.3 million to the hedging of open contracts (micro hedges) and EUR 392.8 million to the hedging of high-probability transactions (portfolio hedges).

Commodity futures contracts are used exclusively to hedge price risks arising on fluctuations in the purchase prices of raw materials used in Knorr-Bremse Group products (portfolio hedges). The volume of underlying transactions (hedged items) is calculated on the basis of high-probability requirements for raw materials over a rolling two-year planning period. The derivatives are based on reference indices traded on commodity futures exchanges. The effectiveness of the hedging relationship is retrospectively analyzed using statistical correlation techniques, showing a correlation in excess of 80%. Concluded contracts with a total nominal value of EUR 1.1 million are carried in full in macro hedges.

The nominal and market values of financial instruments as at December 31, 2013 break down as follows:

	Total Dec. 31, 2013	Total Dec. 31, 2013	Total Dec. 31, 2012	Total Dec. 31, 2012
in EUR millions	Nominal value	Market value	Nominal value	Market value
Foreign exchange contracts				
Forward exchange transactions	408	10	530	7
Currency options	87	3	200	1
Interest rate contracts				
Cross currency swaps	133	(17)	132	(24)
Interest rate swaps	35	(5)	36	(7)
Commodity-related contracts				
Swaps	1	0	4	0

Negative market values correspond to the risks associated with financial derivatives. Positive market values are offset by risks associated with the underlying transactions (hedged items) in the respective macro hedges.

While cross currency swaps generally come under the heading of interest rate instruments, in terms of content they are used exclusively to hedge foreign currency risks, because the interest rates in the underlying currencies are exchanged at fixed rates.

The market value of financial derivatives is best defined as the price one party is prepared to pay in order to assume the rights and/or obligations of another party. Market values are calculated on the basis of market information available at the balance sheet date and by applying standard market valuation methods as follows:

- Currency hedging contracts are valued on the basis of reference rates, taking account of forward premiums and discounts.
- Cross currency swaps are valued analogously to pure interest rate contracts or currency hedging contracts, on the basis of discounted, projected cash-flows using market interest rates and reference rates for the remaining lifespans of the instruments.
- The lease payments for one real estate leasing contract were hedged by an interest rate swap.

- Commodity contracts are used to hedge risks associated with steel and aluminum price fluctuations. The contracts are valued at market price.

- Options are valued using recognized models for calculating option prices (e.g. Black-Scholes).

Paid option premiums are carried under Other assets. As at the balance sheet date, the book value of call option premiums paid out amounted to EUR 2.4 million.

27 Research and development expenditure

In fiscal year 2013, Group expenditure on research and development amounted to TEUR 252,549 (2012: TEUR 249,729).

28 Miscellaneous

The Group financial statements are published in the official Federal Gazette and in the Commercial Register at the local first-instance court in Munich, Germany. Under the terms of § 264 (3) of the German Commercial Code (HGB), the subsidiary companies Knorr-Bremse Systeme für Nutzfahrzeuge GmbH, Munich/Germany, Knorr-Bremse Systeme für Schienenfahrzeuge GmbH, Munich/Germany, and Hasse & Wrede GmbH, Berlin/Germany, are exempt from the obligation to publish their figures pursuant to § 325 of the German Commercial Code.

29 Total remuneration of the Supervisory Board and Executive Board

The total remuneration of members of the Supervisory Board amounted to TEUR 314 and the total remuneration of the Executive Board to TEUR 4,775. Pension commitments to former members of the Executive Board and their surviving dependents are covered by an accrual of TEUR 26,653; payments in the fiscal year amounted to TEUR 2,879.

Munich, March 3, 2014

Knorr-Bremse AG
Executive Board

Dr. Michael Buscher | Klaus Deller | Dr. Dieter Wilhelm | Dr. Lorenz Zwingmann

Consolidated Cash Flow Statement in Compliance with GAS 2 (German Accounting Standard)

Cash funds are comprised of the Group's cash and cash equivalents, and marketable securities.

	2013 TEUR	2012 TEUR
Result for the period (including minority interests in consolidated results)	366,704	295,027
Depreciation and amortization on/Additions to intangibles and fixed assets	125,065	159,840
Increase in accruals	70,777	87,846
Income from disposals of intangibles, fixed assets and investments	(12,496)	2,032
Increase (2012: decrease) in inventories, receivables and other assets not related to investing or financing activities	(166,905)	52,109
Increase (2012: decrease) in payables and other liabilities not related to investing or financing activities	112,139	(81,460)
Cash flows from operating activities	**495,284**	**515,394**
Disbursements for investments in intangible assets	(6,885)	(8,375)
Proceeds from disposals of intangible assets	250	154
Disbursements for investments in fixed assets	(152,578)	(157,428)
Proceeds from disposals of fixed assets	19,027	3,841
Disbursements for investments in financial assets	(31)	(2,809)
Proceeds from disposals of financial assets	(878)	3,089
Disbursements for the acquisition of consolidated companies and other business units	(17,261)	(7,836)
Proceeds from disposals of consolidated companies and other business units	1,537	194
Cash flows from investing activities	**(156,819)**	**(169,170)**
Proceeds from additions to shareholders' equity	4,615	210
Disbursements to company owners and minority shareholders	(191,869)	(184,933)
Proceeds from borrowings	8,097	8,091
Disbursements for the redemption of borrowings	(11,965)	(10,138)
Cash flows from financing activities	**(191,122)**	**(186,770)**
Change in cash funds resulting from exchange rate movements and changes in group structure	(24,815)	(7,979)
Changes in cash funds resulting from cash-relevant transactions	**122,528**	**151,475**
Cash funds at the beginning of the period	683,871	532,396
Cash funds at the end of the period	806,399	683,871

Interest paid out in fiscal year 2013 amounted to TEUR 4,793 (2012: TEUR 5,832), interest received to TEUR 10,724 (2012: TEUR 10,323). Income tax paid out in 2013 amounted to TEUR 164,855 (2012: TEUR 116,251), tax refunds received to TEUR 472 (2012: TEUR 6,893).

Segment Report in Compliance with GAS 3 (German Accounting Standard)

In order to comply with GAS 3, Knorr-Bremse AG has compiled the following report on three segments that are subject to reporting requirements. The breakdown by segment is based on the Group's activities in the three major geographical regions that provide the geographical framework for the Group's internal organizational and reporting structures. The operating segments cover three regions: Europe, the Americas and Asia/Australia, each of which is characterized by different market and customer demands. The Knorr-Bremse Group's main product lines – braking systems for rail and commercial vehicles – are represented in all three regions.

Fiscal Year 2013	Europe	Americas	Asia/ Australia	Knorr-Bremse Group
in EUR thousands (TEUR)				
Sales by region	2,629,729	1,090,737	1,051,120	4,771,586
(thereof net sales with third parties)	2,252,457	1,019,132	1,031,093	4,302,682
(thereof net sales with other segments)	377,272	71,605	20,027	468,904
Net income	160,180	78,227	128,297	366,704
Income tax charge	79,029	38,596	63,299	180,924
Investments (excluding financial investments)	92,751	39,285	27,427	159,463
Depreciation (excluding financial investments)	81,480	28,296	15,375	125,151
Result for associated companies	(857)			(857)
Result for affiliated and other companies	31			31
Assets	1,458,176	604,114	806,778	2,869,068

Fiscal Year 2012	Europe	Americas	Asia/ Australia	Knorr-Bremse Group
in EUR thousands (TEUR)				
Sales by region	2,490,622	1,140,399	1,075,696	4,706,717
(thereof net sales with third parties)	2,181,783	1,070,857	1,047,468	4,300,108
(thereof net sales with other segments)	308,839	69,542	28,228	406,609
Net income	145,535	64,340	85,152	295,027
Income tax charge	83,086	36,732	48,614	168,432
Investments (excluding financial investments)	78,399	62,480	24,924	165,803
Depreciation (excluding financial investments)	95,500	30,390	33,950	159,840
Result for associated companies	(875)	188		(687)
Result for affiliated and other companies	30			30
Assets	1,305,541	589,035	720,457	2,615,033

Fiscal Year 2013	Net sales	Investments (excluding financial investments)	Depreciation (excluding financial investments)	Assets
in EUR thousands (TEUR)				
Rail vehicle systems	2,247,001	83,967	59,604	1,767,093
Commercial vehicle systems	2,070,388	67,300	58,040	1,278,164
Miscellaneous/consolidations	(14,707)	8,197	7,507	(176,189)
Knorr-Bremse Group	4,302,682	159,464	125,151	2,869,068

Fiscal Year 2012	Net sales	Investments (excluding financial investments)	Depreciation (excluding financial investments)	Assets
in EUR thousands (TEUR)				
Rail vehicle systems	2,216,856	79,521	93,618	1,518,510
Commercial vehicle systems	2,098,185	56,914	60,582	1,187,806
Miscellaneous/consolidations	(14,933)	29,368	5,640	(91,283)
Knorr-Bremse Group	4,300,108	165,803	159,840	2,615,033

The analysis does not show borrowings or interest payable by region, because these items are controlled centrally across the Group by the parent company, thus are not dependent on regional decisions associated with day-to-day business operations.

The usual prices apply as agreed between counterparties.

Statement of Changes in Group Equity in Compliance with GAS 7 (German Accounting Standard)

Changes in group equity 2013	Capital stock	Capital reserves	Retained earnings	Net income	Minority interests	Knorr-Bremse Group
in EUR thousands (TEUR)						
As at Dec. 31, 2012	67,600	153	535,515	241,018	150,921	995,207
Dividend payments				(156,000)	(35,003)	(191,003)
Net income 2013				316,081	50,623	366,704
Transfers to retained earnings			117,868	(117,868)		0
Currency fluctuations			(57,874)		(6,690)	(64,564)
Other fluctuations			(10,910)		11,403	493
As at Dec. 31, 2013	67,600	153	584,599	283,231	171,254	1,106,837

Changes in group equity 2012	Capital stock	Capital reserves	Retained earnings	Net income	Minority interests	Knorr-Bremse Group
in EUR thousands (TEUR)						
As at Dec. 31, 2011	67,600	153	431,730	263,924	138,968	902,375
Dividend payments				(156,000)	(28,933)	(184,933)
Net income 2012				254,807	40,220	295,027
Transfers to retained earnings			121,713	(121,713)		0
Currency fluctuations			(5,583)		(5,572)	(11,155)
Other fluctuations			(12,345)		6,238	(6,107)
As at Dec. 31, 2012	67,600	153	535,515	241,018	150,921	995,207

Group equity includes capital differences arising on foreign currency translation in the amount of TEUR -71,423, of which TEUR -7,536 relates to minority interests.

Other changes in minority interests result primarily from the purchase of former minority interests in:

Kalmar Tågkompetens AB, Kalmar/Sweden

Knorr-Bremse S.R.L., Bucharest/Romania

MSA Electroteknik Sanayi ve Ticaret Limited Şirketi, Şerifali, Istanbul/Turkey

Following these purchases, the Group holds a 100% interest in each of the three companies concerned as at the balance sheet date.

Independent Auditor's Report

We have audited the consolidated financial statements prepared by Knorr-Bremse Aktiengesellschaft, Munich – comprising the balance sheet, income statement, notes to the financial statements, cash flow statement, statement of changes in equity and segment report – as well as the group management report for the business year from January 1 to December 31, 2013. The preparation of the consolidated financial statements and the group management report in accordance with German commercial law is the responsibility of the parent company's management. Our responsibility is to express an opinion on the consolidated financial statements and on the group management report based on our audit.

We conducted our audit of the consolidated financial statements in accordance with § 317 HGB [German Commercial Code] and German generally accepted standards for the audit of financial statements promulgated by the Institut der Wirtschaftsprüfer (IDW). Those standards require that we plan and perform the audit such that misstatements materially affecting the presentation of the net assets, financial position and results of operations in the consolidated financial statements in accordance with German principles of proper accounting and in the group management report are detected with reasonable assurance. Knowledge of the business activities and the economic and legal environment of the Group and expectations as to possible misstatements are taken into account in the determination of audit procedures. The effectiveness of the accounting-related internal control system and the evidence supporting the disclosures in the consolidated financial statements and the group management report are examined primarily on a test basis within the framework of the audit.

The audit includes assessing the annual financial statements of those entities included in consolidation, the determination of entities to be included in consolidation, the accounting and consolidation principles used and significant estimates made by management, as well as evaluating the overall presentation of the consolidated financial statements and group management report. We believe that our audit provides a reasonable basis for our opinion.

Our audit has not led to any reservations.

In our opinion, based on the findings of our audit, the consolidated financial statements comply with the legal requirements and give a true and fair view of the net assets, financial position and results of operations of the Group in accordance with these requirements. The group management report is consistent with the consolidated financial statements and as a whole provides a suitable view of the Group's position and suitably presents the opportunities and risks of future development.

Munich, March 3, 2014

KPMG AG
Wirtschaftsprüfungsgesellschaft

signed Rupprecht,
Independent auditor

signed Peth,
Independent auditor

Consolidated Balance Sheet as at December 31, 2013

Assets	Notes	Dec. 31, 2013 TEUR	Dec. 31, 2012 TEUR
Purchased intangibles	(3)	130,368	139,922
Fixed assets	(4)	642,562	618,397
Investments	(5)	62,568	69,227
Intangibles, fixed assets and investments		**835,498**	**827,546**
Inventories	(6)	279,342	270,411
Accounts receivable, trade	(7)	758,261	663,928
Other assets	(7)	111,241	100,237
Other marketable securities		13	15
Cash and cash equivalents	(8)	806,386	683,856
Current assets		**1,955,243**	**1,718,447**
Prepaid expenses	**(9)**	**17,659**	**15,507**
Deferred tax assets	**(10)**	**60,668**	**53,533**
Balance sheet total		**2,869,068**	**2,615,033**

Equity and Liabilities	Notes	Dec. 31, 2013 TEUR	Dec. 31, 2012 TEUR
Capital stock	(11)	67,600	67,600
Capital reserves	(12)	153	153
Retained earnings	(13)	584,599	535,515
Unappropriated consolidated net income	(25)	283,231	241,018
Minority interests		171,254	150,921
Group equity		**1,106,837**	**995,207**
Pension plan accruals	(14)	208,175	202,202
Other accrued liabilities	(15)	766,770	720,992
Accruals		**974,945**	**923,194**
Accounts payable, banks		130,570	132,915
Accounts payable, trade		562,855	471,346
Other liabilities		85,869	90,022
Liabilities	**(16)**	**779,294**	**694,283**
Deferred income		**7,992**	**2,349**
Balance sheet total		**2,869,068**	**2,615,033**

Consolidated Statement of Income for the Fiscal Year from January 1 to December 31, 2013

	Notes	2013 TEUR	2012 TEUR
Net sales		4,302,682	4,300,108
Changes in inventories		(7,378)	(13,005)
Own work capitalized		446	466
Total operating performance		**4,295,750**	**4,287,569**
Other operating income	(18)	172,303	126,408
Cost of materials	(19)	(2,160,927)	(2,200,257)
Personnel expenses	(20)	(907,404)	(861,463)
Depreciation and amortization on purchased intangibles and fixed assets	(21)	(125,151)	(159,840)
Other operating expenses	(22)	(722,157)	(724,678)
Financial results	(23)	(4,786)	(4,280)
Income before taxes		**547,628**	**463,459**
Taxes on income	(24)	(180,924)	(168,432)
Net income	**(25)**	**366,704**	**295,027**
Minority interests in results of consolidated subsidiaries		50,623	40,220

Main Majority-owned Subsidiaries of Knorr-Bremse AG

The Americas

Knorr Brake Holding Corporation, Watertown, New York (US)*

- Anchor Brake Shoe Company LLC (US)
- Bendix Commercial Vehicle Systems LLC (US)
- Bendix Spicer Foundation Brake LLC (US)*
- IFE North America LLC (US)
- Knorr Brake Company LLC (US)
- Knorr Brake Ltd. (CA)
- Merak North America LLC (US)
- New York Air Brake Company LLC (US)
- Technologies Lanka Inc. (CA)*

Knorr-Bremse Brasil (Holding) Administração e Participação Ltda., Itupeva (BR)

- Knorr-Bremse Sistemas para Veículos Comerciais Brasil Ltda. (BR)
- Knorr-Bremse Sistemas para Veículos Ferroviários Ltda. (BR)

Asia – Australia

Knorr-Bremse Asia Pacific (Holding) Ltd., Hong Kong (HK)

- Hasse & Wrede CVS Dalian, China Ltd. (CN)*
- IFE-VICTALL Railway Vehicle Door Systems (Qingdao) Co., Ltd. (CN)*
- Knorr-Bremse Australia Pty. Ltd. (AU)
- Knorr-Bremse Brake Equipment (Shanghai) Co., Ltd. (CN)
- Knorr-Bremse Braking Systems for Commercial Vehicles (Dalian) Co., Ltd. (CN)
- Knorr-Bremse CAFF Systems for Commercial Vehicles Chongqing Ltd. (CN)*
- Knorr-Bremse CARS LD Vehicle Brake Disc Manufacturing (Beijing) Co., Ltd. (CN)*
- Knorr-Bremse Commercial Vehicle Systems Japan Ltd. (JP)**
- Knorr-Bremse India Pvt. Ltd. (IN)
- Knorr-Bremse / Nankou Air Supply Unit (Beijing) Co., Ltd. (CN)*
- Knorr-Bremse Rail Systems Japan Ltd. (JP)*
- Knorr-Bremse Rail Systems Korea Ltd. (KR)
- Knorr-Bremse Systems for Commercial Vehicles India Pvt. Ltd. (IN)
- Knorr-Bremse Systems for Rail Vehicles (Suzhou) Co., Ltd. (CN)
- Knorr-Bremse Technology Center India Pvt. Ltd. (IN)***
- Sigma Transit Systems Pty. Ltd. (AU)
- Sydac Pty. Ltd. (AU)
- Westinghouse Platform Screen Doors (Guangzhou) Ltd. (CN)*

* Minority holding in subsidiary by non-Group companies

** 20% stake held by Robert Bosch GmbH, Stuttgart (DE)

*** Shareholders: 50% Knorr-Bremse Systeme für Schienenfahrzeuge GmbH, Munich (DE); 50% Knorr-Bremse Systeme für Nutzfahrzeuge GmbH, Munich (DE)

As per December 31, 2013

Europe – Middle East – Africa

Knorr-Bremse Systeme für Schienenfahrzeuge GmbH, Munich (DE)

- Dr. techn. Josef Zelisko Ges.m.b.H. (AT)
- Freinrail Systèmes Ferroviaires S.A. (FR)
- Heine Resistors GmbH (DE)
- IGE-CZ s.r.o. (CZ)
- Knorr-Bremse 1520 OOO (RU)*
- Knorr-Bremse Ges.m.b.H. (AT)
- Knorr-Bremse Nordic Rail Services AB (SE)
- Knorr-Bremse Rail Systems Italia S.r.l. (IT)
- Knorr-Bremse Rail Systems OOO (RU)
- Knorr-Bremse Rail Systems (UK) Ltd. (GB)
- Knorr-Bremse RailServices (UK) Ltd. (GB)
- Knorr-Bremse S.A. (Pty.) Ltd. (ZA)*
- Knorr-Bremse Systemy dla Kolejowych Środków Lokomocji PL Sp. z o.o. (PL)
- Knorr-Bremse Vasúti Jármű Rendszerek Hungária Kft. (HU)
- Merak Sistemas Integrados de Climatización S.A. (ES)
- Microelettrica Scientifica S.p.A. (IT)
- Oerlikon-Knorr Eisenbahntechnik AG (CH)
- SWT Swedtrac Sverige AB (SE)

Knorr-Bremse Systeme für Nutzfahrzeuge GmbH, Munich (DE)**

- Bost Ibérica S.L. (ES)
- Hasse & Wrede GmbH (DE)
- Knorr-Bremse Benelux B.V.B.A. (BE)
- Knorr-Bremse Fékrendszerek Kft. (HU)
- Knorr-Bremse KAMA Systems for Commercial Vehicles OOO (RU)*
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- Knorr-Bremse Systems for Commercial Vehicles Ltd. (GB)
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