Knorr-Bremse Group

Annual Report 2012

Reliability

Technological Excellence

Entrepreneurship

Passion

Responsibility

KNORR-BREMSE

At a Glance

KNORR-BREMSE GROUP		2008	2009	2010	2011	2012
Sales	EUR mill.	3,384	2,761	3,712	4,241	4,300
Net income	EUR mill.	192	99	239	329	295
Employees (as per Dec. 31)*		15,890	15,613	18,053	20,050	19,120
Personnel costs	EUR mill.	686	641	721	805	861
Balance-sheet total	EUR mill.	1,788	1,664	2,194	2,530	2,615
Equity	EUR mill.	639	533	754	902	995
Capital expenditure**	EUR mill.	134	101	113	159	166
Depreciation**	EUR mill.	115	118	147	165	160
Incoming orders	EUR mill.	3,209	3,185	4,040	4,073	3,948
Research and development expenditure	EUR mill.	171	153	175	209	250

* incl. leasing

**not including investments in financial assets

Main Majority-owned Subsidiaries of Knorr-Bremse AG

The Americas

Knorr Brake Holding Corporation, Watertown, NY (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 Corporation (US)
- Knorr Brake Ltd. (CA)
- Merak North America LLC (US)
- New York Air Brake Corporation (US)
- Technologies Lanka Inc. (CA)*

Knorr-Bremse Brasil (Holding) Administração e Participação Ltda., São Paulo (BR)

- Knorr-Bremse Sistemas para Veículos Comerciais Brasil Ltda. (BR)
- Knorr-Bremse Sistemas para Veículos Ferroviários Ltda. (BR)

Europe – Middle East – A

Knorr-Bremse Systeme für Schienenfahrzeuge GmbH, Munich (DE)

- Freinrail Systèmes Ferroviaires S.A. (FR)
- Heine Resistors GmbH (DE)
- Knorr-Bremse Rail Systems Italia S.r.l. (IT)
- IGE-CZ s.r.o. (CZ)
- Knorr-Bremse Ges.m.b.H. (AT)
- Knorr-Bremse Nordic Rail Services AB (SE)
- Knorr-Bremse Systemy dla Kolejowych Srodków Lokomocji PL Sp. z o.o. (PL)
- Knorr-Bremse Rail Systems (UK) Ltd. (GB)
- Knorr-Bremse Rail Systems OOO (RU)
- Knorr-Bremse S.A. (Pty.) Ltd. (ZA)*
- 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)
- Sociedad Española de Frenos, Calefacción y Señales S.A. (ES)
- Dr. techn. Josef Zelisko Ges.m.b.H. (AT)

* Minority holding in subsidiary by non-Group companies

** 20% stake held by Robert Bosch GmbH, Stuttgart (DE)

As per December 31, 2012

Africa

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)*
- Knorr-Bremse Polska SfN Sp. z o.o. (PL)
- Knorr-Bremse Sistemi per Autoveicoli Commerciali S.p.A. (IT)
- Knorr-Bremse Systèmes pour Véhicules Utilitaires France S.A. (FR)
- Knorr-Bremse System för Tunga Fordon AB (SE)
- Knorr-Bremse Systems for Commercial Vehicles Ltd. (GB)
- Knorr-Bremse Systémy pro užitková vozidla ČR, s.r.o. (CZ)

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 CARS LD Vehicle Brake Disc Manufacturing (Beijing) Co., Ltd. (CN)*
- Knorr-Bremse CAFF Systems for Commercial Vehicles Chongqing 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)
- Sigma Transit Systems Pty. Ltd. (AU)
- Sydac Pty. Ltd. (AU)
- Westinghouse Platform Screen Doors (Guangzhou) Ltd. (CN)*

Overview

Reports

Consolidated Financial Statements

2012 at a Glance

February

Christoph Günter, Deputy Chair of the Executive Board of Knorr-Bremse Global Care e. V. and Federico Manfredda, Managing Director of Knorr-Bremse Sistemi per Autoveicoli Commerciali, attend a private audience with Pope Benedict XVI. The invitation to the audience came via the missionary youth service (Sermig), which Knorr-Bremse Global Care helped to build a hostel for the homeless in Brazil.

March

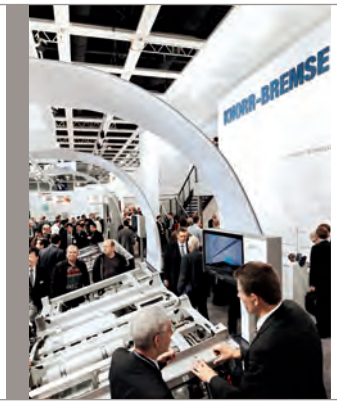
Hungarian Prime Minister Viktor Orbán visits the Knorr-Bremse plant in Kecskemét, Hungary // The 2012 Financial Statements Press Conference takes place at Knorr-Bremse headquarters in Munich // Presentation of the in-house 2012 Knorr Excellence and Corporate Responsibility Awards // Knorr-Bremse showcases products and services at the Eurasia Rail trade fair in Istanbul, Turkey

June

Knorr-Bremse celebrates a Group-wide Values Day to launch the new corporate values // Representatives of the British Department of Trade and Industry visit Knorr-Bremse Rail Systems, UK

September

Dr. Volker Zimmermann becomes Chairman of the Executive Board of Knorr-Bremse Systeme für Nutzfahrzeuge GmbH // Knorr-Bremse wins the contract to supply brake equipment for the E7 generation and bogie equipment for the W7 generation of Shinkansen trains in Japan // Knorr-Bremse Commercial Vehicle Systems presents its products and services at the IAA Commercial Vehicles show in Hanover // Knorr-Bremse Rail Vehicle Systems showcases its latest technologies at the InnoTrans fair in Berlin



October

Outstanding value stream management brings Knorr-Bremse victory in the Factory of the Year competition // Jochen Hahn defends his title in the FIA Truck Race European Championships // Knorr-Bremse is awarded the "Pay Equality in Companies" (Logib-D) certificate by the German Federal Ministry of Family Affairs, Senior Citizens, Women and Youth // Rating agencies Standard & Poor's and Moody's reaffirm their outstanding ratings for the Knorr-Bremse Group

January

Rolf Härdi joins the Executive Board of Knorr-Bremse Systeme für Schienenfahrzeuge GmbH, where he is responsible for the RailServices segment. Together with Dr. Ralf Voß, he is also responsible for the Brake Control Center of Competence.

April

Dr. Robert Wassmer joins the Executive Board of Knorr-Bremse Systeme für Schienenfahrzeuge GmbH, before being appointed Chairman in July // The NTV Italo high-speed train travels quietly through Italy, equipped with Flexpad Silent "whispering" brake pads // Bendix celebrates ten years as part of the Knorr-Bremse Group // The Group-wide Value Stream Academy is officially opened at the Liberec plant in the Czech Republic

May

Knorr-Bremse is voted "Best Brand in the Commercial Vehicle Sector" in the brake category for the seventh time running // Knorr-Bremse Global Care supports the renovation and expansion of a clinic in Timbavati Nature Reserve, South Africa // Bendix presents its in-house Drive for Distinction Awards to the best teams of the past year

July

Chinese Minister Song Dahan visits the Munich headquarters of Knorr-Bremse during his visit to Germany // Some 100 Knorr-Bremse employees take part in the corporate B2Run race in Munich // Dr. József Czukor, Ambassador of the Republic of Hungary to the Federal Republic of Germany, visits Knorr-Bremse headquarters in Munich

August

Dr. Stephan Weng is appointed to the Executive Board of Knorr-Bremse Systeme für Nutzfahrzeuge GmbH // Knorr-Bremse plays a part in ensuring the safe transportation of visitors to the London Olympics // Knorr-Bremse supports vintage trucks in Tour of Friendship rally // Dr. Lorenz Zwingmann accompanies the cabinet of German Federal Chancellor Dr. Angela Merkel as part of a business delegation to China // Knorr-Bremse subsidiary Microelettrica celebrates the opening of its new site in Buccinasco, Italy

November

Bosch, Knorr-Bremse and ZF plan a joint venture to provide a full-service offering to multi-brand commercial vehicle workshops

December

Knorr-Bremse introduces a uniform Group-wide Code of Conduct

The Executive Board of Knorr-Bremse AG

Klaus Deller

Dr. Lorenz Zwingmann
Spokesman of the Executive Board

Dr. Dieter Wilhelm

The Supervisory Board of Knorr-Bremse 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

Dr. Hans-Peter Binder
Berg
Retd. Member of the Board of Management of Deutsche Bank AG, Munich Branch

Werner Ratzisberger*
Munich
Chairman of the Works Council of Knorr-Bremse Systeme für Nutzfahrzeuge GmbH, Aldersbach plant

Dr. Michael Buscher
Meilen/ZH Switzerland
(since March 16, 2012)
Chairman of the Board of OC Oerlikon Management AG

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

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

Heinz Hermann Thiele
Munich
Chairman, Entrepreneur

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

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

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

Dr. h. c. Horst Zimmer
Lampertheim-Hofheim
(until November 9, 2012)
Retd. Member of the Board of Management of Mercedes-Benz AG

Hans-Georg Härter
Salzweg
(since November 9, 2012)
Former Chairman of the Executive Board of ZF Friedrichshafen AG

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

Dr. Kurt Kiethe,
Munich (until March 16, 2012)
Attorney at law

* Employee representative

Report of the Supervisory Board

In the course of fiscal 2012, 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. 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 2012 the Knorr-Bremse Group was able to post a modest increase in sales, which rose to EUR 4.30 billion (2011: EUR 4.24 billion). The Rail Vehicle Systems division compensated for downturns in sales in Europe, South America and Asia/Australia by returning a strong performance in North America. The Commercial Vehicle Systems division benefited from the positive development of the commercial vehicle markets in North America and Japan in particular, which more than offset minor declines in Europe and South America.

To safeguard the future development of the company, in 2012 Knorr-Bremse continued to invest in the strategic development and expansion of its production plants. In the year under review, a new Rail Vehicle Systems plant was opened in Buccinasco (Italy). Also in 2012, construction activities were begun or continued at five plants: in Pune (India) for the Commercial Vehicle Systems division, in Faridabad (India), Westminster (USA) and Granville (Australia) for the Rail Vehicle Systems division, and in Itupeva (Brazil) for both divisions.

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. In the rail vehicle sector the acquisition of an additional 25% of the Icer Rail S.L. joint venture in Pamplona (Spain) further strengthened the friction materials product segment. As a result of this increase, Knorr-Bremse subsidiary Sociedad Española de Frenos, Calefacción y Señales S.A., Getafe (Spain) and the second shareholder, Berkshire Rail S.L., Pamplona (Spain), now hold equal 50% shares in the joint venture. Knorr-Bremse subsidiary Microelettrica Scientifica S.p.A., Buccinasco (Italy) reinforced its capabilities in the field of power systems by acquiring the outstanding shares in Heine Resistors GmbH, a manufacturer of special-purpose resistors based in Dresden (Germany). In addition, Rheinmetall Simulation Australia Pty. Ltd., Adelaide (Australia) concluded an agreement with Knorr-Bremse subsidiary Sydac Pty. Ltd., Adelaide (Australia) governing the acquisition of the latter's military driving simulators business with effect from February 1, 2013. Through this sale, Knorr-Bremse is moving out of an area that does not fall within the Group's strategic fields of activity. Moreover, the two divisions of Knorr-Bremse founded the Knorr-Bremse Technology Center India Private Ltd., Pune (India), as a cooperative venture between Knorr-Bremse Systeme für Nutzfahrzeuge GmbH, Munich (Germany) and Knorr-Bremse Systeme für Schienenfahrzeuge GmbH, Munich (Germany). The object of the joint venture company is to perform development services for the parent companies.

Against the backdrop of rising 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 2012, the new Value Stream Academy – a training center serving both divisions – was opened at the Commercial Vehicle Systems site in Liberec (Czech Republic). The Academy drives improvements along the entire value stream and provides a firm theoretical grounding in the relevant principles for Knorr-Bremse employees.

The 2012 Financial Statements and the Management Report on Knorr-Bremse AG, the 2012 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 1, 2013. The Supervisory Board also examined the Financial Statements for fiscal 2012, the Management Report, the proposed allocation of unappropriated retained earnings, and the Consolidated Financial Statements and Management Report on the Knorr-Bremse Group. No objections were raised. At its meeting on March 8, 2013, the Supervisory Board approved the 2012 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 22, 2013 as well as the financial statements meeting of the Supervisory Board on March 8, 2013, 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 Paragraph 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 16, 2012, Dr. Kurt Kiethe retired from his position on the employer's side of the Supervisory Board of Knorr-Bremse AG. Dr. Kiethe held a seat on the supervisory boards of both Knorr-Bremse AG and Knorr-Bremse Systeme für Schienenfahrzeuge GmbH. Prior to that, he was a member of the supervisory boards of Süddeutsche Bremsen AG and Knorr-Bremse KG. On behalf of Knorr-Bremse AG, the Supervisory Board wishes to thank Dr. Kiethe most sincerely for many years of successful collaboration in the development of the Knorr-Bremse Group.

The vacancy left by Dr. Kiethe on the employer's side of the supervisory boards of Knorr-Bremse AG and of Knorr-Bremse Systeme für Schienenfahrzeuge GmbH was filled on March 16, 2012 by Dr.-Ing. Michael Buscher. Dr. Buscher has amassed many years' experience in the field of rail transportation and over the coming years will be supporting Knorr-Bremse by bringing his extensive technical and entrepreneurial expertise to the table within the various corporate bodies.

On November 9, 2012 Dr. Horst Zimmer also retired from his seat on the employer's side of the Supervisory Board of Knorr-Bremse AG. Dr. Zimmer had held a seat on the supervisory boards of both Knorr-Bremse AG and Knorr-Bremse Systeme für Nutzfahrzeuge GmbH since 1999. With his great experience and pronounced entrepreneurial thinking, Dr. Zimmer showed great dedication to supporting the progress of Knorr-Bremse during this period, progress that he also played a key part in shaping through fundamental strategic decision-making. On behalf of Knorr-Bremse AG, the Supervisory Board wishes to thank Dr. Zimmer most sincerely for the many years in which he contributed to its work; we will retain a close bond with him.

Effective November 9, 2012, Dr. Zimmer was succeeded on the employer's side of the supervisory boards of Knorr-Bremse AG and Knorr-Bremse Systeme für Nutzfahrzeuge GmbH by Hans-Georg Härter. As a result of his long-time activities within the automotive supplier sector, Mr. Härter can call upon deep reserves of experience across the entire field of management and will in the future be supporting the Group through his contributions to the various corporate bodies.

Munich, March 8, 2013

The Supervisory Board

Heinz Hermann Thiele,
Chairman

Management Report

In fiscal 2012, the Knorr-Bremse Group was again able to report sales of more than EUR 4 billion. In a tough international business environment, sales showed a modest 1% rise to reach EUR 4.30 billion (2011: EUR 4.24 billion). The Rail Vehicle Systems division posted a slight increase in sales, which totaled EUR 2.22 billion in 2012 (2011: EUR 2.19 billion). In the year under review, growth was driven by the North American region, where both the passenger and freight markets were buoyant. Knorr-Bremse's Commercial Vehicle Systems division reported sales of EUR 2.10 billion in 2012, also just ahead of the prior-year level (2011: EUR 2.07 billion). The division posted growth in North America and Asia, offsetting a weakening second-half market environment in Europe in particular.

The State and Development of Knorr-Bremse AG and the Knorr-Bremse 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 automatic door 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 America and 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 worldwide, while at the same time taking specific local needs into account. It also ensures that customers who operate on a regional basis are supplied with globally proven systems and components.

General economic developments

2012 witnessed a slowdown in the economic recovery of the worldwide markets. Uncertainty about economic developments going forward prevented many market players from engaging in substantial investment activity. In overall terms, however, worldwide growth can be said to have continued at a modest pace, with marked differences in developments from one region to the next.

While the pace of growth in emerging nations slowed compared to the rapid expansion of recent years, these markets continued to make the largest contribution to growth. In 2012, the gross domestic product (GDP) of the emerging economies increased by 5.1% (2011: 6.2%) compared to average GDP growth of just 1.3% (2011: 1.6%) for the industrialized nations of the world. Global figures showed overall economic growth of around 3.2% (2011: 3.8%).

Following two years of growth, the economic performance of the Eurozone showed a 0.4% downturn in 2012 (2011: +1.4%) owing to persistent economic difficulties encountered by the southernmost members of the EU. Countries that had previously been less affected, such as Italy and France, proved no longer able to contribute to overall stabilization, posting 2012 growth rates of -2.1% (2011: 0.4%) and 0.2% (2011: 1.7%) respectively. In Germany, the largest Eurozone member state in terms of GDP, while economic output slowed year-on-year, growth remained positive at 0.9% (2011: 3.1%).

In the USA, economic growth showed a modest improvement from 1.8% in 2011 to 2.3% in 2012. The final months of the year under review here were marked by tough negotiations between the political parties as they strove to avoid the "fiscal cliff" with its automatic dramatic tax in-

creases and spending cuts. Full agreement on measures to reduce the high level of national debt has yet to be reached. In Brazil, the pace of economic growth slowed once again, falling from 2.7% in 2011 to 1.0% in 2012.

Following strong performances in previous years, the contributions made by China and India to global economic growth fell in the year under review. In 2012, GDP in China was up 7.8% (2011: 9.3%), while India saw GDP rise by just 4.5% (2011: 7.9%) as weak domestic demand and a low second-half investment rate took their toll. In Japan, after natural disasters had shaped the previous year, GDP recovered to show 2.0% growth (2011: -0.6%).

The uncertainty surrounding the development of the real economy was also reflected in the commodity markets in 2012. Between January and April, the price of oil (Brent) varied between USD 95 and USD 110 per barrel, before falling to an annual low of USD 77 per barrel over the next two months and rising back to USD 92 per barrel at year-end. Aluminum prices followed a similar pattern and, after rising to USD 2,350/t in the first quarter (top price in 2008 approx. USD 3,300/t, lowest price in 2009 approx. USD 1,300/t) declined again to USD 1,830/t in August, before rising back to USD 2,100/t at year-end. On the balance sheet date the value of the US dollar – which lines up alongside the euro as one of the Group's main operating currencies – had risen 2.3% against the euro compared to December 31, 2011, with one euro worth USD 1.32. As an annual average, the euro traded at USD 1.29.

The business environment by sector

For the Rail Vehicle Systems division, the market environment in 2012 was shaped by different developments in rail transportation from one region to the next. In Europe, demand for freight cars increased while locomotive output stabilized and the passenger transportation sector showed modest growth. In South America, demand for freight cars rose in the first half of 2012, only to slip back to a low level, while in North America it moved ahead by around 25%. Orders on the books for locomotives, however, which had been at a high level, declined on account of excess capacity in the rail freight sector, lower freight volumes and the uncertain economic backdrop. The passenger transportation sector in the Americas showed modest growth in the year under review. In Asia the volume of rail freight remained unchanged, while demand for locomotives and high-speed trains again showed a slight fade. This contrasted with sharp growth in the metro system market in China, which almost completely offset the moderate downturns in the other sectors in the Asian region.

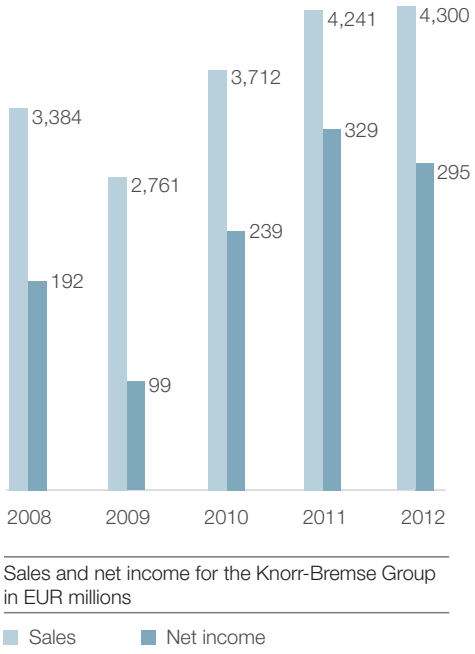
After two years of growth, the commercial vehicle markets showed an overall decline in 2012. Global truck production (air-braked trucks of 6 t and over) fell by 14%. In Europe, truck production was 11% down on the previous year (2011: +31%). In North America there was to be no repeat of the very strong prior-year growth. Nevertheless, the market continued to expand, posting a 4% growth in air-braked vehicles (2011: +54%). In South America, truck output was 35% down in 2012 against the backdrop of legislation introducing the Euro V exhaust emissions standard, which had led to advance buying in the previous year (2011: +14%). In the Asian region, the negative growth trend triggered in the prior year picked up speed in 2012 as truck production fell by 16% (2011: -9%).

Development of the Knorr-Bremse Group in 2012

Consolidated sales for the Knorr-Bremse Group were up 1.4% from EUR 4,240.8 million in 2011 to EUR 4,300.1 million in fiscal 2012. In an economic environment that remained volatile, the company benefited from its strong strategic position with two globally active divisions, Rail Vehicle Systems and Commercial Vehicle Systems, in markets that, in 2012, showed largely similar developments.

The Rail Vehicle Systems division witnessed diverse regional developments in the year under review and was able to increase sales to EUR 2,216.9 million (2011: EUR 2,186.9 million). The division was able to compensate for downturns in Europe, South America and Asia/Australia in 2012 by returning a strong performance in North America.

In 2012 the Commercial Vehicle Systems division also posted a slight increase in sales, which rose to EUR 2,098.2 million (2011: EUR 2,068.2 million). The division benefited from the positive development of the commercial vehicle markets in North America and Japan in particular, which more than offset minor declines in Europe and South America.



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

Acquisitions, additions and joint ventures

On March 28, 2012, Knorr-Bremse subsidiary Sociedad Española de Frenos, Calefacción y Señales S.A., Getafe (Spain) acquired an additional 25% stake in the Icer Rail S.L. joint venture in Pamplona (Spain) from the other shareholder, Berkshire Rail S.L., Pamplona (Spain). As a result, the two shareholders now hold equal 50% stakes in the joint venture.

In June 2012, Knorr-Bremse subsidiary Microelettrica Scientifica S.p.A., Buccinasco (Italy), hereinafter referred to as "Microelettrica" reinforced its capabilities in the field of power systems by acquiring the outstanding shares in Heine Resistors GmbH, a manufacturer of special-purpose resistors based in Dresden (Germany), hereinafter "Heine". With decades of experience, Heine ranks among the most renowned developers and manufacturers of resistors for

drive technology and rail vehicles. Knorr-Bremse has held a majority shareholding in Heine since 2010.

In October 2012, Knorr-Bremse subsidiary Sydac Pty. Ltd., Adelaide (Australia) sold its military driving simulators business to Rheinmetall Simulation Australia Pty. Ltd., Adelaide (Australia), with effect from February 1, 2013. Through this sale, Knorr-Bremse is moving out of an area that does not fall within the Group's strategic fields of activity.

On November 26, 2012, the Knorr-Bremse Technology Center India Private Ltd., Pune (India), was founded as a cooperative venture between Knorr-Bremse Systeme für Nutzfahrzeuge GmbH, Munich (Germany) and Knorr-Bremse Systeme für Schienenfahrzeuge GmbH, Munich (Germany). The object of the company is to perform development services for the Knorr-Bremse Group.

Overall, these acquisitions had no substantial effect on the assets, financial status and profitability of the Knorr-Bremse Group in fiscal 2012.

Major projects

In 2012 Knorr-Bremse continued its rigorous strategy of localizing production and 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 series of business areas and thereby secure its commercial success. The aim is also always to ensure the same customary high standards in terms of production processes and product quality at all plants around the world.

In the commercial vehicle sector, the joint venture between Knorr-Bremse and the Russian commercial vehicle manufacturer KAMAZ, Knorr-Bremse KAMA Systems for Commercial Vehicles OOO, in Naberezhnye Chelny (Russia), hereinafter referred to as "Knorr-Bremse KAMA", began series production of drum brakes for truck trailers in the year under review. The brakes are destined for KAMAZ subsidiary NEFAZ, one of the largest manufacturers of trailers in Russia, with a market share of between 25 and 30%.

In the second half of 2012, brake shoe remanufacturing operations, previously operated by an external vendor, were integrated into the Huntington, Indiana (USA) plant of Knorr-Bremse subsidiary Bendix as a part of the company's remanufacturing business unit strategy. The line complements the plant's existing facilities for the resource-conserving remanufacture of used braking system components. At its plant in Bowling Green, Kentucky (USA) Bendix also expanded its machining capacities for disc brake calipers by installing two new CNC machines.

In the first half of the year under review, at the Dalian plant in China a disc brake production line came on stream. The line turns out pneumatic 22.5-inch disc brakes for customers including Yutong, the world's largest bus manufacturer with an annual output of some 47,000 units. The brakes will mainly be installed in Yutong buses over ten meters long, a segment in which Knorr-Bremse increased its supply position for 22.5-inch disc brakes to 80%.

Two plants also introduced the internal SAP standard "PROGRESS" to support all operational planning, logistics and production processes. Switchover to the new standard took place at the Arcore plant (Italy) in April and at the Pune plant (India) on July 1. This represents an important step towards standardizing processes worldwide and will help to safeguard the high standard of quality that is customary at Knorr-Bremse. In Pune the introduction of this system will also help with preparations for the move to the new plant that is currently being built and will provide the environment for a new and higher level of process excellence.

In the rail vehicle systems sector too, the drive to expand and optimize the integrated global production and de-

velopment network continued. Thus, Knorr-Bremse's Italian subsidiary Microelettrica opened a new site in Buccinasco in August 2012 that bundles the activities of four separate former facilities.

In July 2012, it was decided to rename Merak Railway Technologies (Shanghai) Co. Ltd., Shanghai (China), a subsidiary of Merak Sistemas Integrados de Climatización, S.A., Getafe (Spain), as Knorr-Bremse Railway Technologies (Shanghai) Co. Ltd., Shanghai (China). This was an important step towards the integration of all Knorr-Bremse's HVAC system activities and the realization of synergies, as the Shanghai site now supports both of the Knorr-Bremse HVAC system brands: Merak and Sigma. The associated transfer of all Chinese manufacturing capacity for HVAC systems to Shanghai was successfully completed.

In preparation for production of the new KAB60 control valve for the rail vehicle market in Russia and the CIS states, production lines were set up in Berlin (Germany) in the second half of the year under review. This step supports the industrialization of the production processes in what is a new market for Knorr-Bremse.

Moreover, the Bogie Equipment business unit increased its development capacities in Suzhou (China) to the current total of 15 employees, thereby confirming the growing importance of the Chinese market for the Group and its strategy of locating both production and development activities close to the marketplace.

Quality and processes

Knorr-Bremse continues to target best-in-class processes as the foundation on which its competitive capabilities are based. In 2012, processes and structures were again reviewed and enhanced across all key areas.

For several 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.

The high quality of the processes at the Rail Vehicle Systems division's largest European production plant in Budapest was recognized in 2012 with the "Factory of the Year" award in the category "Outstanding Value Stream". The annual "Factory of the Year" competition is organized by trade journal "Produktion" in conjunction with management consultants A.T. Kearney.

For several years now the Strong Focus program has successfully brought together all activities designed to boost productivity, cut costs and promote growth at Knorr-Bremse. As part of a multi-year forward projection, valuable ideas submitted by the workforce and management are collected, evaluated and gradually implemented. In 2012 this brought further savings in structural and material costs and improvements in productivity along the value chain, helping to safeguard the company's competitiveness.

To provide further support for productivity measures, in the year under review a new training center, the Value Stream Academy, was opened at the Commercial Vehicle Systems plant in Liberec (Czech Republic), serving both of the Group's divisions. The Academy drives improvements along the entire value stream and provides a firm theoretical grounding in the relevant principles for Knorr-Bremse employees. The training courses, which are geared to the various levels of the organization, comprise practical modules made up of workshops, simulations and role play. The design of the modules is such that, in principle, they can be taught at any site. Liberec, however, is the ideal location for the Academy because this relatively re-

cent addition to the integrated production network has a role model function when it comes to the successful implementation of value stream principles and also brings together numerous typical products from the Knorr-Bremse portfolio.

Assets, financial status and profitability

In 2012 the main factors in the development of the Knorr-Bremse Group's business were the continuing high level of economic uncertainty and the diverse nature of regional developments in the key markets of both divisions.

Consolidated sales rose 1.4% in 2012 to EUR 4,300.1 million (2011: EUR 4,240.8 million). In Europe, sales were up 0.6% to EUR 2,181.7 million (2011: EUR 2,169.5 million), which corresponds to 50.7% of the consolidated total (2011: 51.2%). The Americas contributed EUR 1,070.9 million (2011: EUR 1,020.0 million) or 24.9% (2011: 24.1%) to consolidated sales. In the Asia/Australia region, sales amounted to EUR 1,047.5 million (2011: EUR 1,051.3 million), which equates to 24.4% (2011: 24.7%) of the consolidated total.

Incoming orders were valued at EUR 3,948.5 million (2011: EUR 4,072.5 million), 8.2% below the level of annual sales and 3.0% down on the previous year. Orders on the books at the Knorr-Bremse Group declined 11.1% in the year under review to EUR 2,905.3 million (2011: EUR 3,268.1 million).

Net income for the Knorr-Bremse Group fell in the year under review to EUR 295.0 million (2011: EUR 329.3 million). Net return on sales reached 6.9% (2011: 7.8%). The European region contributed EUR 145.5 million to net income, corresponding to a net return on sales of 6.7%. Net income from the Americas totaled EUR 64.3 million, with a net return on sales of 6.0%. The Asia/Australia region posted net income of EUR 85.2 million, which equates to a net return on sales of 8.1%.

In fiscal 2012, the rail vehicle HVAC systems business unit, Merak Sistemas Integrados de Climatización S.A., Getafe (Spain), had to contend with a drop in profitability. This was mainly due to a sharp drop in sales as well as problems with product quality and the technical implementation of projects, leading to a negative impact on income. In response, extensive measures to boost

Overall assessment of the economic position of the Group

economic efficiency were defined and launched in the year under review.

The consolidated balance sheet total rose 3.3% in 2012 to EUR 2,615.0 million (2011: EUR 2,530.4 million), largely influenced by the rise in liquid funds. At year-end 2012, total assets represented 60.8% of sales. As a proportion of the balance sheet total, intangibles, fixed assets, and investments were down from 32.7% in the prior year to 31.7%. Working capital, defined as the sum of inventories and accounts receivable, minus accounts payable trade, stood at EUR 463.0 million at year-end (2011: EUR 470.6 million) or 39 days' sales (2011: 40 days). The equity ratio rose by 2.4 percentage points from 35.7% to 38.1%.

Of the Group's total assets, 49.9% are tied up in the European region, 22.5% in the Americas, and 27.6% in the Asia/Australia region. The increase in net liquidity to EUR 551.0 million was achieved primarily by an inflow of funds from gross cash flow in the amount of EUR 515.4 million. Substantial capital requirements were generated in 2012 by capital expenditure (EUR 165.8 million) and dividends (EUR 184.9 million). The ratio of net liquidity to shareholders' equity stood at 55.4%, compared to 44.0% in 2011.

Knorr-Bremse's robust strategic positioning, the positive development of the company's business and its excellent working capital management were confirmed by the external rating agencies Standard & Poor's and Moody's, who have been rating the Knorr-Bremse Group since 2000. 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 2012 to be awarded an "A" rating.

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 38.1% and net liquidity of EUR 551.0 million, the structure of the Group's assets is extremely stable.

Knorr-Bremse AG

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.

Falling income from investments in associated and related companies, resulting from reduced transfer of profits from the Rail Vehicle Systems division, meant that income before taxation decreased to EUR 134.9 million in the year under review (2011: EUR 183.2 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 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.

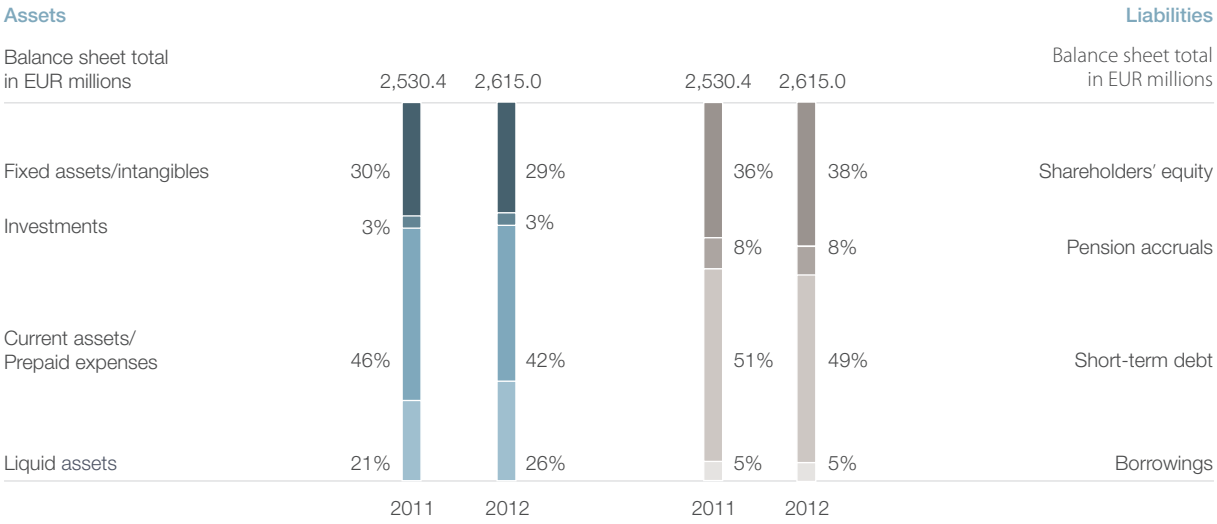
With the aid of the global process standardization and transparency achieved through Knorr Excellence, Knorr-Bremse AG is able to efficiently control its own business and that of the associated and related companies.

Appropriation of retained earnings

Knorr-Bremse AG posted unappropriated retained earnings of EUR 241.0 million in 2012 (2011: EUR 263.9 million). The Annual Shareholders' Meeting will be asked to approve the proposal that an amount of EUR 156.0 million from the unappropriated retained earnings of Knorr-Bremse AG be used to pay a dividend of EUR 60.00 (2011: 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 counterperformance in each case." The report was verified by the Auditors and received their unqualified opinion.



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

Regional developments by division

In the year under review, the Rail Vehicle Systems division contributed EUR 2,216.9 million (2011: EUR 2,186.9 million) to consolidated Group sales, while the Commercial Vehicle Systems division posted sales of EUR 2,098.2 million (2011: EUR 2,068.2 million). The parallel development of the global rail and commercial vehicle markets meant that the contribution to sales of the two divisions remained unchanged in 2012. As in the previous year, the Commercial Vehicle Systems division accounted for 49% and the Rail Vehicle Systems division for 51% of consolidated sales.

The development of the two divisions is set out below for the individual regions that make up the Group.

Europe

Rail Vehicle Systems

In the year under review, the market situation in Europe varied from one country to the next in line with general economic developments in the respective nations. While the rail vehicle market in Germany showed modest growth, the markets in France, the UK and Italy remained at their prior-year level. The rail vehicle market in Russia moved ahead, while the Spanish market returned negative growth. The number of locomotives purchased in the region remained largely unchanged against the previous year; at the same time the number of freight cars manufactured rose by approximately 25% to 9,000 units.

Against this backdrop, Knorr-Bremse was able to further enhance its strong market position by securing some important orders. Thus, for example, Knorr-Bremse equipped the LINK diesel multiple units of Polish manufacturer PESA with key components for the braking, air supply and brake control systems, as well as supplying part of the bogie equipment. In 2012, among other commissions, PESA won an order from Czech operator Ceske Drahy for 31 trains. Also in the year under review, Knorr-Bremse concluded framework agreements with all three potential vehicle manufacturers for Deutsche Bahn's ET DB 400 project. The agreements govern the development and supply of the braking systems for the vehicle platforms from Alstom Deutschland, Stadler Pankow and CAF. In the course of this project, Deutsche Bahn is planning to acquire up to 1,600 new multiple units for various routes. The car sets will be built by one of the three manufacturers and are thus sure to be equipped with braking systems from Knorr-Bremse.

In 2012, Knorr-Bremse benefited from the growing importance of the Russian and CIS markets regulated by the GOST standard and continued the successful expansion of its market position. By way of example, the division won an order from Russia's Transmashholding to supply the bogie equipment for 50 double-decker passenger coaches. Moreover, Knorr-Bremse signed a framework agreement with German locomotive builder Voith governing the supply of braking systems for 500 shunting locomotives to be built by Voith for the Russian market in conjunction with a Russian partner company.

In the RailServices segment too, Knorr-Bremse was able to secure important orders in 2012. In one example, Knorr-Bremse began to replace the oil-lubricated compressors supplied by a competitor as original equipment for the Talent commuter trains run by Austrian Railways (ÖBB) with environmentally compatible oil-free compressors. The entire fleet is scheduled to be converted with 330 type VV120-T oil-free compressors by 2017 at the latest. The division also won orders to modernize and overhaul rail vehicles in all other major European markets. Given the forecast growth in the European aftermarket, this area of business is set to become even more important for the Rail Vehicle Systems division and will be duly reinforced.

Commercial Vehicle Systems

In 2012, the Western European truck market was unable to sustain the growth pattern of the previous two years.

Production of air-braked trucks over 6 t fell 11% year-on-year to 395,000 units, still well behind the pre-crisis level of 562,000 vehicles built in 2008. Under the impact of the debate over the continued membership of the Eurozone of the crisis-hit southern European countries, the second half-year in particular was marked by reticence on the part of buyers and by falling demand. The same picture was reflected in the Western European trailer market, where production was 6% down on the previous year at 172,000 units, as well as in the aftermarket, where Spain and Italy were the worst hit.

In the CIS states, truck output fell 8% to 100,000 air-braked trucks over 6 t. The volume of the aftermarket, by contrast, showed a slight increase, given that the vehicle population here is steadily growing and levels of equipment are rising.

Along with the disc brake, the key sales drivers in Europe in 2012 were electronic braking systems. In the year under review, the technology leadership of Knorr-Bremse products was confirmed by their inclusion in several new vehicle platforms. Thus Knorr-Bremse contributed key technologies to the new Volvo platform. Along with the latest generation of the electronic braking system EBS7, Knorr-Bremse is also providing air supply units, pedal units and compressors – with and without clutch – for the new Euro VI engines installed in the platform. The new valve unit for the air suspension is also being supplied by Knorr-Bremse. In the course of 2013, these products will be joined by the new anti-lock brake system ABS8 that will be installed, for example, in those vehicles based on the platform that Volvo will be shipping to the BRIC countries.

The growing importance of the market for spares, training courses, diagnostics and other services related to vehicles already in service is reflected in the planned establishment of a joint venture with the Automotive Aftermarket unit of Robert Bosch GmbH and with ZF Friedrichshafen AG. Subject to approval by the antitrust authorities, the joint venture will, in mid-2013, begin offering services such as a hotline, technical training courses and information, diagnostics, workshop equipment and quality management for multi-brand commercial vehicle workshops.

In the trailer segment too, Knorr-Bremse scored a major success in 2012, securing a framework agreement with Schmitz Cargobull AG for the supply of trailer EBS, disc brakes and brake cylinders that runs until December 31, 2014.

In Russia, Knorr-Bremse posted further growth in 2012. In the year under review, several Knorr-Bremse sites in Russia and Western Europe began preparing to supply modular braking system components for a new bus generation to be built by the largest Russian automobile group GAZ, with whom an agreement governing the development and production of the complete braking system was concluded. Start of production for the new product line is slated for 2013 or 2014. In addition, the joint venture between Knorr-Bremse and the Russian commercial vehicle manufacturer KAMAZ, Knorr-Bremse KAMA, concluded two agreements in the year under review governing the supply of a new power clutch to KAMAZ and ZF Kama. Series production is scheduled to start in the third quarter of 2013.

North America

Rail Vehicle Systems

The North American rail vehicle market showed further growth in 2012. Freight car production again increased, rising from 47,000 units in the previous year to 59,000 units. On top of this, 1,200 locomotives were built, with North American customers taking delivery of 790 units and the remaining 410 being exported. In the passenger transportation sector the market remained buoyant, not least on account of the expansion and construction of mass transit systems.

In this market environment, the Group's US subsidiary New York Air Brake Corp. won a large number of orders for its driver assistance system LEADER. Since the product was launched, more than 2,500 systems have been sold to eight customers. In the year under review, the largest order, for 1,125 LEADER systems, was received from freight operator Norfolk Southern Railway Corp.

In the mass transit sector too, Knorr-Bremse was able to build on its existing position and won orders for several additional important mass transit projects. Knorr-Bremse subsidiary Knorr Brake Corporation is to supply the braking, door and HVAC systems for 78 car sets that are being built for the Los Angeles Metro by Kinkisharyo International. With these new vehicles, from 2015 onward, metro operator Los Angeles County Metropolitan Transportation Authority is expanding its capacity and modernizing its fleet. The operator has also taken out an option on a further 157 car sets. Knorr Brake Corporation is also to supply the braking, door and HVAC systems for 80 driverless vehicles to be built by AnsaldoBreda S.p.A. for operator Honolulu Authority for Rapid Transportation. The light rail vehicles (LRVs) will be operating on a new commuter line starting in 2015. From 2013, braking and door systems from Knorr Brake Corporation will also be installed in 39 CAF LRVs destined for new mass transit lines in Houston, Texas.

Commercial Vehicle Systems

While the recovery of the North American truck market continued in 2012, it did so at a modest pace. Compared to the prior year, air-braked truck production (over 6 t) was up 4% at 353,000 units. Nevertheless the market still trails 29% behind its 2006 peak of 500,000 units.

Knorr-Bremse's North American business is handled by its subsidiary Bendix Commercial Vehicle Systems LLC, Elyria, Ohio, under the Bendix brand. With delivery of the 200,000th Bendix ESP Electronic Stability Program full-stability system in August, the company reached a major milestone in the year under review. The technology was introduced in 2005 and today there are over 222,000 units in the field.

In 2012, Bendix further reinforced its market leadership in North America by securing a variety of orders. In May 2012, for example, the company's Bendix ESP stability system with Automatic Traction Control (ATC) became standard on the majority of US commercial vehicle manufacturer Peterbilt Motors Company's Class 8 trucks and tractors. Peterbilt also made Bendix Wingman Advanced – a collision mitigation technology – an option on all Class 8 on-highway trucks and tractors. In this system, a radar sensor constantly measures the distance to the forward vehicle and automatically regulates the speed in accordance with the data acquired. If the distance closes too fast, the system first provides audible and visual alerts to the driver. If the driver fails to respond adequately, the Wingman Advanced system will actively intervene, reducing throttle, engaging the engine retarder or, if necessary, applying the foundation brakes. Wingman Advanced was launched in 2011 with Navistar and is released not only at Peterbilt, but also as an option at Kenworth (on select new Class 8 models), Mack and Volvo.

In 2012, US manufacturer Kenworth Trucks also added the SmarTire Tire Pressure and Temperature Monitoring System (TPMS) by Bendix as an option on selected new Class 8 vehicle models. TPMS continuously monitors the pressure and temperature of each tire, providing real-time status information. If the tire pressure falls below a set value, posing a potential safety hazard, the system alerts the driver. In addition to the safety aspect, the system also makes a valuable contribution to cutting fleet operating costs: tire wear and fuel consumption can be substantially reduced by maintaining correct tire pressures.

Bendix scored another success with US commercial vehicle builder Navistar when the company chose to rely exclusively on door systems modules from Bendix for its

annual output of around 15,000 school buses. The systems are manufactured at the Bendix Modules Center of Excellence in Huntington, Indiana.

South America

Rail Vehicle Systems

The fall in global demand for commodities exerted a negative influence on freight volumes in South America in 2012. As a result, output of freight cars in the region was cut in half in the year under review, to around 2,000 units. Output of locomotives staged a recovery in 2012 and at approximately 200 units was back at the level of 2008.

The passenger transportation market remains buoyant. Two major events – the 2014 World Cup and the 2016 Olympics, both in Brazil – are driving the expansion of the country's mass transit networks. In this context, Knorr-Bremse won the order to supply Bombardier Transportation with complete braking systems for 54 car sets for the new Expresso Tiradentes monorail line in São Paulo. Moreover, Knorr-Bremse also secured an order to supply the air supply and brake control systems for 19 trains built by Alstom Transportation for the metro in Lima, the capital of Peru.

Commercial Vehicle Systems

2012 brought a slump in the South American commercial vehicle market which saw truck production (over 6 t) fall 35% to 139,000 units. The downturn had been preceded by a surge in advance buying in the previous year before the introduction of the Euro V emissions standard in Brazil. In this tough market environment, Knorr-Bremse was able to secure a long-term order from Volvo do Brasil for the supply of ABS6 brake control units and pressure control valves for its new truck platform. The start of series production in Brazil is scheduled for 2014. The order runs until 2018 and prescribes localization of production of the pressure control valves from 2015 onwards.

Asia/Australia

Rail Vehicle Systems

Developments in the rail vehicle market in Asia/Australia in 2012 varied from one part of the region to the next. In China, demand for new locomotives and multiple units in the mainline sector – and the high-speed segment in particular – continued to fade. However, local growth in the mass transit sector, driven primarily by the continuous expansion of the country's metro systems, as well as in the service and maintenance sector was able to offset this downturn almost entirely. The Indian, Japanese and Southeast Asian markets all drove new growth.

Knorr-Bremse scored a major success in the Japanese market, winning further orders to supply bogie equipment for Shinkansen high-speed trains. The orders from operator JR East covered 23 cars of its E6 platform and 170 cars of its new E7 platform. On top of this, for the first time ever Knorr-Bremse secured an order from operator JR West to supply bogie equipment for 100 cars of its new W7 Shinkansen platform.

In India Knorr-Bremse won the contract to supply 115 CCB 1.5 locomotive control systems in the year under review. In addition, the market launch of the new CCB 2 locomotive control system proved a success, as orders were received to equip 50 diesel locomotives and 17 electric locomotives. In the growing metro system market in China, Knorr-Bremse was able to secure its first ever order for all three subsystems for metro cars. As a result, the car sets for the Qingdao Metro are to be equipped with braking, door and HVAC systems from Knorr-Bremse.

Commercial Vehicle Systems

The Asia/Australia region reported a further drop in truck production in 2012, with output falling 16%. The sharpest downturn was in China, where truck production was down 21% at 879,000 units. The decline was due to the uncertain global economic situation, which led not only

to falling exports but also to significantly lower levels of investment activity in the Chinese business sector. One positive exception here was the Chinese bus market, driven upward by growing urbanization and the introduction of a new standard for school buses within China, as well as by rising exports.

In this challenging market environment, Knorr-Bremse was able to improve its position in the Chinese commercial vehicle market. After providing an extensive range of components for the H3 generation of trucks from Chinese manufacturer Foton, early in 2012 Knorr-Bremse began supplying initial pedal units, power clutches and handbrake valves for the manufacturer's new H4 platform. Foton is building this heavy truck series for export to Europe and the Americas.

The Indian commercial vehicle market was unable to maintain the growth of previous years. Owing to the fraught economic situation in the second half-year in particular, output of trucks (over 6 t) fell 16% to 256,000 units. In the Japanese commercial vehicle sector, by contrast, the pattern of growth continued, as truck production moved ahead 26% to 207,000 units. Including bus production, the number of commercial vehicles built in 2012 rose by 21% compared to the previous year.

To ensure a continuing appropriate response to the rapidly increasing importance of the Asia-Pacific region for both divisions of Knorr-Bremse, as well as to the specific requirements of their customers, 2012 saw the onset of preparations for the Knorr-Bremse Technology Center India – as a joint strategic initiative by Knorr-Bremse Rail Vehicle Systems and Knorr-Bremse Commercial Vehicle Systems. The Technology Center in Pune will enable Knorr-Bremse to recruit the qualified engineers who will take the Group's product portfolio forward in close collaboration with the other R&D Centers of Competence around the world.

Consolidated sales by region

Capital expenditure and depreciation

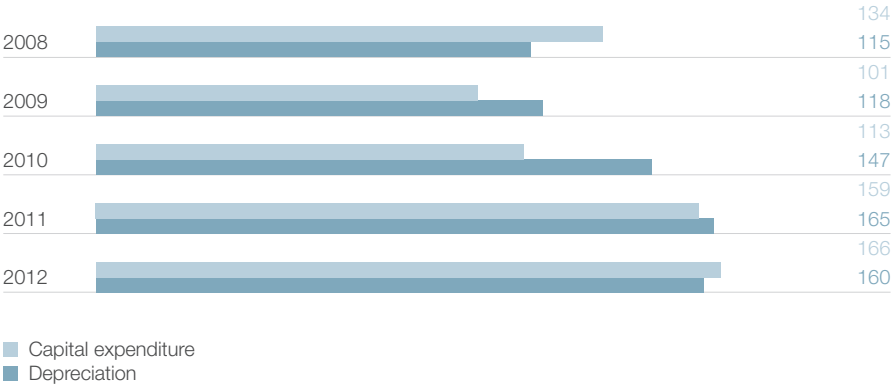
In 2012, the Knorr-Bremse Group invested EUR 165.8 million in fixed and intangible assets, which was 4.3% more than in the previous year (2011: EUR 158.9 million).

At EUR 78.4 million, 47.3% of the company's capital expenditure was invested in Europe. EUR 62.5 million (37.7%) was invested in the Americas and EUR 24.9 million (15.0%) in Asia/Australia.

Broken down by division, the allocation of capital expenditure was such that the Rail Vehicle Systems division benefited in the amount of EUR 79.5 million (2011: EUR 65.9 million) and the Commercial Vehicle Systems division in the amount of EUR 56.9 million (2011: EUR 74.7 million).

Depreciation/amortization on intangible and fixed assets showed a slight decrease across the Group, falling from EUR 164.6 million in 2011 to EUR 159.8 million in the year under review. With EUR 95.5 million, Europe accounted for the largest share of depreciation, followed by Asia/Australia with EUR 33.9 million and the Americas with EUR 30.4 million. A breakdown of depreciation by division shows that the larger proportion of EUR 93.6 million (2011: EUR 97.7 million) was accounted for by Rail Vehicle Systems, while depreciation at the Commercial Vehicle Systems division amounted to EUR 60.6 million (2011: EUR 60.8 million).

In 2012, investment activity focused primarily on the expansion of worldwide production capacities and on replacement investments, as well as on the ongoing construction of new production plants in India (Faridabad and Pune), the US (Westminster), Australia (Granville) and Brazil (Itupeva).



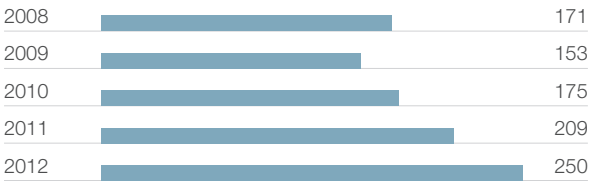
Consolidated capital expenditure and depreciation in EUR millions

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 249.7 million in 2012 (2011: EUR 208.8 million), which equates to 5.8% (2011: 4.9%) 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 (automatic door systems, air-conditioning and 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).

Knorr-Bremse's market success with these products is founded on its comprehensive command of electronics, pneumatics, and mechanical engineering. These capabilities enable the company to provide its customers with complete braking systems. The long-standing trend toward the introduction of innovative system solutions and modular solutions involving the increasing use of mechatronic systems is continuing, which gives Knorr-Bremse a competitive edge in the marketplace. In 2012 the Group continued to pursue its ambition of realizing innovative solutions that meet local market and customer requirements, and of continuously improving these solutions in the interests of its customers, as evidenced by an impressive number of innovations and awards.



Consolidated research and development expenditure in EUR millions

In 2012, research activities in the rail vehicle sector focused among other things on the development of innovative products for the BRIC states as well as for Middle Eastern countries. Thus, for example, the KAB60 control valve for Russia and the CIS states that had been inspected and approved in 2011 was integrated into a complete braking system – including controls – for customer Alstom Transportation. In the development process, the components were prepared to meet the special demands of operating temperatures as low as minus 50°C. The systems are destined for use in twin-unit freight locomotives belonging to Kazakh operator Kazakhstan Temir Zholy, the first application in a rail market governed by the GOST standard. Other significant new developments included a noise-encapsulated oil-free compressor to reduce noise during low-speed braking, and an exceptionally flat HVAC unit from Knorr-Bremse subsidiary Merak that takes account of the very restricted installation space in metro cars and also excels through its low noise level and ease of maintenance.

In the commercial vehicle sector, development activities in the year under review focused – as in the previous year – on the next-generation ABS, EBS and ESP systems and on the further enhancement of the electronically controlled air treatment system (EAC2). Among the development projects brought to a successful conclusion in 2012 were TEBS G2.2 for truck trailers for customer Schmitz Cargobull, as well as EBS7 and EAC2.5 for Volvo. Moreover, a new generation of video cameras for driver assistance systems was developed together with Knorr-Bremse's US subsidiary Bendix. The new cameras are to be introduced on the European market to provide a more robust and compact lane-keeping functionality at lower cost.

In line with Knorr-Bremse's regional strategy, in 2012 the proportion of the Group's development capacity located in emerging markets such as India and China was further increased. In India, for example, the Knorr-Bremse Technology Center India (TCI) was founded which, as a joint venture between the two divisions, will provide development services for the Group. In total, the number of employees in the field of research, development and project planning worldwide showed a slight rise over the previous year.

Human resources

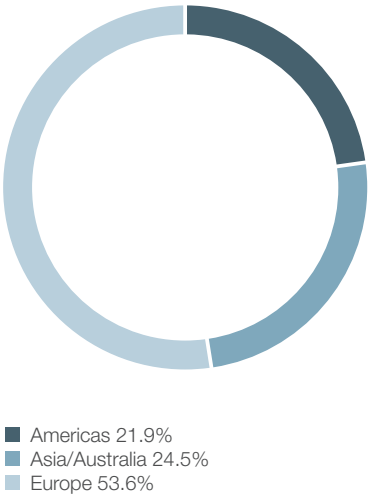
At year-end 2012, the Knorr-Bremse Group employed a total of 19,120 persons (17,539 excluding leasing). This equates to a year-on-year reduction of 4.6% (3.3% excl. leasing).

In the European region, there were 10,251 employees on the payroll at year-end 2012 (9,766 excl. leasing) compared to 10,442 (9,957 excl. leasing) at the end of 2011. At the same time, the proportion of the Group workforce employed in Europe increased from 52.1% in 2011 to 53.6% in 2012. The workforce in Germany totaled 3,750 employees (3,541 excl. leasing), down from 3,848 in 2011 (3,587 excl. leasing). However, the proportion of the Group payroll employed in Germany rose from 19.2% to 19.6%. The number of employees in the Americas also fell in 2012, reaching 4,185 (4,011 excl. leasing) at year-end, compared to 4,569 (4,363 excl. leasing) in 2011, as the proportion of the Group workforce in the Americas fell from 22.8% to 21.9%. In Asia/Australia, the size of the workforce decreased from 5,039 in 2011 (3,823 excl. leasing) to 4,684 (3,762 excl. leasing). The proportion of the total headcount employed in the region fell from 25.1% in 2011 to 24.5%.

The number of employees in both divisions was reduced, while sales showed a slight rise. In the Rail Vehicle Systems division, the number of employees at year-end 2012 had fallen from 11,083 (9,955 excl. leasing) in the previous year to 10,840 (9,781 excl. leasing). In the Commercial Vehicle Systems division too, the headcount fell from 8,636 employees (7,858 excl. leasing) at year-end 2011 to 7,941 (7,422 excl. leasing) in 2012.

In the year under review, HR efforts focused on strengthening the perception of Knorr-Bremse as an attractive employer as well as on the advancement and development of high potentials within the company. Within the scope of the People Excellence (PEX) initiative, a series of measures were introduced to promote a better work-life balance. Thus, for example, employees in Germany are offered the option of telecommuting from home on an hourly or daily basis or of taking a sabbatical for several months. The number of flexible part-time models available was also increased. In the executive development sector the global leadership training program was revamped, uniform global HR appraisal procedures were improved to facilitate the identification of talent, and the selection process for young managers was redesigned.

We would like to thank all of the company's employees for their commitment and hard work in 2012. Our thanks also go to the employee representatives for their constructive collaboration.



Group workforce by region on Dec. 31, 2012

Group workforce on Dec. 31, 2012

Corporate responsibility and sustainable development

Sustainable development and corporate responsibility (CR) again had an important part to play in fiscal 2012 and were taken forward at the company.

In the year under review, one central aspect of Knorr-Bremse's CR activities was the redefinition of its corporate values ("Entrepreneurship", "Reliability", "Technological Excellence", "Passion" and "Responsibility") and of the policies based on these values. The principles and strategic objectives of responsible business practices were defined in a CR policy and guidelines laid down to illustrate how the Group interprets CR and sustainable development. A globally binding Code of Conduct was also drawn up as a frame of reference for how to behave in line with the requirements of the law and of company rules and regulations.

One key focus of the Group's commitment to CR was the further anchoring of the international principles of the UN Global Compact in its business practices. The year under review brought the completion of a Group-wide survey that reviewed the implementation of the principles of the Global Compact. The aim of the survey was to determine which systems and local approaches are being used to ensure compliance with labor, environmental and social standards and respect for human rights, and in which areas there is room for improvement. A plan of action based on the findings was then drawn up. Knorr-Bremse published some of the survey findings in its second Global Compact Communication on Progress.

As in previous years, in 2012 Knorr-Bremse supported the charitable organization Knorr-Bremse Global Care e. V., which was founded in 2005, providing funding for its activities in the amount of EUR 1.5 million. The main focus of the organization's activities in 2012 was again on projects designed to sustainably transform the situation of people in need by helping them to help themselves. Examples included an integrative farming project in Kenya which, by providing theoretical training and better quality plants and seeds, aims to improve the food security situation. As a result, the local people are in a position to establish a secure livelihood and build a brighter future.

Knorr-Bremse Global Care e. V. 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, 46 aid projects were realized in a total of 23 countries on four continents. The projects are supervised on a voluntary basis and with great dedication by Knorr-Bremse employees. In 2012, by providing EUR 1.6 million in funding, Knorr-Bremse Global Care e. V. reached out to help some 50,000 people.

Follow-up report

No events with a material influence upon the assets, financial or earnings position of the Knorr-Bremse Group at the balance-sheet date have since taken place.

Report on risks and opportunities

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 Knorr-Bremse Group is active in business segments that for some years have been characterized by a dynamic process of consolidation on the customer side. This has resulted in powerful demand-side leverage, with corresponding pressure on prices. Knorr-Bremse responds to these factors with innovative products and systems, positioning itself as a partner for long-term relationships that target cost-effective solutions for the customer. The earlier Knorr-Bremse is involved in the customer's project as a whole, the better the chances of attaining that target.

Regional commercial vehicle and rail 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 development of the economies of individual countries and the worldwide flow of trade are carefully monitored in order to minimize 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 or 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 earnings, 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 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 response to 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 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 increasing integration of production plants in emerging countries makes 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.

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.

Outlook

In the next two years, Knorr-Bremse is expecting to see further volatility in markets around the world. In regional terms the markets will probably continue to show divergent developments. In Europe and the USA, high levels of sovereign debt and the austerity policies adopted by many countries are preventing any substantial growth stimulus. And while forecasts predict continuing strong growth for the emerging markets in South America and Asia in particular, growth rates are expected to be far lower than in recent years.

Against this backdrop, we are anticipating further moderate global growth, albeit exposed to high risks and uncertainties in the regional markets. The emerging markets of Asia will probably continue to account for the lion's share of global economic growth in 2013 and 2014. In industrialized countries, opportunities may arise by agreement being reached on long-term measures to resolve the sovereign debt crisis, leading to an easing of restraints on capital expenditure at many companies in these countries, which could provide additional impetus for global growth.

In the European rail vehicle market, we are currently anticipating a largely stable market environment for the next two years. While the negative effects of the economic crisis are evident in Spain, Portugal and Italy, Germany presents a stable, high-level volume of procurement across the various market segments. In Russia, the UK and South Africa, which also forms part of the Group's "European" region, planned investments in a variety of rail transportation projects are expected to generate further growth. The rapidly progressing Middle Eastern region will move further into the spotlight in view of the projected expansion of the rail network.

In the European commercial vehicle sector, the market is expected to shrink in 2013 and 2014. The volume of trucks built in 2013 will probably be slightly down on the prior-year level. In fiscal 2013, the main challenge for the Commercial Vehicle Systems division in Europe will be posed by the prevailing high level of uncertainty over economic developments which, given the pronounced dependency of the commercial vehicle sector on the state of the economy, will be reflected in the order books. In one response to the higher level of market volatility, activities in markets of the future, such as Russia, China and India, will be stepped up – markets that are served in part from Europe, thereby helping to boost the region's stability. In addition, selective expansion into new fields of activity is set to help drive the growth of the company's business in the medium term. In all growth projects, the focus is on boosting customer benefits and extending our technology leadership, with the quality and reliability of all products taking top priority.

In the North American OEM rail vehicle market, Knorr-Bremse is anticipating different developments in the freight and passenger sectors in 2013 and 2014. In the freight car segment, unit output is currently expected to show a downturn, due to falling worldwide demand for commodities and a sustained improvement in asset utilization of the existing fleet. In the locomotive segment, procurement volumes look set to remain stable. The mass transit segment will see major expansion and modernization projects driven forward in San Francisco and New York City, for example, so that positive market development in this segment can be forecast in the next few years.

Knorr-Bremse is anticipating a moderate weakening of the North American commercial vehicle market in 2013, although the necessary replacement purchases could provide growth opportunities beginning in 2014. Aftermarket replacement purchases could generate growth in 2013, offsetting some of the truck build weakness expected. A US-based stability mandate expected to be effective in 2015 or 2016 continues to offer growth opportunities for Bendix ESP, as fleets recognize the value of full electronic stability compared to roll over only.

In the South American rail vehicle market, following the sharp downturn in rail freight in 2012, demand for freight cars and locomotives is expected to remain stagnant for the next few years. The shelving of planned high-speed routes in Argentina, Venezuela and Brazil puts back the chances of growth in this sector by several years. In the passenger transportation sector, several small and mid-sized mass transit networks are being further expanded in 2013, although not on the same scale as in 2012.

In the South American commercial vehicle sector, truck output is expected to show a slight increase in 2013 compared to 2012. The introduction of legislation prescribing ABS for commercial vehicles in Brazil will prove a growth driver in the years ahead.

In the rail vehicle sector in the Asia/Australia region, the outlook for 2013 and 2014 presents regional differences. In China, the mass transit segment is expected to show further modest growth. Developments in the high-speed, intercity and freight transportation segments, however, are marked by uncertainty owing to unclear economic developments and the change of government. Further growth is anticipated for the markets in India and Southeast Asia, while the market situation in Japan, Korea and Australia is expected to remain stable.

In the commercial vehicle sector, the region as a whole is expected to show a moderate increase in truck production in 2013 and 2014. In China, a moderate recovery is anticipated for the next few years following the sharp drop in truck output in 2012. The level of market activity will, however, remain below the record production level achieved on the back of state subsidies in 2010. The commercial vehicle market in India will probably also stage a recovery, while the Japanese market is expected to remain stable.

Based on the regional backdrops set out above, Knorr-Bremse expects to see sales remain stable over the next two years in a business environment still marked by uncertainty. Regional developments will be influenced by the risks for the continued growth of the global economy described above, which differ from one region to the next. Assuming that the economic picture does not deteriorate any further, Knorr-Bremse expects earnings also to remain stable. Based on the assumptions made for the Group, the assets, financial status, and profitability of Knorr-Bremse AG too can be expected to remain stable – depending on the level of income from the company's investments.

In the coming years, Knorr-Bremse will continue to pursue a policy geared to safeguarding the company's long-term health and in particular will be driving forward the steps already introduced to expand its capacities in regions where demand is growing. These include, for example, an intensive marketing effort in the BRIC countries and the introduction of innovative products, as well as the selective expansion of the company's fields of activity. The focus here will remain on boosting customer benefits and securing the company's technology leadership.

Report

Despite a volatile business environment, Knorr-Bremse was able to close its books on a positive year in 2012 and again posted sales of more than EUR 4 billion. As this shows, the Group with its two divisions, Rail Vehicle Systems and Commercial Vehicle Systems, has the right products to meet the often very special requirements of its customers. Together with a globally-oriented strategy founded on broad-based positioning in a large number of markets, in 2012 this again brought the Group outstanding ratings from two prominent rating agencies. Knorr-Bremse was able to not only reinforce its position in its traditional markets in the year under review but also gain a firm, long-term foothold in new marketplaces.

For Knorr-Bremse, 2012 was a year marked not least by the introduction of new corporate values. "Entrepreneurship", "Technological Excellence", "Reliability", "Passion" and "Responsibility" are the values that describe Knorr-Bremse and guide the way the company does business, each and every day.

Growing with Values – Knorr-Bremse's New Corporate Values

In 2012 Knorr-Bremse introduced new corporate values. The redefined values stand for the qualities that set Knorr-Bremse apart – for its strengths, for fair play both inside and outside the Group and for a willingness to acknowledge and remedy mistakes. They are intended to provide a frame of reference for all our employees around the world in their daily actions and decisions. Furthermore, they are designed to shape our business practices and set standards for our behavior towards one another.

Entrepreneurship, Technical Excellence, maximum Reliability, individual Passion and Responsibility – these are the values that define us as Knorr-Bremse.

In what follows, Julia Thiele-Schürhoff, who was responsible for the Values project and heads up the Corporate Responsibility function, and Dr. Marc Pastowsky, head of Corporate Human Resources at Knorr-Bremse, discuss the new corporate values in a personal interview.

YOU CHOSE TO DEFINE NEW CORPORATE VALUES IN 2012. WHY DID YOU THINK THE TIME WAS RIGHT?

Dr. Marc Pastowsky: The business world has been stepping up its focus on values for some time now, and of course we haven't remained untouched by this trend. But I believe that in intensively re-examining our values at Knorr-Bremse, we were actually responding to an inner need. A lot has changed in recent years, both at Knorr-Bremse and in our business environment. We have grown rapidly as a company and are becoming increasingly global, embracing more and more people of different cultural backgrounds. In particular, young people who join our company as well as many employees at our different locations across the globe want to know what the company stands for. By redefining our values we were aiming to formulate our identity – our "corporate DNA" – and set it down in writing, making it accessible to our employees around the world.

Julia Thiele-Schürhoff: Values traditionally play an important role in a family-owned business. Our responsibility towards future generations is also becoming more and more important for us as a company. Taken together, these considerations led us to focus on what actually defines Knorr-Bremse as a company. What factors contributed to our success and made us so strong in the past? And how can we ensure that this success continues in the future? In our corporate values, we have written down all of the convictions and expectations that form the core of our corporate culture. The values now serve as a kind of compass for all employees, setting uniform standards for the way we work, our business practices and our behavior towards one another. They are intended to build bridges between the different regions and locations within the Group – transcending cultural differences. And finally, they are designed to inspire us to keep moving forward and developing. Not just as a company, but also as individuals.

ANY DISCUSSION OF VALUES AUTOMATICALLY INVOLVES AN EXAMINATION OF BASIC PRINCIPLES. WHEN YOU WERE FORMULATING THE NEW VALUES, WERE YOU ALSO OUT TO REDEFINE THE KNORR-BREMSE BRAND?

Julia Thiele-Schürhoff: To all intents and purposes, these values already existed within the organization – they just hadn't been stated explicitly. Clearly defined and authentic corporate values certainly make a brand stronger, but in this case we weren't aiming to redefine the brand itself. As a manufacturer of safety-critical technology, for instance, Responsibility is essential and has always been part of our daily thoughts and actions. And our other values – Entrepreneurship in the form of proactive, forward-looking practices, Technological Excellence, Reliability and individual Passion – are all part of our tradition.

Dr. Marc Pastowsky: It was more that we didn't quite see ourselves reflected in the values in their previous form. In the past, the corporate values were more like a code of conduct – good in principle, but not very company-specific. They could have applied to any corporation. Our newly formulated values, on the other hand, come from within and reflect the special qualities of Knorr-Bremse: the strengths that have made us great and that remain vital to our future success.

YOU SAID THAT THE VALUES ARE SUPPOSED TO PROVIDE A KIND OF COMPASS FOR ALL KNORR-BREMSE EMPLOYEES. HOW DOES ONE ARRIVE AT THAT SORT OF FRAME OF REFERENCE IN A GLOBALLY ACTIVE GROUP THAT UNITES MANY DIFFERENT CULTURES?

Julia Thiele-Schürhoff: The most important thing for us was that

the values were not being defined by a small group of people, but that many of our colleagues contributed to the process. In all, more than 100 employees from over 20 countries were involved. This meant we had access to a wealth of experience that was much broader and more diverse. Open communication and discussions allowed us to build awareness at a fundamental level. During this process, a clear picture began to emerge of where we are coming from as a Knorr-Bremse family and what drives us.

Dr. Marc Pastowsky: Thanks to this openness, the process of identifying the values was a genuine dialogue in which we learned a lot – about others, but about ourselves as well. "Passion", for example, conjures up other associations in the USA than in China, which in turn differ somewhat from the connotations of our German word. When looking at Knorr-Bremse, however, we discovered that despite all the cultural differences, there are unifying elements that form the core of our company; a hub around which everything – everyone – revolves. Our values don't add up to a single fixed image, however. They are points of reference, defining a space in which we all move – a framework with room for individual interpretation.

CAN YOU DESCRIBE THE VARIOUS STEPS THAT LED TO THE ROLL-OUT OF THE NEW VALUES?

Julia Thiele-Schürhoff: Essentially there were three workshops plus a lot of one-on-one and group discussions with international managers from both divisions. In the first workshop we looked at the factors that had shaped our success to date – at our corporate heritage, so to speak. Next we asked ourselves what challenges we're going to be facing in the future and what system of values will help us to master them. In the third workshop we discussed our findings with the Executive Board. Before we finally signed off the five core values, my father, Heinz Hermann Thiele, also contributed to the process in his role as company owner and Chairman of the Supervisory Board. By the time we rolled out the values across the Group, about a year had passed.

Dr. Marc Pastowsky: As we worked to identify the core values we didn't apply any kind of predefined formula or special methodology or delegate the task to external consultants. Although we did seek professional advice during the process and employ moderators from outside the company, the actual back-and-forth about content and priorities took place internally. We were convinced that this was something we had to tackle ourselves, so we had our own team set up the "corporate DNA" project and work out the conclusions. We had a goal in mind, but not a predefined outcome.

Julia Thiele-Schürhoff: That's right. It was an honest and constructive process in which we openly discussed our strengths and weaknesses. That's why the values also represent challenges we need to meet as a Group, like continuing to improve our management performance and teamwork. This motivational aspect was very important to us, because the launch of the new values is also intended to trigger further progress.

THE NEW CORPORATE VALUES WERE INTRODUCED IN EARLY 2012. HOW DID YOU COMMUNICATE THEM TO EMPLOYEES WORLDWIDE AND WHAT DID THE INITIAL RESPONSE LOOK LIKE?

Dr. Marc Pastowsky: On the one hand we communicated the new values via our traditional internal channels – employee magazines, a special values brochure, presentations and so on. We also held a Values Day on 12 June 2012 at all Knorr-Bremse locations around the world to mark the kick-off. Our aim was to launch a process in which the employees engage with the new corporate values and ask themselves questions like: What does each of the values mean to me? To my department? To the way the company operates? On Values Day all Knorr-Bremse employees had a chance to discuss these questions in departmental workshops. We gave the individual departments a lot of freedom to decide what shape these would take. And the program was rounded off with additional fun activities that were designed to create a relaxed, open atmosphere. The feedback from the various regions was extremely positive, which not only made us very happy, but also confirmed that we are on the right road.

IN WHAT WAYS ARE KNORR-BREMSE'S VALUES VISIBLE TO EXTERNAL PARTNERS SUCH AS CUSTOMERS AND SUPPLIERS? AND HOW DO THEY STAND TO BENEFIT?

Julia Thiele-Schürhoff: Our values don't just encourage a culture of fair play within the company. They also guide our behavior towards

partners and customers as well as our approach to the environment and to society as a whole. The values allow us to present a unified and consistent face to the outside world, which generates a sense of security and trust. Values are expressed in our active behavior, in the way our employees actually interact with our external partners. The multitude of interactions and points of contact between Knorr-Bremse and its business partners add up to the outside world's experience and perception of our company. And let's not forget that values such as Technological Excellence and Reliability can also be directly felt in the quality of our products and services.

WHAT PART DO CORPORATE VALUES PLAY IN THE INCREASINGLY IMPORTANT FIELD OF EMPLOYER BRANDING?

Dr. Marc Pastowsky: When choosing an employer, many candidates are looking not just at the job description, but also – and increasingly – at whether their personal values and convictions align with those of the company. As a family-owned enterprise with a long tradition of success, we are aiming to use our values and our corporate culture to set ourselves apart from the competition. What do we stand for as an employer? What makes us unique? What is special about us as a company and our employees? Our goal is to attract talented people who fit into our culture and share our values. And I think it's very important to note that a coherent employer image based on shared values also has a very strong, positive impact on the loyalty, motivation and work ethic of the existing workforce as well.

VALUES CANNOT BE IMPOSED TOP DOWN – THEY HAVE TO BE EMBRACED AND TAKEN ON BOARD. HOW CAN YOU ENSURE

THAT THE NEWLY DEFINED VALUES ARE INTEGRATED INTO DAILY ROUTINES AND LIVED BY ALL THE EMPLOYEES?

Julia Thiele-Schürhoff: Of course it's not that simple, but we'll continue to follow up and work to present the values not as something abstract, but as something to be applied in every workplace situation. This is a long-term cultural process; realistically speaking, we expect it to last somewhere between three and five years. We've decided to move forward with activities that target the application of the values. For example, we are planning to hold Culture Days in 2013. As part of this program we intend to invite all employees to take part in discussions about our corporate culture, something there usually isn't time for during working hours. The idea here is to enable our employees to experience the values and to get everyone more actively involved in the debate. We know that this process will take time and that it's up to us to put the necessary framework in place. But we also believe that every individual has a personal responsibility to approach the redefined values with an open mind and try to integrate them in their own environment. Only then will we be able to successfully and permanently anchor the values in the company.

Dr. Marc Pastowsky: That's right. It's very important that the values are not just seen as requirements set down on paper. They have to be flowed into our policies, processes and conduct. Management in particular must lead by example. When it comes to the values, we call on our managers to

be authentic, active role models, demonstrating that the values are not targets for measuring employee performance, but rather sources of inspiration and motivation for each individual. That's why our second step has been to develop the first ever leadership principles for Knorr-Bremse, based on the corporate values, to specify what we expect of our managers. For our junior managers in particular, we believe it is essential to define leadership more clearly and signpost the direction it should take.

SO THE NEW CORPORATE VALUES PROVIDE A FRAME OF REFERENCE THAT IS NOW BEING FLESHED OUT AND BROUGHT TO LIFE. HOW DO YOU SEE THE REDEFINED VALUE SYSTEM SHAPING THE FUTURE DEVELOPMENT OF KNORR-BREMSE?

Dr. Marc Pastowsky: I am convinced that the values will strengthen our internal cohesion and help us to leverage our growth potential even more successfully in the long run. We want our employees and talented applicants to appreciate Knorr-Bremse as an attractive employer with strong and clearly defined values that set us apart around the globe. We are also sure that, figuratively speaking, our shared system of values provides us with strong guardrails to guide decision-making processes within the company.

Julia Thiele-Schürhoff: We have identified our strengths and are

aiming to use them as a foundation upon which to build a successful future for our company. We are building a bridge between Knorr-Bremse's heritage and development over recent decades and its future. Our grand objective is a strong, motivating and enduring corporate culture that will enable us to be an excellent, responsible and reliable partner to our customers, employees and society as a whole – today, tomorrow and for many years to come.

Entrepreneurship

"Knorr-Bremse sees challenges as an opportunity to generate long-term, profitable growth. As a family-owned company we look to the future and have a bold, open strategy of developing new business fields. We take a pro-active, goal-oriented approach focused on delivering performance."

Gustavo Gonzalez, Managing Director Sociedad Española de Frenos, Spain

Itupeva, Brazil

Westminster, USA

Site-specific Projects

2012 saw Knorr-Bremse display entrepreneurial foresight by systematically expanding its global presence and market leadership, especially in the growth markets of the BRIC states and in North America. In Russia, for example, the company linked up with Russian railway operator RZD to establish a joint venture; in India the Group expanded its production capacity in both the rail and commercial vehicle sectors, building new facilities that meet the very highest standards of modern logistics and environmental protection. In order to keep one step ahead of its competitors, the company also strengthened its research and development activities during the year in question. In India, a modern development center was opened next to the new production hall in Pune.

Rail Vehicle Systems

Microelettrica moves to new headquarters

Knorr-Bremse subsidiary Microelettrica Scientifica is a global market leader in the field of electronic and electro-mechanical control components for rail vehicle applications. The company's product portfolio includes switches and breakers, resistors, high-voltage transducers and fans. In the past these products were manufactured at four facilities around Milan in northern Italy. To consolidate the production shops and bring the approximately 300 employees under one roof, Microelettrica decided to build a new facility in Milan's Buccinasco district. The new plant was officially opened in August of the year under review.

The various components are now manufactured in "lean flow" operations. Each block has its own logistics and warehouse. In addition, the planning process allowed for expansion areas for each block, giving the company the capacity to respond quickly to changes in the business environment. The numerous integrated test facilities document the strength of the in-house development capability at the new Microelettrica headquarters.

RZD Supervisory Board approves joint venture in Russia

Knorr-Bremse further expands its market position in Russia and the CIS states.

After more than four decades in the Russian rail market, Knorr-Bremse is set to further expand its position. In June of the year in question, the supervisory board of the Russian railway company RZD approved the formation of a joint venture between its subsidiary Federal Cargo Company FGK and Knorr-Bremse. The board of the company, which was officially set up on February 12, 2013, consists of representatives of the Russian government and ministries as well as other sectors of Russian industry.

The name of the new company – "Knorr-Bremse 1520" – is derived from the Russian track gauge of 1,520 millimeters. The joint venture is based in the city of Tver, roughly 170 kilometers north of Moscow. Manufacturing activities will initially take place at the existing Knorr-Bremse plant in Voronezh. Construction work on a new factory in Tver with almost 16,000 m^2 of production space began in 2012, and the joint venture will transfer its entire production operations to Tver in 2014, creating some 400 jobs at the new plant. Knorr-Bremse already commands an extensive product portfolio specifically geared to the needs of the CIS market and which from now on will increasingly be manufactured locally. In addition, the existing portfolio will be extended in the medium term to include further products that are also adapted to local requirements and will be manufactured in Tver. One new core product of the joint venture company will be control valves for the CIS market, destined for use in the various rail vehicles operating in the cargo sector. Another focus will be on the production of disc brakes and oil-free compressors.

For Knorr-Bremse, this new joint venture offers numerous opportunities to win a more extensive share of the railway market in the CIS states. In the medium to long term there will be many new-building and modernization projects in this market. And operators are increasingly focusing on vehicle life cycle costs and component reliability as rail vehicle speeds rise. As a result of its long years of experience in the Russian and CIS markets, Knorr-Bremse can draw upon a deep pool of experience and expertise that the company will be able to translate into customer benefits in the course of future projects.

In the Russian railway company and its subsidiary, Knorr-Bremse also has two partners who bring with them an extremely broad field of possible applications for technical rail products in the fields of passenger and freight transportation.


Microelettrica Scientifica


KNORR BRAKE CORPORATION

New plant in India makes good progress

Knorr-Bremse prepares for further expansion of India's rail infrastructure.

In the year under review, construction work on the new Knorr-Bremse plant in Faridabad, India, made rapid progress. As a result, the official opening is set to go ahead as planned in the course of 2013. The new plant is being built in response to the growing demand the company is expecting to encounter on the fast-developing subcontinent in the next few years. One key factor here is the planned expansion of the transport infrastructure in India, with a modernized railway network forming one of the main pillars. Within this expansion, existing rail vehicles are being upgraded and orders placed for new ones, both areas in which Knorr-Bremse has played an active role in India for many years. The company's existing plant, however, does not have the capacity to cope with rising levels of demand.

Knorr-Bremse has located the new facility in the immediate vicinity of the existing plant – avoiding the loss of skilled staff that can result from relocation and retaining the valuable expertise of its employees. When the plant is opened, the 22,000 m^2 site will house both production operations and offices, with a workforce of some 400 employees producing brake control systems, bogie equipment, compressors and air dryers for rail vehicles. As part of Knorr-Bremse's international strategy, these components will be manufactured largely for the Indian market 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. The design of the building conforms to green building standards, with energy-efficient air conditioning and high levels of insulation helping reduce its carbon footprint.

Knorr Brake Corporation celebrates groundbreaking ceremony for new plant in North America

For more than two decades the Knorr Brake Corporation operated successfully from its plant in Maryland, USA, but steady growth in the North American mass transit market, combined with three major orders for HVAC systems, meant the company had reached the limits of its production capacity. During the year under review, Knorr-Bremse therefore started to construct a new production plant, and the official groundbreaking ceremony was held in January 2012. The new plant is located a few kilometers away from the current site at Westminster and will have a total floor space of some 22,000 m^2, where just under 300 employees will produce brake control systems, bogie equipment, compressors, air dryers, HVAC units and access systems.

The architecture and layout of the building has been based on the modern design developed for new Knorr-Bremse facilities in recent years. It is based on the principles of Knorr-Bremse's KPS global production system and meets the highest international standards of process organization, work efficiency, logistics and quality.

The new Westminster facility also meets the requirements of the LEED (Leadership in Energy and Environmental Design) guidelines, which include the use of rainwater for the building's water supply, a particularly energy-efficient air-conditioning system and the intelligent use of natural light for the interior. A solar system has also been installed on the roof and will meet 40% of the plant's energy requirements. When the new facility opens in the first half of 2013, this solar system will be the biggest in the entire region.

Construction work started on new facility in Australia

In Australia, Knorr-Bremse began the cross-functional merger of the four locations that the company has been operating in New South Wales since the acquisition of HVAC system manufacturer Sigma Coachair in 2010. The official groundbreaking ceremony for the expansion of the existing plant in

Granville took place in February of the year under review. The new facility, which has been designed in line with the latest environmental and industrial health and safety findings, is scheduled to become operational in the first quarter of 2013, providing almost 16,000 m^2 of office and production space.

There were several reasons for merging the four locations. On the one hand expansion of the production site in Granville had become a sheer necessity on account of revenue growth and additions to the portfolio in recent years. At the same time, though, the new facility is also designed to bring the activities of the formerly separate manufacturers Knorr-Bremse Australia and Sigma under one roof, thereby facilitating more efficient cross-functional collaboration.

This is now taking concrete shape: in Granville, Knorr-Bremse is bringing together the ongoing Australian development and production activities for rail and commercial vehicle brake components and for Sigma HVAC systems at a single location. In addition, the aftermarket business in the rail vehicle HVAC and braking systems segments will also be brought under one roof at the newly expanded plant.

Commercial Vehicle Systems

Knorr-Bremse opens a new training center aimed at promoting improvement at all levels of value creation within the company.

New Lean Management Training Academy opens in Liberec

During the year under review, Knorr-Bremse's site in Liberec, Czech Republic, established the Value Stream Academy – a new company training center for employees from both the Commercial Vehicle Systems and Rail Vehicle Systems divisions. The aim is to promote improvement across the entire value stream and create a robust theoretical background at Knorr-Bremse. All levels within the company and its suppliers will be scrutinized to identify where there is room for improvement and where processes that do not add value can be eliminated. Throughput times and inventory will be reduced, flexibility and quality improved and employees made more aware of the issue of waste. At all times the focus will be on customer benefit.

The Academy will offer various training sessions in a range of different languages, and participants will then have the opportunity to apply their theoretical knowledge in practical workshops – almost 50% of the content is of a practical nature aimed at establishing best practice solutions that set standards for the entire Knorr-Bremse Group. The idea is also to set up networks of experts and promote an exchange of ideas between sites as well as training more instructors for the Value Stream Academy (VSA) itself.

Liberec offers an ideal location for the Value Stream Academy: it is a new facility equipped with state-of-the-art production technologies and also has a range of products representing a typical Knorr-Bremse portfolio. The next step is to roll out this successful concept in the USA.

Knorr-Bremse introduces new logistics concept in Aldersbach

The Knorr-Bremse plant in Aldersbach, Lower Bavaria, is the leading center for the production of disc brakes within the Knorr-Bremse Group. During the year under review the company started to introduce a new concept for optimizing logistics at the facility. In addition to reducing inventories, the aim was to simplify handling processes. Both the Aldersbach production lines – disc brakes and electronics – were equally involved in developing the new concept.

Even at the planning stage the project team began to optimize material flows, sequencing materials and packaging to synchronize with the customer's schedule and avoid the need for a handling and booking process during materials receipt and shipping.

In the past, the assembly sequence was based on volume requirements, whereas production is now sequenced on the basis of customer orders, ready for immediate shipping. This means that deliveries to the assembly line are reverse-scheduled. Assembly orders are allocated and timed on the basis of the final loading plan for an entire truck. Under- and over-supply of the production line is avoided, largely eliminating excess supplies of components. Storage of materials for shipping is organized in truck-based lanes rather than so-called "mixed" lanes, with two warehouse tow-tractors from the central warehouse supplying the new lanes once every hour; up till now this had been carried out with forklift trucks at irregular intervals according to need.

Volume production of trailer drum brakes launched at Knorr-Bremse KAMA

Trailer drum brakes extend Knorr-Bremse KAMA's product portfolio in Russia.

During the year under review, Knorr-Bremse KAMA in Naberezhnye Chelny – the joint venture set up by Knorr-Bremse and Russian truck manufacturer KAMAZ OJSC – launched volume production of drum brakes for trailers. The brakes will be delivered to NEFAZ, a KAMAZ subsidiary and one of Russia's largest manufacturers of trailers, with a market share of between 25% and 30%.

The new drum brakes are based on the tried-and-tested design of the current KAMAZ truck brakes but have been developed specifically for trailers. Most of the components are standardized and already available, which means the brakes offer a combination of value for money and high quality. The aim is to produce some 20,000 units per year.

The launch of volume production of the new brakes marks a further expansion of the joint venture's product portfolio. Knorr-Bremse KAMA currently manufactures 42 different types of drum brake for commercial vehicles, as well as other products such as dampers, manual slack adjusters, clutch servos and clutch master cylinders. In the near future the portfolio is to be further expanded with a view to offering customers a wider range of localized products manufactured to the usual high Knorr-Bremse standard.

Knorr-Bremse opens new logistics center in Moscow

Back in 1997 Knorr-Bremse established a sales office in Moscow to handle activities in the Russian market and the CIS states. Since then, Knorr-Bremse has steadily and systematically built up its business in the region with a portfolio of products and services geared to these markets, and embarked upon a successful collaboration with Russian commercial vehicle manufacturers like KAMAZ and Group GAZ. Following the Moscow facility's conversion into a subsidiary of the Knorr-Bremse Group, in the year under review it also began handling all local logistics activities for all Russian customers, as well as for customers from the CIS states.

The 20 employees in Moscow have since been responsible for organizing efficient supplies of original Knorr-Bremse parts to dealers, trailer manufacturers and OEMs. Revised and optimized processes facilitate the ordering process and make for smooth order handling, all the way to invoicing. In the ware-

housing, logistics and customs clearance sectors, the team in Moscow's Sheremetyevo International Airport, with excellent infrastructure links which ensure that all shipments are dispatched promptly and reliably.

Knorr-Bremse drives forward construction of new plant in Pune

In India Knorr-Bremse is combining its commercial vehicle engineering and development services for products aimed at the Asian market.

In the long term India promises to be one of the world's biggest growth markets in the commercial vehicle sector. The healthy order levels at Knorr-Bremse India over recent years reflect the relatively steady economic growth enjoyed by the Indian subcontinent. Many indicators point to continuing high growth rates in the medium and long term. The orders resulting from this growth will, however, be more than Knorr-Bremse can handle at its existing commercial vehicle plant in Pune in Central India. To remedy the situation, in November 2011 Knorr-Bremse started work on construction of a new production plant and development center for commercial vehicle products, just a few hundred meters from the current site. Construction work will be completed by the end of March 2013.

As production was transferred to the new location, all production processes were systematically enhanced to maximize value added. This was crucial in ensuring the optimization of existing processes and enabling the level of vertical production to be increased. With the new building, Knorr-Bremse also created extensive opportunities for expansion. As a result, in the future, Knorr-Bremse India will be able to respond very quickly to new market requirements and expand its portfolio to include new product lines with relative ease.

Directly alongside the new production plant is the Knorr-Bremse Technology Center India (TCI). Here, Knorr-Bremse Commercial Vehicle Systems has focused its engineering and development services for commercial vehicle products specifically for the Asian market. One core activity is software development. In order to benefit from synergies, a new software development center for the Rail Vehicle Systems division is being set up in the same building. By 2015 the TCI will be providing work for some 200 employees. Pune is an established hub of IT and software activities in India, which means there is an extensive local pool of talented software developers.

By setting up this new development center Knorr-Bremse is making sure that the company will have sufficient resources going forward to meet the growing demand in the Asian market and master increasingly complex products.

Bendix steps up capacity in Kentucky

In Bowling Green, Kentucky, Bendix Spicer Foundation Brake LLC operates a state-of-the-art manufacturing site for air disc brakes and foundation drum brakes for the North American commercial vehicle market. In 2011, the company expanded the size of the facility while also launching a new automated disc brake line at the location, tripling its assembly capacity and capitalizing on its significant market gains in foundation brakes. This was followed in the year under review by a further multi-million dollar investment in a major expansion of production capacity and purchase of new equipment. One key factor in this decision was new first phase of the US Reduced Stopping Distance regulation enacted in August 2011. The mandate requires a 30% reduction in stopping distance for new three-axle tractors with Gross Vehicle Weight Ratings (GVWRs) up to 59,600 lbs. and produced after the August 1, 2011, implementation date. Tractors with two axles, as well as severe service tractors with GVWRs above 59,600 lbs., must comply with the new mandate by August 1, 2013. To help operators meet this requirement, Bendix developed the Bendix ADB22X air disc brake and the high-performance Bendix Extended Service (ES) drum brake. Introduction of the new legislation triggered a sharp rise in demand for these brakes.

Knorr-Bremse Brazil moves to new plant at Itupeva

In the wake of significant growth in recent years and in anticipation of medium-term growth in the South American market, Knorr-Bremse decided last year to expand and relocate its current Brazilian production plant – the biggest joint facility for the rail vehicle and commercial vehicle divisions in the Group. The location selected was the city of Itupeva, only 85 km from the current plant in São Paulo. The process of transferring operations began at the end of 2012.

The biggest joint facility for rail and commercial vehicles will in future be located in Itupeva, Brazil.

The company's São Paulo plant had reached the limits of its capacity and could not accommodate any additional product lines. Space restrictions also meant that production processes could not be brought up to modern standards. As the land surrounding the plant was increasingly being used for residential purposes, there was no scope to expand the existing site.

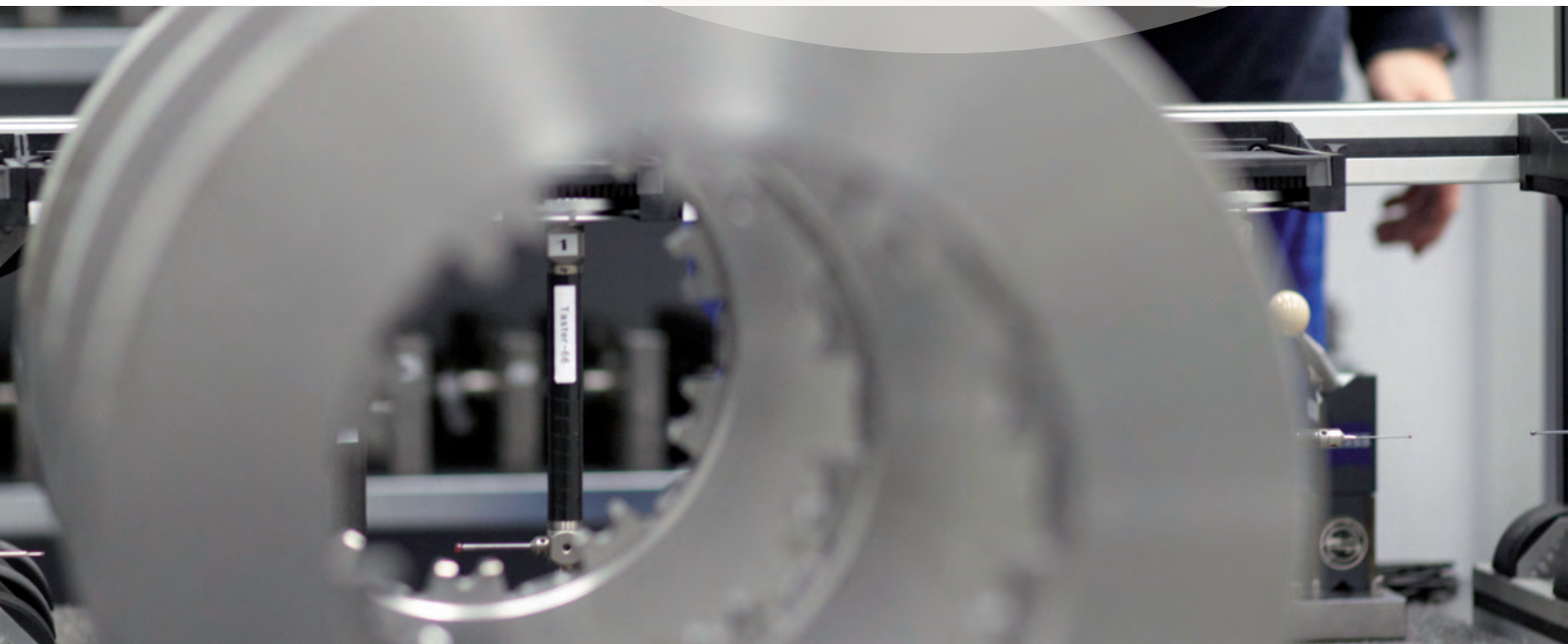
The new plant will manufacture brake control systems, bogie equipment and onboard systems for rail vehicles, but some 70% of its production will be for commercial vehicles, covering the entire product portfolio for the local truck market, including brake control systems, air supply and treatment systems, brake cylinders, disc and drum brakes and torsional vibration dampers.

The move to the new location has enabled Knorr-Bremse to significantly extend its capacity not just in volume production and equipment refurbishing but also in the fields of surface treatment, functional and torsion testing and vehicle testing. The focus during the design phase of the new facility in Itupeva was on optimizing layout and production processes and introducing a modern logistics concept. The result should be significantly reduced throughput times in the various production processes.

Technological Excellence

"Knorr-Bremse is all about technological expertise and competence – and these can be found in all parts of the company. By carefully monitoring and analyzing market developments and social trends we are able to generate new ideas, identifying our customers' needs in advance and generating added value in the form of innovative system solutions. Drawing on the considerable expertise of our entire workforce, we develop new, cutting-edge sustainable products – or refine and improve existing ones. "

Jörg-Johannes Wach, Vice President Brake Control,
Knorr-Bremse Rail Vehicle Systems, Germany



Products

In their constant search for technological excellence, both Knorr-Bremse divisions launched innovative new developments as well as refinements of existing products during the course of the year under review. Amongst other things the new "whisper brake pad" Flexpad Silent and the soundproof oil-free compressor were both developed in response to increasingly strict noise prevention and environmental regulations for rail vehicles. The Commercial Vehicle Systems division also contributed to protecting the environment with new developments like the prototype electronically powered oil-free compressor for hybrid vehicles. The Pneumatic Booster System (PBS) improves engine performance and makes it possible to down-speed or down-size the engine – with an associated reduction in fuel consumption. And Knorr-Bremse also came up with new ideas in the field of driver assistance systems.

Rail Vehicle Systems

Thanks to the new "whisper brake pad", the "Italo" Italian high-speed train operates extremely silently.

Knorr-Bremse develops innovative "whisper brake pad"

The noise of train brakes can cause considerable annoyance to residents in the vicinity of railway lines, but now Knorr-Bremse has developed a new high-performance brake pad that virtually eradicates brake squeal and makes rail transportation more environmentally friendly – the high-tech Flexpad Silent.

Brake squeal is caused mainly by a stick-slip effect that occurs at slow speeds as a result of the low clamping force of the brake pads and low rotational speed of the brake disc. The brake pad repeatedly adheres briefly to the disc, causing vibrations that trigger the unpleasant noise.

Knorr-Bremse tackled this problem on two fronts. To prevent the pads sticking to the disc, a compound material was used that combines a high-friction sintered surface with a lubricated core. And a mechanical sound damper was also developed with sound insulation between the pad and the backing plate to absorb any vibration.

Having gained official approval, the "whisper brake pad" is now ready for use – and that includes the high-speed sector. Since April of this year the Flexpad Silent has been in operation on Italy's "Italo" high-speed train – the "Ferrari on Rails" – on the line between Milan and Naples.

Knorr-Bremse launches highly complex brake control module

Brake control modules are essential to any braking system. Installed in the engine room of the locomotive, they not only contain the control unit for the locomotive's pneumatic brakes but also regulate the brakes for the entire train via the main brake pipe. The equipment trestle integrates electrical and electronic components, pneumatic control and air reservoirs and the brake equipment panel. During the year in question, Knorr-Bremse developed a highly sophisticated brake control module of this kind designed to operate at temperatures down to minus 50 degrees Celsius.

The module forms part of a braking system, the first examples of which were delivered to vehicle manufacturer Alstom during 2012 for installation in 25 double freight locomotives ordered by rail operator Kazakhstan Temir Zholy for use in Kazakhstan. Amongst other things the braking system includes the specially designed KAB60 control valve and the BP Compact electronic HL control system modified to meet the operating regulations of the GOST market.

In the run-up to its successful low-temperature testing of the braking system, Knorr-Bremse had invested heavily in acquiring the necessary development expertise to manufacture GOST-standard products for the Russian and CIS markets. Knorr-Bremse now also operates the only accredited testing center outside Russia that is permitted to carry out certification of GOST components.

The order from Kazakhstan is doubly important for Knorr-Bremse. Firstly the customer has already taken out an option on 175 more double locomotives; and secondly, delivery of complete locomotive braking systems to Kazakhstan has enabled Knorr-Bremse to demonstrate its GOST competence – which should stand the company in good stead when tendering for future projects in other CIS states.

Brake control system includes condition monitoring of bogie components

In the past, the main purpose of the brake control system was to operate the brakes and monitor their functioning, as well as calculating vehicle speed and diagnosing wheelset rotation. Now, by doubling up sensors and making intelligent use of existing interfaces, Knorr-Bremse has been able to extend its

A new system monitors wheel rotation and prevents critical situations such as derailment.

role. The latest brake control system also carries out condition monitoring of bearings, gearbox components and wheels – at only a minimal increase in cost and complexity.

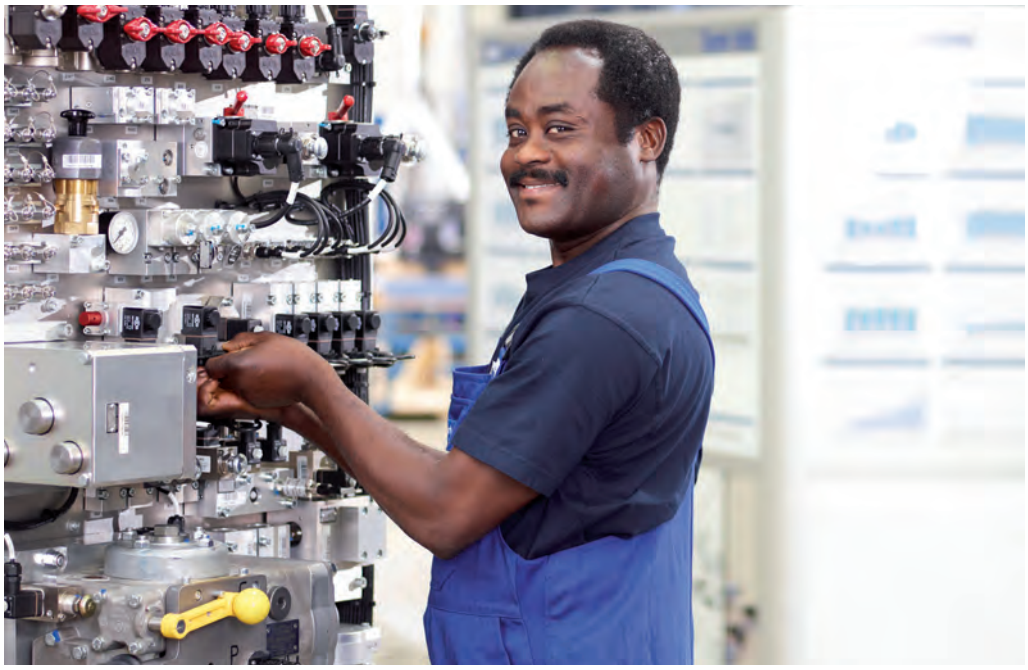
The COMORAN system monitors wheel bearings, analyzing their vibration frequencies and relaying data on their condition either to an onboard computer or via Ethernet to a central server. Using information based on experience with residual operating life, this enables condition-based maintenance of components to be carried out without making any concessions in terms of availability and safety. Intelligent use of mechatronics enables temperature and acceleration measurement to be integrated into the existing sensor system.

Following several years of field testing on a vehicle operated by Munich Metro, the system was officially launched in 2012. The first commercial order has already been received, with COMORAN scheduled for installation in a Brazilian urban train in 2013. The flexibility of the system not only enables the wheel bearings to be monitored – it also detects critical situations such as derailment.

Knorr-Bremse develops new windscreen wiper and washer system for high-speed applications

PHX (Pneumatic High End NeXt Generation System) is a new wiper and washer system specially designed by Knorr-Bremse to cope with the forces acting on the large front windscreens of trains travelling at high speeds. System testing for the first application started during the year under review.

The electro-pneumatic system is the latest generation of the tried-and-tested wiper and washer system that Knorr-Bremse has been producing for various high-speed applications over the last 15 years. It combines several subsystems and is therefore less complex than its predecessors. PHX is also smaller, lighter and more compact.



Encasing the oil-free compressor in a soundproof capsule is an intelligent response to increasingly strict noise prevention regulations.

Knorr-Bremse introduces soundproofed oil-free compressor

Constant noise is bad for your health – which is why noise prevention is increasingly becoming an issue for politicians and society as a whole. By developing an oil-free compressor contained in a sound capsule, Knorr-Bremse has come up with an intelligent solution to the challenge of increasingly strict noise emission regulations for rail vehicles.

The special feature of the sound capsule only reveals itself on closer inspection. A number of devices ranging from a sound trap to soundproofing materials and a special silencer have been packed into a very small space. These serve to cool and dampen the sound of the compressor – which also has a special mounting to prevent most of the vibration from passing to the outside world. But that is not all:

The sound capsule encasing the compressor also has to withstand a range of external influences. In the Russian market, for instance, the air supply unit has to cope with extremely low temperatures down to minus 50 degrees Celsius.

To prevent overheating of the capsule, Knorr-Bremse has also developed a mechanically operated radial fan linked to the compressor, which automatically switches on to extract hot air when the compressor is running.

New hydraulic brake caliper installed in monorail system

Canadian manufacturer Bombardier is to deliver 54 vehicles for the new "Expresso Tiradentes" monorail line in São Paulo, and Knorr-Bremse will be supplying brake discs, brake calipers, supply units and brake control units for the hydraulic braking system, which is designed for speeds up to 80 km/h. Developing the brake caliper was a particular challenge, as the brake discs can reach temperatures of over 500 degrees Celsius. For the new caliper Knorr-Bremse developed a lightweight brake frame and carrier and a special ribbed pressure plate with the option of an additional heat-insulating disc. The system also uses special heat-resistant brake pads.

The new brake caliper is also highly modular in design – the only difference between applications for braking forces of 8 kN and 10 kN is a thicker spacer washer.

IFE develops new access system

The new E3 access system developed by Knorr-Bremse subsidiary IFE has been specially designed to meet the highest standards of thermal and sound insulation and ensure operability under harsh winter conditions. Active locking mechanisms in the lower part of the door mean the module can cope with speeds of up to 200 km/h, including trains passing in the opposite direction, and withstand dynamic load peaks of up to 3,000 Pa, with static loads of up to 4,000 Pa. The specially developed door leaf has an additional insulation layer for maximum sound and heat insulation.

The new E3 access system comes with particularly high levels of thermal and sound insulation.

As in the past, each door is equipped with at least two steps. The so-called Track Access Device (TAD) consists of separately powered sliding steps, with the upper one designed for passengers and the lower one, controlled by a key switch on the outside of the car, ensuring safe entry and exit for the driver. The majority of parts requiring maintenance are identical on both steps – which reduces spares inventory and maintenance costs.

During the year under review the new access systems were installed for the first time in the latest version of the FLIRT family of cars built by Stadler for Norwegian Railways.

New HVAC unit for metro applications

Rail vehicle air conditioning systems must turn in top performance reliably for hours on end, ideally make no noise at all and, in metro cars in particular, must be as compact as possible. For precisely these applications, in the year under review Knorr-Bremse subsidiary Merak presented a new and extremely flat HVAC unit.

The new, extremely flat HVAC system from Merak has been specially designed for metro applications.

Taking account of the very restricted installation envelope in metro cars, the unit, which is built into the car roof, measures just 290 mm at its highest point. Its integrated air intake means there is no need for an additional vehicle-side air supply to the system.

Thanks to its flexible design, the newly developed HVAC unit can be adapted to meet a wide variety of customer requirements and climate conditions with relative ease. Despite its robust stainless steel frame and copper coils, the unit is far lighter than comparable systems and easy to maintain.

Microelettrica specializes in innovative power electronics

The product portfolio of Knorr-Bremse's Italian subsidiary Microelettrica includes switches and breakers, resistors, high-voltage transducers and fans for rail vehicles and industrial applications. In the year under review, the Milan-based company brought numerous innovations to market in the field of power electronics.

These include the totally maintenance-free LTSS solid state contactor, the next generation of multi-position modular disconnectors (LTMP) and the new G-PRO protection relay. The company also presented the new fully industrialized IR3000 V DC high-speed circuit breaker, based on the tried-and-tested IR2000. And the new IR4000F/V model, based on the proven IR6000, was also presented in the year under review.

One new addition to the portfolio is the Ecometer. This is a system that measures the current and voltage on both AC and DC networks and can therefore be used to calculate the vehicle's consumption in relation to the current available from the catenary system. Combined with driver information systems, simulators and appropriate consumption data management, the Ecometer can reveal potential savings and therefore constitutes an important element in a comprehensive energy-saving system for trains.

Knorr-Bremse combines Sydac simulators with LEADER driver assistant system

Testing a train driver's reaction to dangerous situations or equipment malfunctions is difficult under normal operating conditions; nor is it easy to practice energy-saving operation of a multiple unit. Now Knorr-Bremse has developed a system that combines simulators from its subsidiary Sydac with the LEADER driver assistant system to offer drivers comprehensive, realistic training that includes tips on how to save fuel.

Sydac simulators combined with LEADER enable the driver to undergo training in efficient operation of the vehicle prior to working under real conditions.

The high-definition displays on Sydac simulators reproduce all types of weather conditions and times of day or year. Realistic, three-dimensional representations of the landscape, including vehicles, passers-by, passengers and even track workers help generate an authentic picture of the environment in which the driver has to operate. Training can then take place in how to respond to virtually any situation without risking damage to individuals or materials.

The LEADER driver assistant system installed in the cab of a multiple unit helps the driver to operate the train in a way that saves energy. The screen provides recommendations for reducing fuel consumption and – in the case of long freight trains – for minimizing longitudinal forces. In addition to holding information about the route and gradients, LEADER also knows the timetable and the specific technical characteristics of the vehicle. In the case of a passenger train, it uses the information available to calculate how to best save fuel and still arrive at your destination on time.

Knorr-Bremse has used its competence in both fields to combine the two systems and improve the training on offer for drivers of multiple units. Simulator training combined with LEADER makes it possible to practice correct and efficient handling of the vehicle before it is used under real conditions.

Commercial Vehicle Systems

Knorr-Bremse develops gearbox and clutch module for new Volvo Platform
At the 2012 IAA exhibition, Volvo became the world's first truck manufacturer to present a fully-automatic dual clutch system that uses two part-gearboxes to enable gear changes with no interruption in power delivery, enhancing drivability and performance and also significantly reducing fuel consumption.

Knorr-Bremse was involved in this project with a highly innovative gearbox and clutch change module that operates the additional gears on the secondary shaft and at the same time uses solenoid valves to control the dual clutch unit. It thus plays an important part in the new functions of the dual clutch gearbox. The extremely compact module is mounted directly on the gearbox and consists of a combination of mechanical components such as pneumatic cylinders and selector forks and electronic components such as solenoid valves and sensors.

In developing these components for the Volvo dual clutch module Knorr-Bremse was able to draw on many years of expertise with such core components. From mid-2013 onwards the company will be supplying the gearbox and clutch module for Volvo's new heavy truck platform, thereby further expanding its portfolio of gearbox products.

Volume production of EBS7 begins

EBS7 is located outside the driver's cab and amongst other things simplifies the cabling required.

During the year under review, Knorr-Bremse started volume production of its new EBS7 electronic braking system – a further development of the tried-and-tested EBS5. The particular advantage of the new system is that the control unit is mounted outside the driver's cab on the vehicle frame, freeing up more space in the cab and simplifying the vehicle's cabling system, as there are in any case multiple connections located around the frame.

EBS7 can be used on virtually all vehicle configurations from 4S/3M to 8S/8M and comes in a robust design with a service-friendly self-diagnosis function. Its intelligent brake management system reduces brake pad wear, and its coupling force control ensures optimum brake blending between the tractor vehicle and the trailer. 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. It is being used for the first time as standard equipment on the new FH Volvo vehicle platform.

New generation of TEBS G2.2 with electronic leveling control
Knorr-Bremse developed the TEBS electronic braking system especially for use on trailers. It combines electronic control, pneumatic control and part of the sensor technology into one central module. By adjusting the braking command to the load distribution on the trailer, TEBS ensures more even braking across the entire vehicle. During the year under review, Knorr-Bremse added a new type of leveling control to the system, based on two new features – iLvl and iTAP. Market launch of these new TEBS functions is planned for 2013.

The Intelligent Leveling Control System (iLvl) consists of an electronic suspension system for trailers that enables the ramp height to be easily changed through modifying the pressure in the air springs. The system, which uses state-of-the-art sensors, will be compatible with a wide variety of trailers and semi-trailers. Whereas the vehicle height in relation to the loading ramp is currently manually adjusted using a lifting/lowering valve on the side of the vehicle, the driver will in future be able to use iTAP (Intelligent Trailer Access Point) to control it from a mobile device such as a smartphone or tablet PC via a Wi-Fi interface.

The main advantage of using iTAP is that the driver can stand a few meters away from the trailer when adjusting the ramp height, which means he has a much better overview of the situation. He is also able to adjust the height without himself standing in the trailer danger zone. The mobile device uses an app to communicate with an electronic module that relays the control commands to the brake and chassis control system via a CAN-Bus. The system comes with a pneumatic interface as a back-up.

With this wireless communication system iTAP not only reduces the overall complexity of the vehicle but also increases the efficiency and safety of trailers. A WLAN structure in the vehicle makes it possible, for example, for visual information from a camera mounted at the rear of the vehicle to be automatically relayed to the smartphone as soon as reverse gear is selected on the vehicle. And safety features such as anti-theft devices or safety locks for tanker trucks can also be controlled.

Knorr-Bremse develops compact rear axle module for ABS8

Introduction of a flexible, modular system has made it possible for the components of Knorr-Bremse's ABS8 system to be more easily tailored to the needs of individual customers and the requirements of specific markets. Volume production of ABS8 in Europe and Brazil began in 2012, and preparations for its launch in the North American and Asian commercial vehicle markets are due in the first half of 2013.

The new rear axle module simplifies installation and reduces complexity.

Designing an ABS system destined mainly for the BRIC states involves modifying certain standard components to make them as robust and cost-efficient as possible. At the same time, the system has to cover the full range of functions, from standard ABS right down to complex electronic braking functions. With these requirements in mind Knorr-Bremse developed the ABS Compact Rear Axle Module (CRAM).

The CRAM avoids the need for several individual components for brake pressure regulation, as these are now all integrated into the new rear axle module in the form of a single compact unit. This considerably simplifies installation for the vehicle manufacturer, reduces costs and makes for a more robust system. Reduction of the number of interfaces means that extensive piping and bolting of individual components to the vehicle is not required. Care was also taken when developing the new Compact Rear Axle Module to ensure that component manufacture and assembly could take place directly in the BRIC states concerned.

Bendix develops new "third generation" camera

Knorr-Bremse's North American subsidiary, Bendix, has further enhanced its Lane Departure Warning (LDW) system, AutoVue, by introducing a new "third generation" camera. At the same time, Bendix has upgraded its SafetyDirect system, expanding its already robust capabilities with data from technologies such as the SmarTire tire pressure monitoring system.

In combination with the AutoVue lane departure warning system and the SafetyDirect system, the new camera adds up to a powerful truck safety platform.

AutoVue is the market-leading camera-based LDW system for commercial vehicles. It uses camera input to continuously track lane markings and to detect when the vehicle begins to drift toward an unintended lane change and the turn signal is not activated. Upon detection, the AutoVue system automatically emits a distinctive "rumble strip" or other warning, alerting the driver. It uses a camera with a 60-degree field of view that works effectively 24 hours a day and in most weather conditions.

Compared to its predecessor, the new AutoVue camera offers greater precision. Today the new camera is already being installed by various European and North American OEMs, as well as by several fleet operators in North America.

SafetyDirect monitors data coming from safety systems to display driver performance information over time. Using the AutoVue LDW system to gather data from the vehicle, the SafetyDirect web portal allows fleet owners the opportunity to analyze safety information about their vehicles that is wirelessly transmitted – in real time – via telematics systems already installed on the vehicles. SafetyDirect can provide an immediate warning through email to fleet operators if their drivers are braking too hard or traveling too fast. The wireless data is transmitted to a fleet's back office, eliminating the need for technicians to manually extract it from the vehicles. The video and other trending data is delivered by SafetyDirect in a fraction of the time. This helps fleet managers make key decisions, such as identifying risky driver behavior and providing targeted training for drivers.

New steering brake for truck applications prevents understeer

Classic three-axle construction site vehicles often suffer from understeer when cornering. Particularly in the slippery conditions encountered in building excavations or quarries, even a modern vehicle can be difficult to maneuver. The new steering brake function by Knorr-Bremse is intended to help the driver in such situations. Integrated into the EBS electronic braking system, it reduces the cornering radius by applying the brake on the inside rear wheels.

The system functions a bit like the split brake pedal that is often found on agricultural vehicles. In the case of the steering brake, the brake cylinder on the inside rear wheels receives a higher pressure than the outside wheels, effectively countering the characteristic understeer that can be experienced on slippery surfaces. The degree of the difference in brake pressure between the two ends of the axle depends on the steering wheel angle – the further the driver turns the wheel, the more firmly the brake is applied on the inside wheel. To prevent tire scuffing the pressure is automatically reduced when the slip limit is reached.

Differential lock for commercial vehicles assists truck drivers
Drivers sometimes find it difficult to decide when to activate the differential lock and when it is better not to. The result is that it is often switched on too late, when the vehicle has already stopped moving or one wheel is already spinning so much that the differential lock no longer engages. The so-called Differential Lock Control system developed by Knorr-Bremse helps the driver by activating the lock on solo and tandem rear axles and automatically deactivating it again as soon as it is no longer required.

If one or more wheels start to spin, the system applies the brake to the spinning wheel(s) to synchronize the axle concerned, and then automatically activates the differential lock. To speed up the process, ensure rapid activation and minimize wear, the drive train may also be briefly disengaged.

New ST7-430 trailer brake boosts efficiency in trailers too
The new ST7-430 brake literally lightens the load for trailers. This successor to the successful SK7 is one of the lightest two-piston disc brakes for 22.5-inch wheels on the market. The ST7-430 is designed for 9-tonne trailer axles and thanks to its optimized disc and caliper weighs in at around four and a half kilograms less than its predecessor. This means that for a classical trailer application the unladen weight is reduced by 27 kg. The fact that this enables the load volume to be increased is, if you take a mineral oil tanker as an example, a strong argument for purchasing the system. And if the full load capacity is not used, the 27 kg saved will certainly reduce fuel consumption. Thus either way, trailer efficiency can be increased. During 2012 prototype testing was completed and preparations made for customer field testing.

Compressor development for hybrid applications
There are still many unanswered questions about how truck hybrid applications can be used effectively in the medium and long term, but one thing is clear: sooner or later such modern drive systems are going to be found in this segment. It is also clear that the compressors used to generate air for the braking system will no longer be powered by the vehicle's combustion engine, as – depending on the type of system involved – it temporarily switches off during hybrid operation. And, of course in the case of fully electric vehicles, the combustion engine will cease to exist completely. Hence the need to look to the future and develop an electrically-powered compressor.

The new electrically-powered compressor is designed for maximum flexibility and can be installed in a wide range of hybrid vehicles.

During the year under review, Knorr-Bremse started to work on a prototype electric compressor that is also oil-free and air-cooled, as current compressors are not just mechanically linked to the vehicle's combustion engine but also share its oil- and water-cooling system. The new compressor is completely separate from the drive system and can be installed anywhere in the vehicle as a stand-alone, battery-powered component. Knorr-Bremse sees the main use of hybrid drive systems as being on urban buses and local distribution trucks, so the new battery has been designed to be highly flexible and capable of installation in a wide variety of different vehicle types. At the same time the emphasis during the development stage was on noise and vibration reduction.

Volume production launched of new slack adjusters for disc brakes
Slack adjusters are essential elements of any disc brake, as they ensure that the running clearance between the brake pads and disc remains constant, however much wear the pads are exposed to. During 2012 Knorr-Bremse successfully launched volume production of its new N2G slack adjuster. These will initially be installed on semi-trailer tractor units, and in 2013 will be rolled out for the entire range of disc brake applications including truck trailers.

The N2G has been designed to be more robust than its predecessor. Knorr-Bremse has also transferred the entire assembly process to its Aldersbach plant, where it has developed a separate assembly line and appropriate test rigs. And all the components needed for the assembly of the N2G adjuster are now being sourced directly from the suppliers by Knorr-Bremse.

Short NG3 spring brake added to portfolio

The new short spring brake takes account of the ever smaller installation envelopes at the wheelend.

Knorr-Bremse has added the Short NG3 spring brake to its portfolio. As the name suggests, this is an extra-short spring brake measuring just 204 mm. While it can be customized for any brake application and output 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 – that is hub, bearings and brake disc. The improved location of its center of gravity means that the Short NG3 will also offer high vibration resistance.

In the year under review, initial prototypes were produced at Knorr-Bremse and the first tests conducted together with a customer. The target for volume production is the end of 2015.

Knorr-Bremse KAMA further develops drum brake

Disc brakes predominate in the Western European truck market, but there is still comparatively strong demand for drum brakes in Eastern Europe, Russia, North and South America and Asia. This has both historical and practical reasons. Drum brakes are relatively enclosed, which means the surfaces of the brake pads and drums are well protected from corrosion and dirt when the vehicle is operating in rough terrain.

Knorr-Bremse currently manufactures a tried-and-tested drum brake in Russia in a joint venture set up in 2007 with Russian vehicle manufacturer KAMAZ, but in the medium and longer term the plan is to develop an entirely new concept for the next generation.

In the year under review the joint venture – with the support of Knorr-Bremse's subsidiary Bendix Spicer – started work on optimizing the existing brake, with the aim of improving its functionality, reducing its weight and introducing modern technologies for its production. A further requirement was that the modified brake should be easier to install. Most of the development work on the new brake is being carried out by Knorr-Bremse KAMA, the Russian joint venture, but the product is destined to be sold in all markets worldwide.

Volume production of Pneumatic Booster System PBS

Knorr-Bremse's Pneumatic Booster System (PBS) eliminates so-called turbo-lag in commercial vehicle diesel engines during drive-off. It boosts engine performance and also enables down-speeding or down-sizing, which saves fuel. In 2012 a major customer started to install the system as standard equipment.

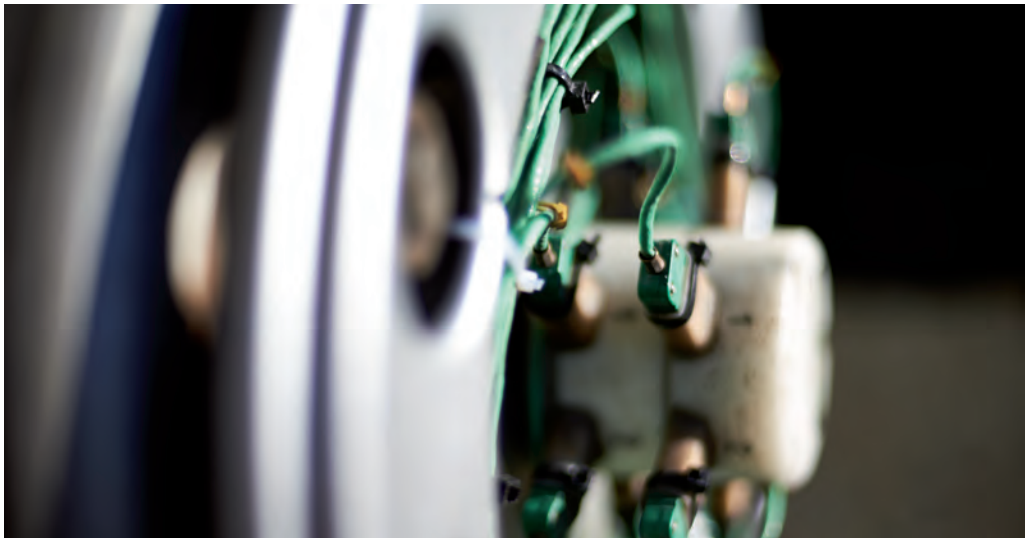
Several seconds can pass before a large turbo-diesel engine reaches maximum torque. PBS briefly boosts the engine's power output by blowing compressed air from the braking system into the engine air intake, effectively overcoming the turbo-lag that can occur during drive-off, overtaking or on uphill gradients. The engine responds more rapidly, and as the vehicle accelerates, the driver can select a higher gear earlier. This reduces average engine revs – which can result in fuel savings of up to 5%.

A vehicle equipped with PBS accelerates as though it had an engine with 20% to 30% more cubic capacity, which means that a smaller engine equipped with PBS can replace a larger one. Particularly in the case of local public transport and freight distribution operations this is a considerable advantage, as less installation space is required for the engine.

Jochen Hahn successfully defends title in European Truck Racing Championship
2012 saw Jochen Hahn successfully defend his title as European Champion at the FIA European Truck Racing Championship. Following an exciting season the end result came quickly – after the first of the final races at the legendary Circuit Bugatti in Le Mans, France, Hahn had such a lead over his nearest rivals that victory was certain.

The brilliant result was immediately celebrated by his team and almost 50,000 fans – and Knorr-Bremse was also quick to congratulate the new champion. The company is delighted to have been supporting him and his team since 2001 and since 2003 has been an official sponsor.

Knorr-Bremse supplies the high-performance brakes for Hahn's racing truck. The rules of the competition require all components to be drawn from normal series production, so the systems Knorr-Bremse tested in conjunction with the Hahn racing team were volume-produced rather than prototypes, as is often the case in Formula 1 racing. The collaboration means Knorr-Bremse is able to monitor the performance of its braking systems under demanding racing conditions and gain valuable insights for its series production.



In this race truck disc brakes are tested to their limits.

EFFICIENT. TECHNOLOGY. WORLDWIDE.

Trade Fairs

Maintaining close customer contact is an essential success factor for any international business. During the year in question Knorr-Bremse made full use of the opportunities offered by the two leading trade fairs in its field – InnoTrans in Berlin and IAA Commercial Vehicles in Hanover – to showcase its systems competence. It also attended other specialist trade fairs, demonstrating its technological excellence and its response to current megatrends: energy efficiency, safety, urbanization and globalization.

Leading trade fairs in 2012

InnoTrans and IAA Commercial Vehicles a resounding success

Under the motto: "Efficient. Technology. Worldwide." Knorr-Bremse presented cutting-edge brake technologies and onboard systems to an international audience at the two leading trade fairs in 2012 - InnoTrans in Berlin and IAA Commercial Vehicles in Hanover. The focus at InnoTrans, the rail industry event, was on the company's global systems competence and on innovations aimed at saving resources across the entire product life cycle. And at the IAA Commercial Vehicles the central themes were energy efficiency and pollution reduction, as well as increased safety and the needs of regional commercial vehicle manufacturers.

The ninth InnoTrans trade fair was attended by record numbers of visitors (up 19% at 126,000) and exhibitors (over 2,500 in all) including an increased international presence – all eager to conclude business deals or find out about the latest products and services on offer. The 64th IAA Commercial Vehicles was also a record-breaking event, with no fewer than 354 product premieres. Despite difficult market conditions the organizers managed to attract more than 1,900 exhibitors, making it the second-biggest IAA Commercial Vehicles of all time. Knorr-Bremse used the opportunities offered by both events to make a large number of valuable customer contacts.

Knorr-Bremse presents numerous product highlights at InnoTrans 2012

Knorr-Bremse presents a wide range of products that demonstrate its systems competence and global presence.

In developing new products, Knorr-Bremse Rail Vehicle Systems always puts a strong emphasis not just on safety but also on energy-efficient solutions designed to cut vehicle life cycle costs and minimize consumption of resources. This was demonstrated by the products highlighted at the InnoTrans trade fair.

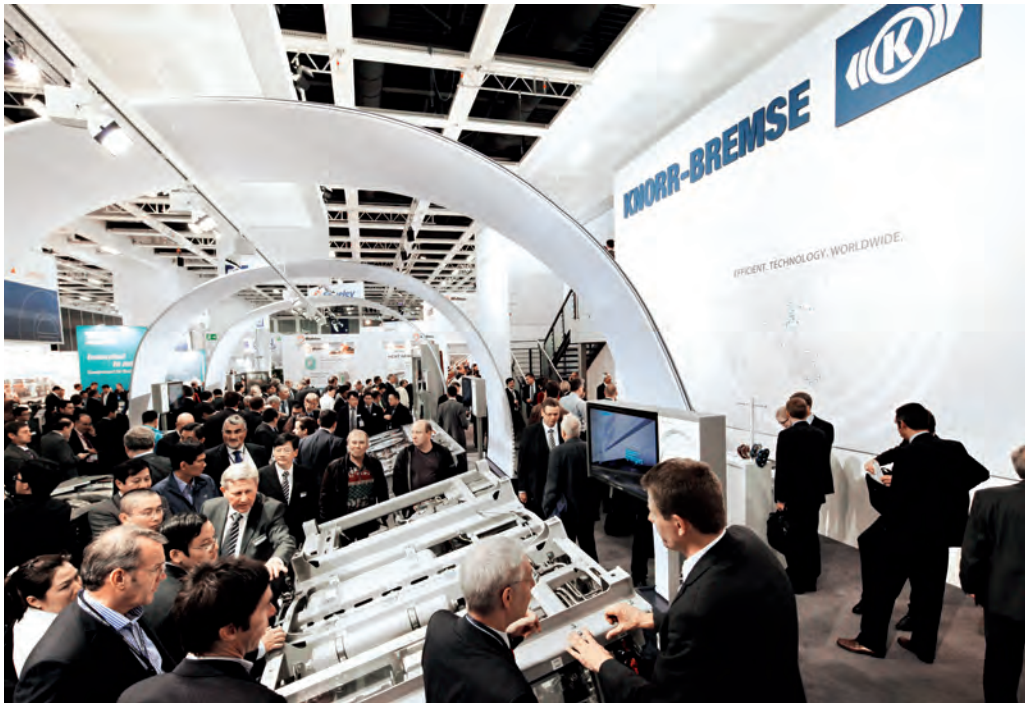
With LEADER, for example, Knorr-Bremse has created an intelligent train management system that facilitates fuel savings while at the same time reducing wear and helping the driver bring the train to its destination safely and on schedule. To ensure optimal staff training, Knorr-Bremse combined the system on display at the trade fair with a drive simulator from its subsidiary Sydac.

Knorr-Bremse demonstrated its systems competence with the CRH5 brake frame, which is already installed on Chinese high-speed trains. This shows how the compressor, air treatment and brake control can be integrated into a single compact brake frame, making it much easier for vehicle builders to enhance production efficiency and incorporate the brake equipment into their vehicle design.

The several thousand refurbished brake calipers currently in use on trains around the world are a testament to the success of Knorr-Bremse RailServices in the market. A compact brake caliper was on display as an example of a Knorr-Bremse product that has been refurbished "as new".

Knorr-Bremse's new Flexpad Silent "whisper brake pad" also made its first public appearance at InnoTrans. This new high-performance brake pad combines innovative design with intelligent use of materials to largely eradicate brake squeal. A further example of an intelligent response to increasingly strict noise regulations was the soundproofed oil-free compressor.

In the field of hydraulics, Knorr-Bremse presented a new spring-operated brake caliper especially designed for use on monorail vehicles. This innovative product is extremely compact and lightweight and is capable of operating at high brake disc temperatures. Another product highlight on display was the KAB60 control valve that has been specially designed for the Russian freight market. Developed over a number of years, the valve can operate at extremely low temperatures down to minus 60 degrees Celsius.



Dr. Dieter Wilhelm, Member of the Executive Board of Knorr-Bremse AG responsible for the Rail Vehicle Systems division, welcomes Federal Transport Minister Dr. Peter Ramsauer to the Knorr-Bremse stand at InnoTrans, Berlin.

In the heating, ventilation and air-conditioning sector, Knorr-Bremse presented a new ultra-flat HVAC system developed by its MERAK subsidiary for use in metro trains. And Knorr-Bremse subsidiary IFE, one of the leading manufacturers of train door systems, exhibited a modern, passenger-friendly door system that has particularly high levels of sound and heat insulation.

Knorr-Bremse subsidiary Microelettrica Scientifica, the world's leading manufacturer of electronic and electro-mechanical control systems for rail applications, had its own separate stand at InnoTrans 2012 at which the company presented the latest products for a variety of electrically-powered rail vehicles.

IAA 2012 – increasing efficiency, saving fuel, protecting the environment

The Commercial Vehicle Systems division's stand at the IAA focused on safety and energy efficiency.

Safety and energy efficiency are two core requirements made of Knorr-Bremse Commercial Vehicle Systems and were the central focus at the 64th IAA Commercial Vehicle Show in Hanover. A further rise in visitor numbers from Asia underlined the increasing importance of the company's products outside its core markets of Europe and North America and reflected its years of sustained business activity in Asia.

The company showcased innovative chassis and powertrain technologies designed to cut life cycle costs, fuel consumption and emissions. One impressive example was the Pneumatic Booster System (PBS), which utilizes compressed air not only to brake the truck but also to help it accelerate. At low engine speeds the system injects air into the intake manifold and thereby eliminates turbo lag. This intelligent combination of compressed air and mechatronics enables a European long-haul truck to achieve fuel savings of more than 5%.

Intelligent compressed air management is one means of increasing the efficiency of a commercial vehicle, saving fuel and thereby helping the environment – and this was demonstrated to great effect by Knorr-Bremse's Electronic Air Treatment system (EAC2), a modular system that combines proven pneumatic components with sophisticated electronics. Vehicle manufacturers, fleet operators and drivers all stand to benefit from this new system, the main advantages of which are easy installation in the vehicle, integration of the air dryer, the multiple-circuit protection valve and other functionalities as well as greater fuel economy.

The new SM7 and SL7 disc brakes on display at the IAA are substantially lighter than their predecessors, which means increased safety and improved energy efficiency. Rounding off the package is the ProTecS brake pad retainer system that brings a further improvement in safety and service by providing optimal brake pad guidance.

Knorr-Bremse also showcased the EBS7 Electronic Braking System for commercial vehicles – the successor to the proven EBS5 system. This integrates active driver assistant systems, making a substantial contribution to road safety.

Along with the latest version of established systems such as the Automatic Emergency Braking System (AEBS), Knorr-Bremse also displayed camera and assistance systems from its North American subsidiary Bendix in the shape of AutoVue and SafetyDirect.

Knorr-Bremse's focus on greater safety is not limited to tractor vehicles – it also extends to semitrailers and trailers. The key system here is the company's Trailer EBS, which brings together electronic controls, pneumatics and sensors in a single unit. The new generation, TEBS G2.2, offers extended functionalities through the integration of Electronic Leveling Control.

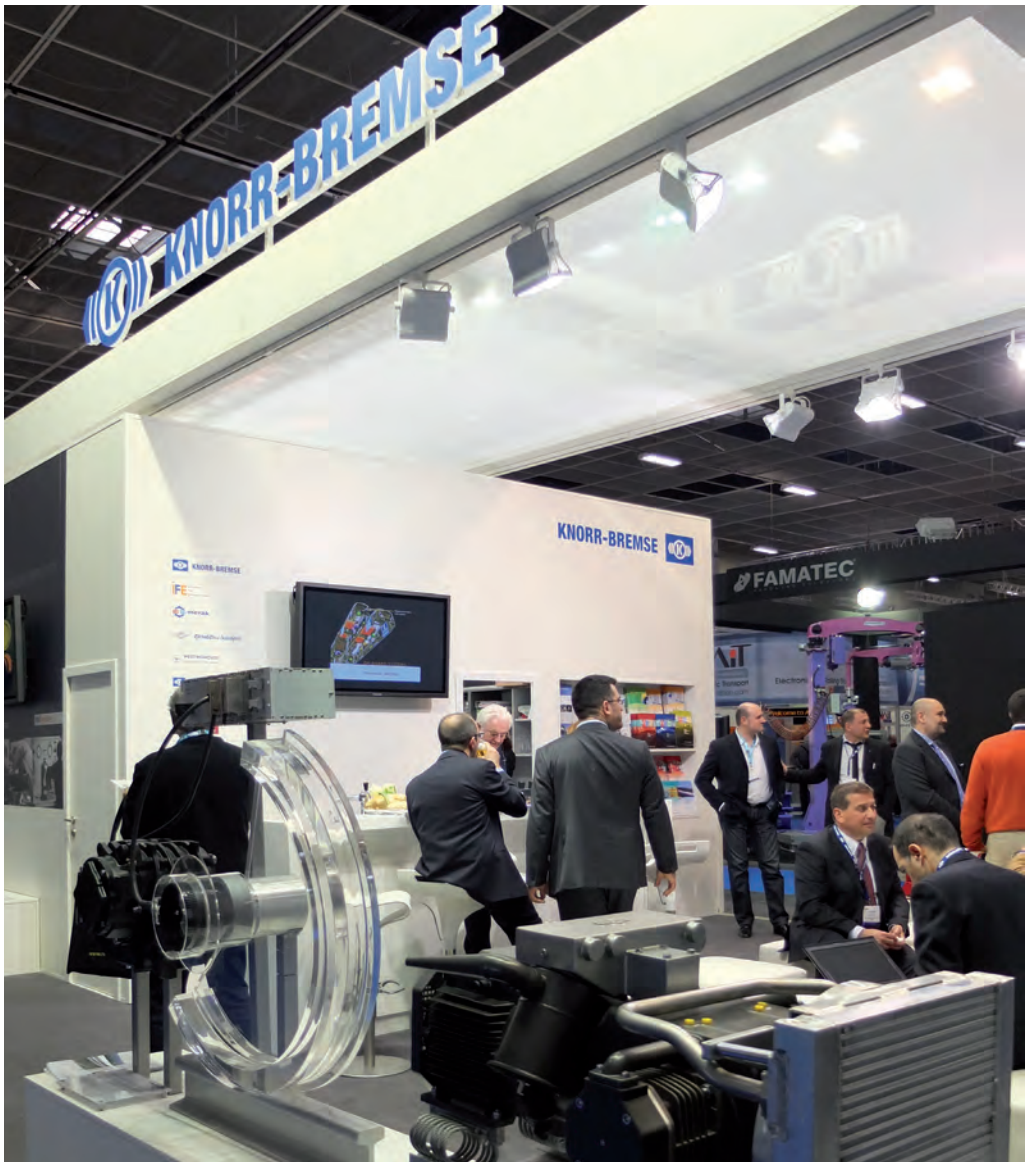
The newly created "Technology Center" offered Knorr-Bremse's customers and business partners an opportunity to find out about the company's extensive product portfolio, which is tailored to the particular local conditions in various regions of the world.

Heinz Hermann Thiele, owner and Supervisory Board Chairman of Knorr-Bremse AG and Klaus Deller, Executive Board Member of Knorr-Bremse AG, welcome Dr. Volkmar Denner, Chairman of the Board of Management of Robert Bosch GmbH, to the Knorr-Bremse exhibition stand.

Rail Vehicle Systems

The issues that currently dominate the global market – energy efficiency, safety, urbanization and globalization – are set to continue to exert a strong influence on the rail vehicle industry and confront it with considerable challenges. With its consistent focus on these megatrends, Knorr-Bremse Rail Vehicle Systems is already able to present products and systems designed to meet tomorrow's needs.

Eurasia Rail Fuari 2012, Istanbul, March
Because of its geographical location at the interface between Europe and Asia, the second Eurasia Rail Fuari held in Istanbul in 2012 focused on products that are used in both markets. In addition to Knorr-Bremse, 187 other companies from 21 different countries attended this exhibition for rail equipment, systems and services in the Istanbul Expo Center (IFM).



Expo Ferroviaria 2012, Turin, March
Expo Ferroviaria 2012 once again took place in conjunction with INTERtunnel 2012. The exhibition brings together manufacturers and suppliers from various sectors of the rail industry every year and is the only regular event for the rail and tunnel construction industry in Italy. Amongst the 371 international exhibitors were Knorr-Bremse subsidiaries IFE and Microelettrica Scientifica.

Hanover Trade Fair 2012, Hanover, April
Hanover Trade Fair is an important international specialist event and a meeting point for decision-makers, with a reputation as a place for networking and making business contacts. One visitor in five is or has been the managing director or owner of a company, and the proportion of specialists attending the trade fair is extremely high at 95%. In line with the main theme of the 2012 event – "greentelligence" – Knorr-Bremse showcased its VV180-T oil-free compressor.

Rail + Metro China, Shanghai, May/June
Rail + Metro China is one of the biggest and best known exhibitions in China for rail technology, especially metro applications, and covers all aspects of the sector, from planning and design to operation and maintenance. It is well established as an important platform for exhibitors from all over the world.

Czech Raildays 2012, Ostrava, June
This was the thirteenth time this international trade fair for railway technology had been held. The main focus was on products and services for the mass transit and long-distance sectors. Knorr-Bremse subsidiary IFE was amongst the 180-odd exhibitors.

Railway Days, Bucharest, October
Knorr-Bremse used the opportunity of this 6th edition of Railway Days to exhibit some of its latest innovations to a broad public not only from Romania but also from many other central and eastern European countries. The exhibition is now well established as an important event in the rail calendar.

Business on Rails 2012, São Paulo, November
Business on Rails takes place in the Red Pavilion of the Expo Center Norte in São Paulo and is regarded as the premier rail event in Latin America, with displays of innovative products, seminars and opportunities to exchange ideas and experiences. Both Knorr-Bremse and Microelettrica Scientifica used the opportunity to present themselves to a broad Latin American public.

Modern Railways, Beijing, November
The Modern Railways exhibition offers an important platform for contacts between manufacturers and rail operators in China. One of the highlights of the Knorr-Bremse stand was the presentation of a compact driver cab simulator linked to real train equipment. Amongst other products exhibited by the company was a bogie, an IFE automatic door system, a platform door from Westinghouse Platform Screen Doors and HVAC systems from Merak.

Commercial Vehicle Systems

Products for the commercial vehicle market obviously have to meet high standards of safety and efficiency, but they also have to satisfy the varied requirements of global markets. At various trade fairs during the year under review, Knorr-Bremse demonstrated how this can be done.

Mid-America Trucking Show, Louisville, Kentucky, March
The annual Mid-America Trucking Show in Louisville, Kentucky, enables North American truck manufacturers to showcase their latest innovations and offers industry representatives and transport companies a platform for finding out about the latest market developments. Knorr-Bremse subsidiary Bendix was there to provide visitors with information about its latest technologies.

RAI 2012 Bedrijfsauto, Amsterdam, April
The 180 exhibitors who attended the RAI 2012 Bedrijfsauto to display their trucks, vans and mini-buses, special vehicles and parts and accessories were more than satisfied by the attendance level of 46,700 visitors. Knorr-Bremse operated a stand at this important Dutch trade fair for sustainable road transport.

TROST Schau 2012, Stuttgart, April
The TROST Schau is one of the biggest specialist trade fairs for workshop equipment, car and truck parts and workshop concepts. At this fifteenth edition 275 exhibitors displayed their brands and products at the trade fair site in Stuttgart under the motto "Super Action, Super Show". Knorr-Bremse was there with a mix of tried-and-tested systems and new solutions.

Automec 2012, São Paulo, April
This was the third time Brazil's biggest trade fair for heavy trucks and commercial vehicles had been held in the Anhembi Exhibition Center near São Paulo. Knorr-Bremse exhibited the latest market trends in equipment, services and vehicle components as well as new remanufacturing concepts and trailer ABS systems.

Automechanika Middle East 2012, Dubai, May
The German pavilion jointly run by the Ministry of Economics and Technology and the Association of the German Trade Fair Industry offered Knorr-Bremse and 86 other companies their first opportunity to exhibit their products at the biggest automotive trade fair in the Middle East, held in the Dubai International Convention & Exhibition Center. A large number of excellent contacts resulted.

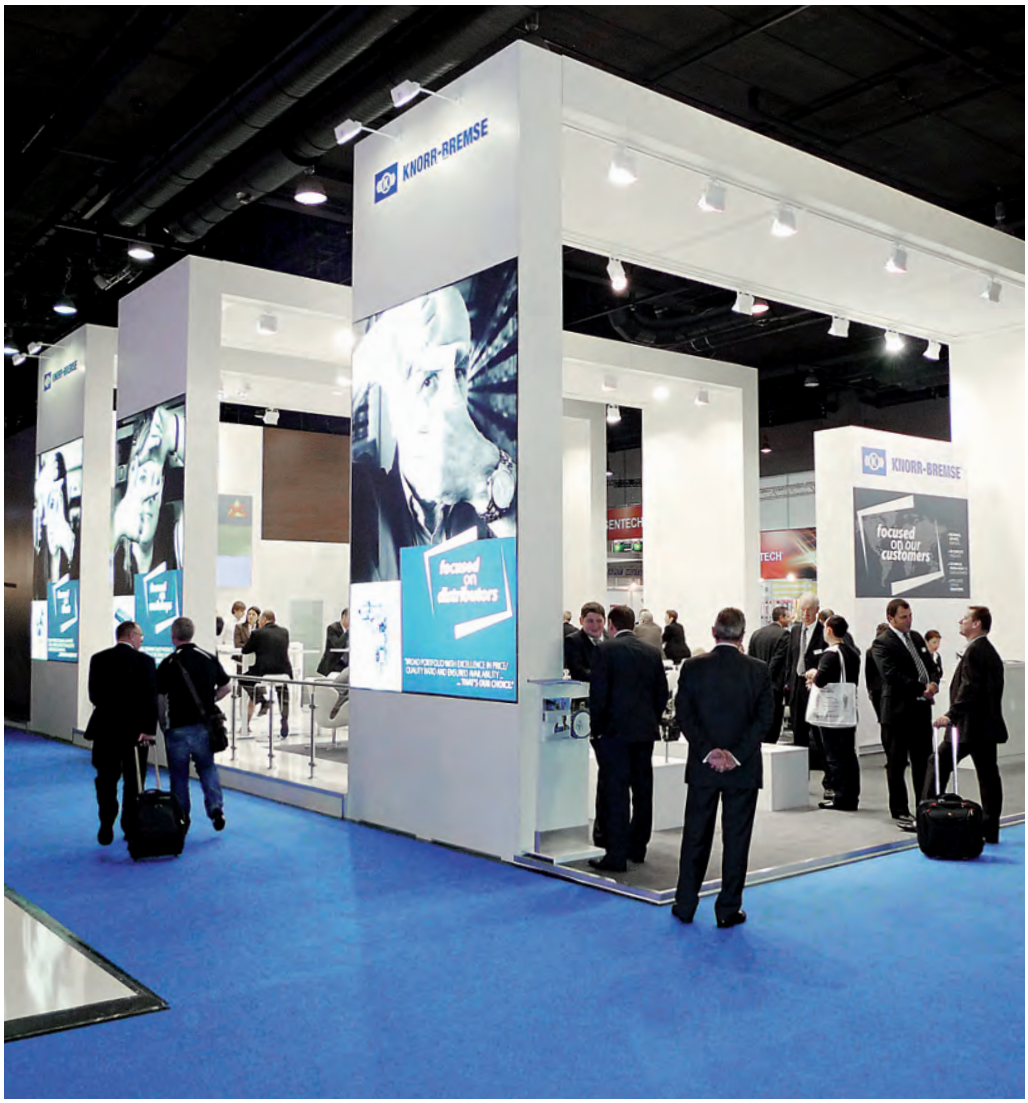
Shanghai Auto Show, Shanghai, June
With more than 2,000 exhibitors, the Shanghai Auto Show is regarded as one of the most popular events of its kind in China and is targeted at manufacturers, dealers, aftermarket experts and other specialists from the automotive and commercial vehicle industry. In addition to showcasing new products, the focus in 2012 was on spare parts and aftermarket solutions.

Automechanika 2012, Frankfurt, September
A record 148,000 visitors and 4,593 exhibitors from 174 and 74 countries respectively came to the world's biggest international trade fair for the automotive aftermarket. Knorr-Bremse exhibited innova-

tive service strategies – not least for its Compressor with Clutch and its Electronic Air Control system EAC2 – aimed at preparing commercial vehicle service workshops and the spares trade for tomorrow's challenges.

Agritechnica 2012, Hanover, November
The world's leading agricultural technology trade fair saw some 2,700 exhibitors from all over the globe present their latest products. On a floor space of more than 180,000 m^2, 415,000 visitors were able to find out about the latest trends and developments in agricultural technology. Knorr-Bremse used the opportunity to make many valuable contacts.

Euro Bus Expo 2012, Birmingham, November
Euro Bus Expo 2012 offers a platform for networking with experts from the entire bus and transport sector. Attended by more than 10,000 representatives of manufacturers and suppliers, the event was a resounding success for Knorr-Bremse.



Reliability

"Safety is the basis of all our actions – and we make no compromises in this regard. Our products and services are subject to the highest safety requirements and call for excellent quality standards in all areas and processes. We honor the agreements we make and personally ensure that the needs of our customers, business partners and colleagues are fully met."

Joe McAleese, President & CEO Bendix Commercial Vehicle Systems, USA


KNORR-BREMSE

Service

Customized, value-for-money solutions, highly-trained service personnel and a strong regional presence are the strengths of the comprehensive aftermarket service through which Knorr-Bremse actively supports all its partners around the globe. During the year under review, the company further enhanced its reputation for excellent customer service in both divisions.

Rail Vehicle Systems

Knorr-Bremse organizes the full range of its global service activities under the title of RailServices.

RailServices

Every fleet operator has a unique profile – and unique service needs when it comes to the maintenance, overhaul, upgrading and repair of their braking and onboard systems. To guarantee an individualized service at all times during the entire life cycle of a product, Knorr-Bremse organizes the full range of its global service activities under the title of RailServices. This enables the company to tailor its service package to the precise needs of each customer – whether they are operating freight cars, streetcars, metros, commuter trains, locomotives or high-speed trains.

RailServices is a byword for schedule effectiveness, optimum spare-part availability and excellent overhaul quality – all delivered with a minimum of red tape. The service covers standardized original spare parts kits for overhauling Knorr-Bremse equipment, high-quality customer training and extensive on-site support by mobile field service teams for the installation, calibration and repair of components.

Rail vehicle braking and onboard systems are safety-critical products, and Knorr-Bremse service centers therefore operate with the same state-of-the-art test rigs that are used in OEM manufacture. Overhauled components are only returned to the customer if they pass the same rigorous tests as new products.

Staff members at RailServices are familiar with every detail of the components and systems produced by Knorr-Bremse. It makes sense that no-one can deliver a better quality of service than the original manufacturer when it comes to maintaining, repairing, overhauling and upgrading complex systems.

Service centers located in virtually every European country and a total of over 20 further centers around the globe ensure comprehensive provision of the full range of modern services. Because systems manufactured by Knorr-Bremse are often directly integrated into the service centers, many repair and maintenance jobs can be carried out at a single location. Close cooperation with the engineering and production sections ensures that the latest technologies are always used, even in the aftermarket.

Knorr-Bremse expands training

Special training concepts are tailored to the needs of the operators.

Rail vehicle brakes are highly complex systems made up of sophisticated components and modules, and make very high demands on those responsible for their maintenance and inspection. In the past, many major operators accumulated their own expertise in the field, but demographic change and the introduction of new technologies calls for a new approach to employee training. With decades of experience in developing braking systems, combined with a highly-qualified workforce, Knorr-Bremse is an ideal partner for meeting this challenge. In the year under review the company therefore launched an across-the-board process of professionalizing its training offer for rail vehicle maintenance. A comprehensive market survey had identified increasing demand for such training amongst operators.

One important element in this restructuring of the company's training program was the development of special concepts tailored to the – usually highly individual – requirements of operators and covering the full range of service needs occurring in the day-to-day operation of rail vehicles.

Most of the training takes place directly on the vehicle at the operator's premises and covers general brake technology, electronic brake control, pneumatics, hydraulics and diagnostics. In order to ensure a balanced and thorough transfer of knowledge, the training sessions consist of a combination of theoretical and practical modules.

The program is designed to ensure very high quality, particularly when it comes to knowledge transfer. To achieve this, Knorr-Bremse only uses teaching staff who can demonstrate practical experience of the technologies involved – and the trainers themselves are provided with ongoing further training in didactics and technology. The company has now built up an international network of trainers that ensures that throughout Europe the training takes place in the language of the participants.

During the year under review, Knorr-Bremse launched a pilot project in collaboration with logistics provider DB Schenker covering basic training, refresher sessions and further training measures – all related to the braking systems of the locomotives operated by the company. The project involves

basic training on braking systems and their maintenance, diagnostics training and special training in recommissioning following a major inspection. In addition there are advanced modules involving further braking systems. The first pilot sessions held during 2012 were highly successful and generated very positive feedback.

Knorr-Bremse retrofits Austrian Talent trains

Oil-free compressors from Knorr-Bremse supplement ÖBB's environmental strategy.

During the year under review Knorr-Bremse started the task of replacing oil-lubricated compressors manufactured by a competitor and supplied as original equipment to the Talent commuter trains operated by Austrian Railways (ÖBB) with 330 Type VV120-T environmentally friendly oil-free compressors. As ÖBB already draws most of its electricity from its own hydroelectric power stations, the installation of environmentally friendly Knorr-Bremse compressors formed an ideal complement to the company's environmental strategy. Installation of the first compressors began during 2012, and by 2017 at the latest, the entire fleet of 165 vehicles will have been refitted.

What attracted ÖBB to the Knorr-Bremse product were the low life cycle costs of the compressors and the technical support on offer. Rapid availability of the compressors for pilot testing and the backup from Knorr-Bremse specialists available during the first months of the project helped clinch the decision.

The VV120-T not only uses some 20% less energy than a traditional piston compressor – it also operates without any oil lubrication, which means that in the case of a large fleet, thousands of liters of oil can be saved and there is no need to dispose of oil-contaminated water condensate. The oil-free compressor also enhances passenger comfort as it reduces levels of vibration and is therefore virtually silent.

Knorr-Bremse secures contracts for upgrade projects in Poland

Poland is one of the top four European countries in terms of the size of its rail vehicle fleet. In addition to purchasing new vehicles, the country is also carrying out extensive upgrading of its older rolling stock.

As a highly experienced global system supplier, Knorr-Bremse is an ideal partner for implementing upgrade projects. In addition to the high quality of its products, the company's core competences include excellent project management, customized systems development, modern production techniques and comprehensive long-term backup – all factors that enabled it to take part in two extensive upgrade projects in the Polish rail market during 2012.

The first project involved EN57 multiple units from Polish manufacturer Pafawag that had been supplied between 1961 and 1993 to Polskie Koleje Państwowe (PKP), the biggest Polish rail operator. Knorr-Bremse supplied an ESRA-based EP Compact brake control system with integrated parking brake control and distributor valve, as well as an air supply system consisting of SL20 compressors with dual chamber air dryers.

The second project concerned SM42 locomotives manufactured by Malady Fablok, 867 of which still form the backbone of Polish freight operations. This project involved new brake panels with BP Compact, distributor valves, an ESRA electronic brake control system, SL20 compressors, and dual chamber air dryers.

Service order for hydraulic braking system goes to Knorr-Bremse

Naples mass transit authority Azienda Napoletana Mobilità (ANM) operates 22 streetcars based on

the Sirio platform of Italian vehicle manufacturer AnsaldoBreda. In the year under review, Knorr-Bremse won the maintenance contract for this fleet of vehicles. The contract governs maintenance and overhaul work for the electro-hydraulic brake units themselves and all of the hydraulic brake calipers. Closing this transaction brought Knorr-Bremse its first ever service order for a hydraulic braking system in Italy.

At the end of 2012 the first overhauled vehicle successfully returned to operational duties and the remaining car sets will now be overhauled by Knorr-Bremse at a rate of one per month. The work is being handled at the new Hydraulics Service Center operated by Knorr-Bremse Rail Systems Italia near Florence.

New field tests begin for New York City Subway

New York City Subway is one of the world's largest and most complex metro networks. Its trains run 24 hours a day, 365 days a year. The Subway is run by the New York City Transit Authority (NYCT), the

Systems to be supplied to New York Metro must first be exhaustively tested under real conditions – and that includes braking systems from Knorr-Bremse, HVAC systems from Merak and door systems from IFE.

largest mass transit operator in the USA, providing around seven million rides a day. Before they can supply the New York City Subway, suppliers must first undergo a lengthy qualification process. One part of this involves comprehensive test operation under real working conditions. Knorr-Bremse braking systems have already successfully completed these tests. The year under review brought the start of field testing with Merak HVAC systems and door systems manufactured by Knorr-Bremse's Austrian subsidiary IFE.

For these tests, five metro cars were equipped with door systems and one car with an HVAC system. For the doors, IFE provided its proven S3 system, while for the HVAC system Merak supplied a unit custom-developed to meet NYCT requirements. The qualification process for the door systems is scheduled for completion in 2014, with the HVAC system tests being completed a few months later.

Aftermarket strategy achieves success in China

The aftermarket strategy pursued by Knorr-Bremse has led to several success stories in the Asia Pacific region, too. In 2012, the company obtained its first aftermarket order for Chinese high-speed train equipment covering overhaul of the braking and HVAC systems of the CRH5 high-speed fleet for the Chinese Ministry of Railways.

The CRH5 high-speed fleet and metros in Shanghai and Tianjin rely on Knorr-Bremse's comprehensive aftermarket service.

Two factors were decisive in securing this contract: firstly, some 80% of the CRH5 brake systems and around 50% of the door systems and 30% of the HVAC systems were originally supplied by Knorr-Bremse. And secondly, the Knorr-Bremse RailServices team put in a superb performance supporting the operator of the CRH5 fleet on site.

With its products present in more than 10,000 metro cars in China, Knorr-Bremse has also won some significant maintenance contracts in the metro segment. The most substantial orders for the year under review came from the metro operators in Shanghai and Tianjin. Both opted to rely on the expertise of Knorr-Bremse to overhaul the brake system, HVAC system and the bogie equipment on their vehicles.

Knorr-Bremse expands field service support in China and Australia

In response to a rising demand for on-site support by many of the rail vehicle operators in the Asia Pacific region, Knorr-Bremse has significantly reinforced its field service support organization especially in China and Australia.

For example, the field service support team in China, spread across many operational depots and car builders' workshops, has been enlarged from 230 to over 260 employees. These service specialists help ensure the smooth everyday operation of the braking, doors and HVAC systems in the many different types of rail vehicles fitted with Knorr-Bremse equipment throughout China. In the background, Knorr-Bremse's newly rebuilt and enlarged Service Centre in Suzhou has played an important supporting role for our field service personnel providing a rapid turnaround for repairs and parts needed back in revenue service. Not only that, but the enhanced service support organization was the key to winning maintenance contracts for compressors and brake calipers from the CRH1 high-speed trains, and for overhaul of the CCBII brake control systems in the large and still growing Chinese locomotive fleet.

With the integration of HVAC manufacturer Sigma into Knorr-Bremse Australia, the company is pursuing a multi-product service strategy here too, from which customers in Australia are already deriving a benefit. As a result of combining and expanding its field service support organization, in both China and Australia, Knorr-Bremse is now in a position to provide full life cycle management for the Group's products from a single source.

Commercial Vehicle Systems

The main focus of Knorr-Bremse's aftermarket service is on boosting the efficiency of commercial vehicle products and systems during their entire life cycle and across the entire value and distribution chain. The company achieves this by focusing at the product development stage on economical solutions tailored to the particular area of operation and market requirements. Regional aftermarket specialists then provide service solutions in close collaboration with the customer during the entire lifetime of the product.

Knorr-Bremse offers aftermarket customers high product quality and optimum service.

Active Service

Under the name Active Service, Knorr-Bremse combines comprehensive service solutions for distributors, workshops, fleet managers and drivers under one roof. From product development to in-vehicle installation to maintenance, everything is geared toward offering the customer optimum quality and service over the entire life cycle of the product or system.

Active Service also means that when a new product is launched in the market, it is accompanied by a carefully-planned, value-for-money service concept as well. The broad range of services on offer from Knorr-Bremse enables customers to design every aspect of their work and business processes efficiently and economically. This enables vehicle downtimes to be kept to a minimum.

Knorr-Bremse's Active Service concept is precisely tailored to the needs of the industry and includes technical support of crucial importance for workshop processes: OEM-quality products, technical training for expanding practical knowledge and telephone and on-line support. Service manuals and a range of technical documentation are available quickly and easily for downloading.

Service concepts designed for dealerships match a broad portfolio of products with the technical experience of the original equipment manufacturer at product family level and result in lower warehousing costs and fixed capital. This also increases product availability in the case of servicing at all levels of the distribution chain. And Internet-based services like our electronic catalogue with technical details of all our products help customers find service-relevant information quickly and easily at all times.

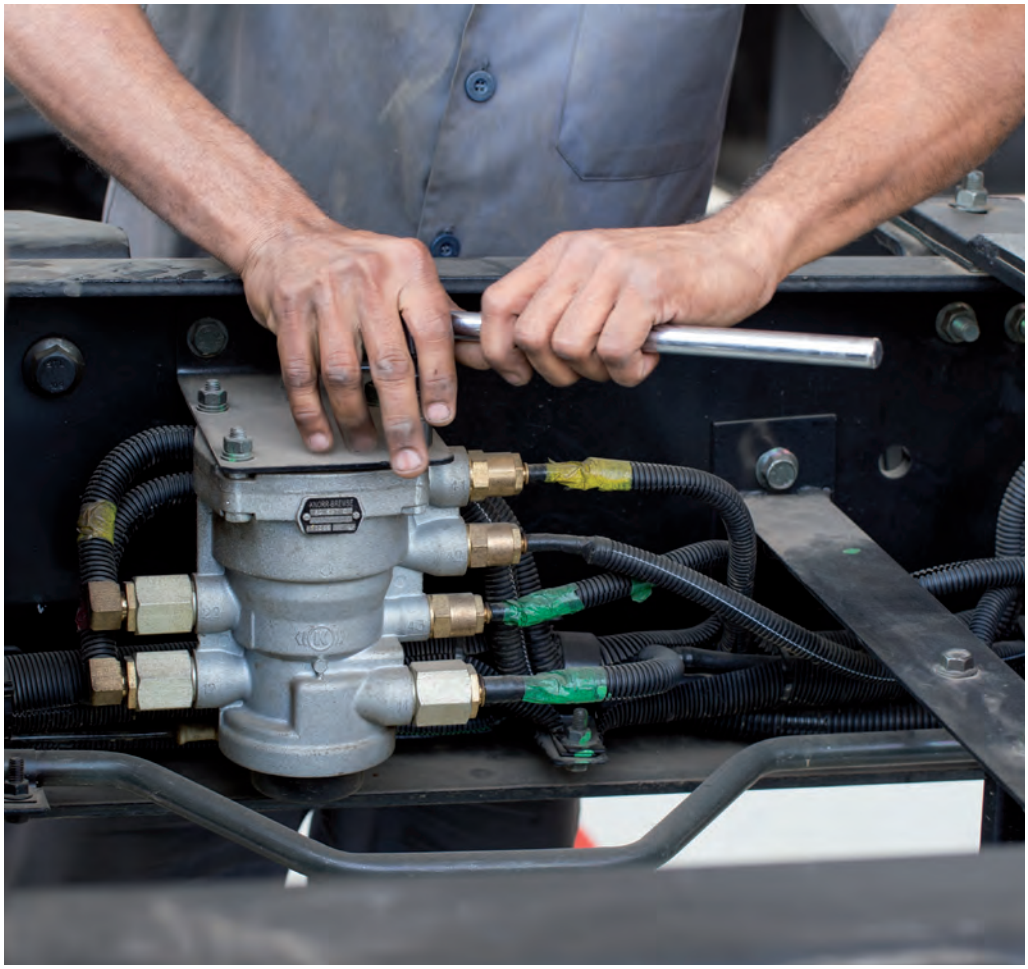
The dealership portal brings together product searches, web shop, legacy parts lists and warranty information and offers certified trade customers a service process that is user-friendly and efficient right across the supply chain. All transactions are internally integrated into the Knorr-Bremse ERP system in order to maximize efficiency.

New modular service concept introduced for air processing units

Knorr-Bremse has been manufacturing air processing units (APUs) for some 30 years, and around 500,000 are currently in service all over the world. Up till now, maintenance work involved, for the sake of simplicity, replacing the entire unit, even if only one of the individual components was defective. The result could be higher costs for the customer. During the year under review Knorr-Bremse optimized servicing of APUs and reduced the need to replace components. From now on only the multi-circuit protection valve or the air dryer needs to be replaced – no longer the entire unit. This not only cuts costs for the customer but also simplifies the ordering process by reducing the part numbers required.

Knorr-Bremse develops service concept for compressor with clutch

Following the introduction of volume production of the compressor with clutch, Knorr-Bremse started



to roll out its service concept in 2012. To ensure customer-friendly, value-for-money servicing for this innovative product, the company developed a concept based on the various functional components of the compressor. It involves service kits for the compressor, clutch, the casing with pump drive for the power steering, solenoid valve and sensor.

One of the advantages of the new concept is the fact that when the compressor with clutch requires servicing, the entire unit does not have to be replaced but rather individual components – reducing the cost for the operator. In addition to this, the compressor with clutch has been designed to enable a system check to be carried out if a defect occurs. This means the components requiring replacement can be rapidly identified.

Brake Pad Finder for disc brake applications helps customers

Use of the new ProTecS pad holder spring system, which up till now was confined to the SN7, SM7 and SL7 disc brakes, was extended in 2012 to include the SN6 and approved OE brake pads. Because this automatically meant the introduction of new part numbers, Knorr-Bremse developed a so-called Brake Pad Finder to simplify the task of identifying a suitable brake pad. It takes the form of a manually-operated disc or a computer flash animation and quickly shows repair shops which OE brake pads should be used for which vehicle applications. This saves time-consuming searches to find out which old part number has been replaced with which new one.

Components remanufactured by Knorr-Bremse meet the same quality standards as OEM products.

Remanufacturing of mechatronic components and compressors in Europe takes off

Reducing consumption of energy and resources is becoming increasingly important from both an economic and an ecological point of view. As a result remanufacturing – the reconditioning of used components – is gaining in significance. For many years now, Knorr-Bremse has been investing in the development and testing of solutions that enable the company to offer affordable remanufactured options in the aftermarket for complex mechatronic products.

In 2011, the Knorr-Bremse plant in Aldersbach began remanufacturing the electro-pneumatic modules for the EBS2 electronic braking system and the EAC1 electronic air treatment unit. And last year the company launched volume production of these reconditioned parts. The company also introduced a new, more efficient deposit system for old parts.

The returned original parts or "cores" are disassembled, cleaned, inspected and processed. Reusable parts are then sent to the assembly plant where they are assembled on the same lines as the OEM equipment, undergoing the same end-of-line quality and safety tests as original parts. This means they comply with the same standards in terms of functionality and quality as the comparable OEM parts.

Bendix expands remanufacturing portfolio in the USA

In North America too, remanufacturing has for years been an integral part of the service strategy, in particular for conventional products like compressors, air treatment units and valves. To provide a sustainable response to the resultant growth in demand for remanufactured components, Knorr-Bremse subsidiary Bendix also reinforced its activities in this sector and expanded its remanufacturing portfolio in 2012.

In the year under review Bendix continued to drive forward the expansion of its remanufactured portfolio, adding the BA-922 compressor to its remanufactured range and opening a new brake shoe remanufacturing center at its Huntington, Indiana plant. One fundamental aspect of the remanufacturing approach in North America too is that all remanufactured components must pass the same functional and quality tests as new original equipment.

Joint venture announced for new multi-brand workshop concept

During 2012 the Automotive Aftermarket Division of Robert Bosch GmbH, Knorr-Bremse Systeme für Nutzfahrzeuge GmbH and ZF Friedrichshafen AG announced their plan to set up a joint venture to operate as a central facility offering complete services to multi-brand commercial vehicle workshops. Based in the Greater Munich area, the joint venture will have a workforce of around ten, but is still subject to approval by the relevant antitrust authorities.

Knorr-Bremse, Bosch and ZF Friedrichshafen aim to offer a joint repair shop concept for commercial vehicles.

The full service on offer from the joint venture will consist of a hotline, technical training and information, diagnostics, workshop equipment and quality management. The plan is for this workshop concept to be offered under an independent brand name from mid-2013 onwards, initially in Germany before being rolled out in other European countries.

The three members of the joint venture are amongst the leading automotive and commercial vehicle suppliers in the world, with product portfolios designed to make the transport sector more economically viable and sustainable. The comprehensive service concept on offer is based on long years of experience in operating workshops in all three companies.

New planning and disposition concept improves parts availability

Rapid availability of parts is an important factor in the success of any workshop. To improve availability across its entire portfolio and continue to ensure excellent service delivery, Knorr-Bremse introduced a new planning and disposition concept for Germany, Austria, Switzerland, the Czech Republic and Scandinavia during 2012. It is based on a carefully thought-out division of labor and responsibility between Knorr-Bremse and its certified business partners.

The new strategy resulted in responsibility for ensuring the availability of high-volume parts with a rapid turnover being passed to dealers – which means the parts will in future be closer to the customer and can be accessed much faster. Parts with a lower turnover remain the responsibility of Knorr-Bremse – though with a clear guarantee of their short-term availability. This solution reduces warehouse risks for both the dealer and Knorr-Bremse and considerably improves the logistical parameters for all parties.

Part of the new concept also involves Swedish and Czech supply logistics being integrated into the Berlin warehouse. This not only supports the aftermarket but also trailer sales, SOEMS (special original equipment manufacturers) and exports – with the result that customers benefit from the existing broad range of parts and excellent delivery performance.

NEO Version 5 is introduced

NEO System Diagnostics is an electronic diagnostic platform for commercial vehicles that provides comprehensive, rapid and professional support for the servicing of electronic systems. NEO communicates either via a diagnostic interface or via the vehicle's onboard electronic control unit. It covers a range of functions from error code diagnostics right down to complete systems analysis. Even complex faults can be easily traced. During the year in question, Knorr-Bremse introduced NEO 5 – a new version that extends the tool's functionality by adding ABS6 and the EAC2 electronic air treatment unit.

Knorr-Bremse India expands it service network

In the long term India promises to be one of the world's biggest growth markets in the commercial vehicle sector, and this has led Indian dealers and workshops to assign increasing priority to fleet servicing. Knorr-Bremse India responded to this market trend in the year under review with the further substantial expansion of its service network. The number of authorized Knorr-Bremse dealers was increased by seven to 52, and ten additional service centers opened for business.

On the product side, in the aftermarket sector Knorr-Bremse India introduced a new, high-precision manual slack adjuster. The company also developed a footbrake valve that will in future provide an alternative to a competitor product in the aftermarket.

Service Training Center for brake equipment starts up in Pune

Several years ago, the charitable organization Knorr-Bremse Global Care e. V. funded the construction and equipment of a hostel for over a hundred trainees at Don Bosco Tech – India, an organization that provides training programs for young people, amongst other places in Pune, Central India. The hostel offers places to vocational students from poorer areas in Pune and the four neighboring districts in Maharashtra state.

Employees from Knorr-Bremse India teach trainees to repair brake components.

In the year under review – again in collaboration with Don Bosco – a brake equipment service training center was opened close to the hostel where employees from Knorr-Bremse India teach the students to repair the most common brake components in India. This training will greatly improve the students' chances of finding work – with a good chance of some being taken on by one of the many Knorr-Bremse service centers.

Knorr-Bremse further develops aftermarket strategy for the Middle East

Every year, more than 100,000 commercial vehicles over six tonnes are sold in the Middle East, making this one of the most rapidly developing regions in the world. Growth is driven in particular by urban buses and trucks used in the construction and logistics sectors. The need to keep these on the road is boosting demand for OEM-quality spare parts and comprehensive service.

During 2012 Knorr-Bremse actively developed its sales strategy for the Middle East in a bid to benefit from the high levels of growth in the region. A targeted aftermarket strategy was developed, with a range of measures aimed at improving the service support offered by the local sales network.

Knorr Excellence

Knorr-Bremse is a leading supplier of braking systems for rail vehicles and commercial vehicles. Our name stands for technological excellence and reliable processes. Reliability and outstanding quality characterize our products – as well as being the hallmarks of our endeavors to improve what is already very good.

Innovations from Knorr-Bremse have played a key role in the history of modern braking and transportation systems and, from the outset, striving for outstanding performance has been a characteristic of our Group. To this day it remains part of the self-image of Knorr-Bremse, applying to all our areas of activity and business processes. And we are doing our best to keep it that way through "Knorr Excellence" – a Group-wide program that both bears and safeguards our good name.

A program of excellence

Outstanding products and services are founded upon technological excellence, reflected in our 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 short, they call for a culture of innovation. 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 pools all the management systems of Knorr-Bremse in a standard model. It provides a common framework for all improvement measures at the Group, allowing 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 it.

The objective of KE is not to make individual improvements but rather to ensure a continuous improvement process with outstanding performance in all processes throughout the Group. The results of KE initiatives flow back into the KE model, helping to enhance processes at Knorr-Bremse. This allows best practices to be proliferated across the Group and deficiencies in existing processes to be identified and eliminated. As a result, best practices become standard practice, creating a "system of excellence".

Successful initiatives

in the year under review, excellence initiatives were continued and taken forward in six main areas: the quality initiative Q-First; the supplier management initiative Global Purchase Excellence; the initiative for performance improvement in logistics (Supply Chain Excellence); Financial and IT Management (Finance & IT Excellence); our worldwide energy efficiency initiative Efficient Cut of CO_2; and the human resource and executive development initiative People Excellence launched in 2011.

Q-First - intelligent quality management

Quality First: safety and quality are top priorities for Knorr-Bremse.

Within the Q-First quality campaign, Knorr-Bremse defines specific measures to ensure that each and every component developed and supplied by Knorr-Bremse is of the highest possible quality. Q-First comprises a raft of measures covering areas such as management, human resources, product development, production, supplier development, complaints management and customer relations. As a manufacturer of safety-critical products, first-class quality management is crucially important for Knorr-Bremse.

The Group adopts a proactive and systematic error avoidance strategy to ensure that potential errors are predicted at the development stage and prevented during production and that customers are protected by comprehensive quality testing of all products prior to delivery. This three-stage strategy – predict, prevent, protect – identifies potential errors in good time before they can lead to defects in the field. Regular process and project audits are conducted to ensure that safety-relevant requirements are already integrated into development processes from the outset.

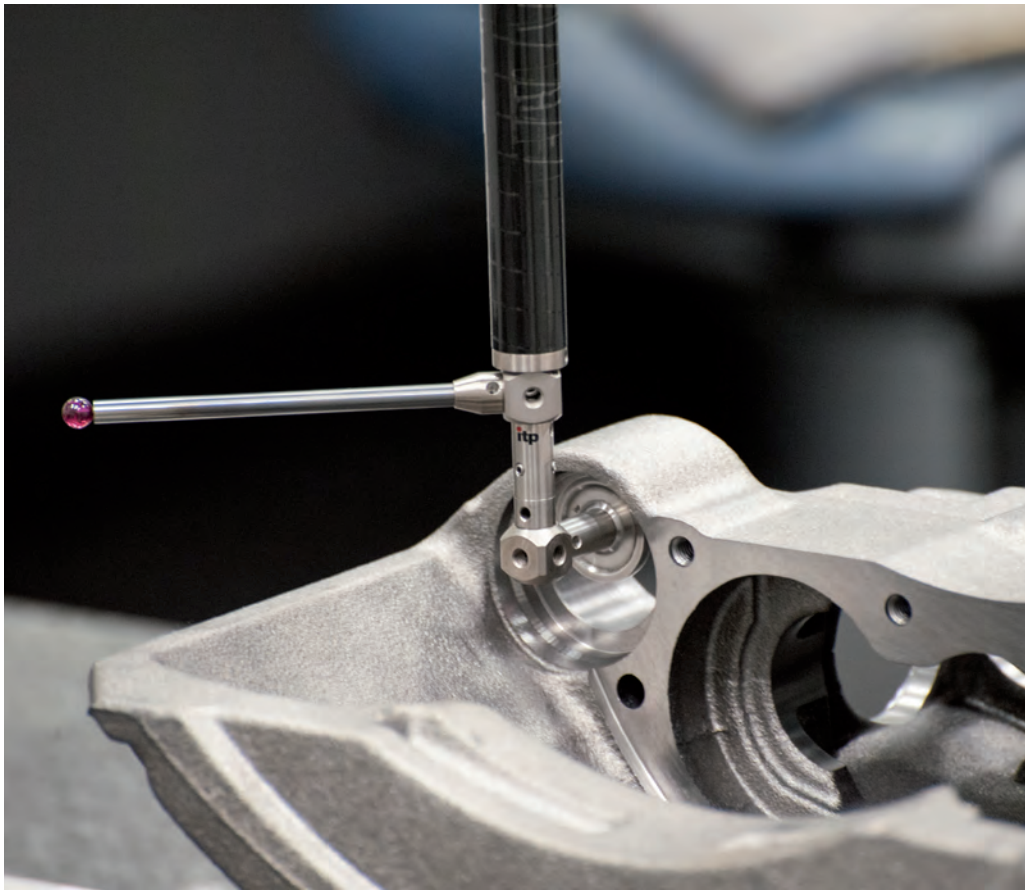
In addition to a large number of external product audits, in 2012 Knorr-Bremse again conducted its own Product Safety Audits (PSA) throughout the world. These especially strict audits that are specific to Knorr-Bremse ensure that internal and external suppliers comply with the Group's very high quality standards.

GPE – optimization of purchasing

Supplier management is a key success factor in the Knorr-Bremse value chain. All measures for the further improvement of supplier management are grouped together in the Global Purchase Excellence program. Once again, in 2012 work continued to systematically improve various processes and methods as well as resource conservation, with a view to driving up the efficiency and quality of all products worldwide. In the year under review, sustainability aspects were also given more intensive consideration in the purchasing structures of the Group and supplier selection was enhanced in accordance with the principles of the UN Global Compact.

SCE – improved logistics performance

In 2012, the Supply Chain Excellence (SCE) project again focused on the global development and harmonization of logistics performance levels throughout the Group. In both divisions, further progress was made with the optimization of processes over the entire supply chain and flexibility was again improved. 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. Experience at the 5-day factory operated by Knorr-Bremse Rail Vehicle Systems in Budapest and the value stream factory of Knorr-Bremse Commercial Vehicle Systems in Liberec proved especially valuable in this context. This experience was utilized systematically in the planning and implementation of further plant optimization and construction projects, and played a key role in the enhancement of the global Knorr-Bremse production and logistics network. The 5-day factory not only sets new standards within the Group; in 2012 it also received an award in the Outstanding Value Stream category of the renowned industrial competition Factory of the Year.




生産管理部
Production Control

FIT – reliability and efficiency of IT systems

Within the FIT initiative (Finance & IT Excellence), Knorr-Bremse has adopted a structured approach to establishing best-in-class processes in the finance and IT fields. FIT provides effective support for all planning and operational processes through reliable IT systems. Against this backdrop, the Knorr-Bremse SAP system was migrated to a new, efficient platform in the "Knorr-Bremse Cloud". In addition, project portfolio management in the IT field was restructured, global processes were introduced and cooperation with specialist departments was reorganized to make it more efficient. Other key areas of the FIT initiative include improving the efficiency of the entire planning system by slimming down procedures, and adapting to increased market volatility.

$ECCO_2$ – an efficient contribution to environmental and climate protection

Through its $ECCO_2$ (Efficient Cut of CO_2) initiative, Knorr-Bremse is aiming to make a sustained contribution to environmental and climate protection. In 2009, the Group adopted the target of improving its energy efficiency by 20% and thereby cutting 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 heightening environmental awareness among employees. Thanks to the measures deployed, it has already been possible to improve energy efficiency by more than 20%, with a corresponding reduction in CO_2 emissions. In absolute terms, the Knorr-Bremse Group achieved savings amounting to almost 10% of its annual energy consumption, and CO_2 emissions were reduced accordingly in the year under review. Knorr-Bremse is committed to pursuing this initiative consistently with a view to ensuring the efficient use of energy going forward.

PEX - top-class human resource and executive development

PEX – People Excellence – is a human resource and executive development initiative launched by Knorr-Bremse in 2010. The aim of the initiative is to introduce the basic elements of human resource development throughout the Group and to foster the ongoing development of a corporate leadership culture. In 2012, the process environment was further expanded. Furthermore, for the first time Knorr-Bremse defined uniform leadership principles. In addition, employee communications were intensified and supplemented by a new intranet. The measures adopted as part of the PEX initiative in the year under review again helped to improve the quality of human resources work throughout the Group and build up an excellent people management system.

External ratings confirm investment grade status

Since 2000, two external rating agencies have been assessing the activities of the Knorr-Bremse Group. Both granted Knorr-Bremse investment grade status from the outset, but their ratings have been progressively raised over the years. Since 2011, Moody's has rated the Group "A3/Outlook stable", while Standard & Poor's has awarded Knorr-Bremse an "A-/Outlook stable" rating since 2010. Both agencies confirmed these ratings for 2012 in renewed recognition of Knorr-Bremse's good strategic positioning, its strong competitive situation and the positive development of the Group's business. Other factors that again proved influential included excellent working capital management and the conservative financial policy adopted by Knorr-Bremse. In 2012, Knorr-Bremse was again the only family-owned company in Standard & Poor's "Global Automotive Suppliers Ranking" to be granted an "A" rating.

Moody's and Standard and Poor's again recognize Knorr-Bremse's good strategic positioning, strong competitive situation and the positive development of its business.

In their rating reports, the two agencies acknowledged in particular the intelligent financial management and stable cash flow generation at Knorr-Bremse. Based on a very robust financial policy, the agencies reported, even under what were at times difficult economic conditions the company was able to further consolidate the liquidity base it put down in 2011.

The Group's globally-oriented strategy and its product diversification were again underlined by both rating agencies as particular strengths of Knorr-Bremse and decisive stability factors. The Group's business areas are subject to different economic cycles that, in the past, have taken very different courses in terms of time and from one market to the next and thus represent a significant risk diversification factor. Added to this there is the Group's broad-based position, with local subsidiaries in all key regions, which works to offset regional fluctuations. Another factor viewed as positive is the intensification of Knorr-Bremse's presence in growth markets such as India and Russia. In addition, the systematic expansion of business in the less volatile aftermarket sector in both divisions helped mitigate the impact of the economic cycles in the OEM sector.

Passion

"We are driven by enthusiasm for everything we do. New challenges inspire our creativity. Everyone in the company works to the full extent of their capabilities in their particular specialist field. We are passionate about achieving good results, ambitious in our aims – and often surpass our own expectations. We give due recognition to good performance and celebrate exceptional successes."

BaoPing Xu, Managing Director Commercial Vehicle Systems China, and Stephan Rebhan, Vice President Engine Air & Transmission, Knorr-Bremse Commercial Vehicle Systems, Germany

Market Successes

During 2012 Knorr-Bremse Commercial Vehicle Systems achieved significant sales successes against a relatively difficult international economic backdrop. Colleagues all over the world worked with great passion and enthusiasm on solutions designed to offer significant added value. At the center of all their activities was partnership and close collaboration with the customer.

Rail Vehicle Systems

Knorr-Bremse ensures its involvement in Deutsche Bahn ET DB 400 project

During 2012, Knorr-Bremse concluded framework agreements on the development and delivery of braking systems with all three vehicle builders potentially involved in Deutsche Bahn's ET DB 400 project. The company signed a letter of intent with Alstom Deutschland for the Coradia Continental II platform, a framework agreement for Stadler Pankow's FLIRT3 platform and a supply agreement for a prototype of the CAF Civity platform for the German market. Civity vehicles from CAF are already in operation in some European markets, but do not yet meet the strict approval criteria of the German railway authorities.

In the forthcoming tendering process for a number of routes Deutsche Bahn will be selecting at least one of the three platforms – but whichever is chosen, Knorr-Bremse will be supplying the braking systems. Over the next few years Deutsche Bahn aims to order up to 1,600 new multiple units to be configured as three or six-car sets. One firm order has already gone out – the new trains for the S5 and S8 commuter lines in Dortmund will come from Alstom's Coradia Continental II platform.

But the agreements between Knorr-Bremse and these three vehicle builders cover more than just the ET DB 400 project – they also apply to any order for one of the three platforms for the German market in the period up to 2017.

Windscreen washer and wiper system supplied to streetcars in Hanover

Fleet operator üstra Hannoversche Verkehrsbetriebe ordered 50 new streetcars from vehicle manufacturer Heiterblick for use in the public transport system of the city of Hanover. Knorr-Bremse is supplying the new vehicles with 100 windscreen washer and wiper systems with the new Electric Advanced System EAS.

The EAS motor is designed for 3,000 hours of operation. A PWM (Pulse Width Modulation) controller regulates the various rotation and wiper speeds, which means they are no longer affected by voltage fluctuations in the vehicle's electrical system. An angle of rotation sensor identifies the position of the wiper arm in real time and adapts the wiper speed accordingly. The result is a much improved wiper performance from the driver's point of view.

The first of the systems are slated for delivery in January 2013. In addition to the 50 vehicles, the operator has also taken out an option on 96 further vehicles with 192 EAS washer and wiper systems from Knorr-Bremse.

Berlin S-Bahn retrofits Knorr-Bremse sanding system

The correct functioning of the sanding system can be verified within seconds.

Berlin's S-Bahn light rail system has retrofitted 569 Class 480 and 481 S-Bahn vehicles with the new Knorr-Bremse sanding system. The secret of the system is its ability to measure the sand flow using the electrical charge generated in the sand particles. This enables the correct functioning of the system to be verified within seconds instead of having to carry out the traditional time-consuming manual checks.

In the case of the Berlin S-Bahn, the manual monitoring system used in the past had a further disadvantage. The existence of a live rail on the system meant there were only certain locations at which the driver could check the functioning of the sanding system and the train had to be temporarily taken out of circulation for that purpose. But since last year this has been a thing of the past.

Knorr-Bremse was involved in the entire project, from initial design and product development to actual production and installation in the customer's vehicles. Close co-ordination between the development engineers, project managers, field service teams and the customer meant the entire process from initial tendering to the start of installation work took only four months.

"Whisper brake pads" used for Italian high-speed train

Since spring 2012 Italy has had a new high-speed train – the Italo – which was built by French manufacturer Alstom for private Italian train operator NTV (Nuovo Trasporto Viaggiatori). Travelling at speeds of up to 300 km/h, the Italo completes the journey from Rome to Naples in just over an hour. The fact that the train can come to a halt safely and quietly is due to the newly-developed Flexpad Silent brake pad from Knorr-Bremse.

Passengers can travel with the Italo from Rome to Naples quickly and silently – thanks to Knorr-Bremse "whisper brake pads".

Brake squeal is caused mainly by a stick-slip effect that occurs at slow speeds when the brake pad repeatedly adheres briefly to the disc, causing vibrations that trigger the unpleasant noise.

The new "whisper brake pad" avoids this noise almost completely. The product used on the Italo combines intelligent use of materials with a new design – to prevent the pads sticking to the disc, Knorr-Bremse uses a compound material that combines a high-friction sintered surface with a lubricated core. In addition, special sound baffles are installed to absorb vibrations.

NTV ordered 25 of the trains, which set new standards of comfort with leather seats even in economy class and also a cinema car. Further routes, for example between Milan and Naples and Turin and Venice, are currently being planned.

IFE ensures success in extended FLIRT family

During the year under review, vehicle builder Stadler shipped the first of the latest version of FLIRT

IFE supplies access systems for Norwegian commuter and regional passenger trains.

electric multiple units ordered by Norwegian national railroad operator NSB. The trains are designed to be especially customer-friendly – particularly in the case of families, the elderly and passengers with limited mobility.

In developing the access systems for the trains, Knorr-Bremse subsidiary IFE focused on thermal and sound insulation for the doors and their operability under harsh winter conditions. The 3D door and sliding step system is designed to cope with speeds of up to 200 km/h, including trains passing in the opposite direction, and to withstand high dynamic and static loads. The door leaf has an additional insulation layer for maximum sound and heat insulation.

As in the past, each door is equipped with at least two steps, with the system selecting the appropriate one according to the platform involved. Unlike the passenger doors, the driver access point on the FLIRT trains is equipped with a specially developed third step that ensures easy entry and exit even on the open track.

NSB ordered a total of 50 new trains from Stadler, of which 26 will be used for commuters in the Greater Oslo region. The remaining 24 five-part trainsets will be used for regional journeys of up to three hours in Southern Norway.

Merak supplies HVAC systems for Régiolis trains

The new Régiolis trains being manufactured by Alstom are single-decker, low-floor regional trains that can be built as electric multiple units or as electric/diesel-electric hybrid multiple units. Along with reduced noise levels, enhanced seat comfort and better interior lighting, development work on these trains also focused on the use of new, state-of-the-art HVAC systems. French national rail operator SNCF ordered 100 trainsets from Alstom based on the new platform. Knorr-Bremse subsidiary Merak is providing all of the 465 HVAC systems required, with shipments starting in mid-2012 and expected to continue until early summer 2014.

The modern HVAC systems feature two separate cooling circuits filled with R-134a refrigerant. The units have a maximum cooling output of 35 kW, and a maximum heating output of 32 kW. During operation a sensor constantly monitors the CO_2 content of the air in the respective compartment. The higher this rises, the more fresh air the system draws in from the outside.

Knorr-Bremse receives follow-up order for Velaro RUS 2

Sapsan – meaning peregrine falcon – is the name given to the Velaro RUS high-speed train manufactured by Siemens. Russian state railway operators RZD use their eight Sapsans on the busy line between Moscow and St. Petersburg, amongst other routes. Despite making a number of halts, the high-speed trains cover the 650-odd kilometers in a mere 3 hours and 45 minutes. And even in challenging weather conditions the Sapsan achieves reliability levels of between 95% and 98% – thanks partly to the braking, HVAC and door systems developed and supplied by Knorr-Bremse.

The Sapsan is to continue to rely on Knorr-Bremse systems for its journeys from Moscow to St. Petersburg.

RZD recently ordered eight more high-speed trains, and Knorr-Bremse will also be supplying the braking, HVAC and door systems for these new Velaro RUS 2 vehicles. They will be used to increase the frequency of the service on the busy route between Moscow and St. Petersburg and also on the line between Moscow and Nizhny Novgorod.

As the power supply on the lines to St. Petersburg and Nizhny Novgorod use different systems, and RZD wishes to be able to use the trains flexibly on either route, the Velaro RUS 2 had to be capable of operating in double traction. This meant Knorr-Bremse had to design completely new software architecture for the brake control system. During the year under review the first of the new braking systems were delivered to Siemens.

Moscow Metro opts once again for Knorr-Bremse

More than 9 million passengers used the metro system in Moscow at peak periods, and train frequency is therefore very high. From the point of view of the operator, the vehicles therefore have to be completely reliable. But there is a further factor – some of the metro runs overground, and the trains and their systems therefore also have to operate at extremely low temperatures.

Knorr-Bremse's extensive experience of the Russian market means the company can meet both these requirements – which was one of the reasons it was chosen last year to supply various systems for the 360 new-generation cars ordered by Moscow Metro from Russian vehicle builders Metrowagonmash and OAO TVZ. Knorr-Bremse will be delivering oil-free compressors and block brake units. But the company's involvement does not stop there – the door systems will be coming from IFE, and Italian subsidiary Microelettrica Scientifica will for the first time be supplying resistors and circuit breakers. This has enabled Knorr-Bremse to successfully expand its share of the systems supplied to the metro.

Crucial factors in winning this order were the high levels of service competence demonstrated by Knorr-Bremse's local staff and the company's plan to produce the braking systems directly in Russia.

NYAB strengthens market position in driver assistant systems

In fiscal 2012, Knorr-Bremse's US subsidiary New York Air Brake (NYAB) continued to expand the installed fleet for its LEADER driver assistant system. By year's end NYAB had delivered more than 2,500 systems to eight customers worldwide.

LEADER is a sophisticated train management system that significantly improves the locomotive engineer's ability to handle heavy freight trains more economically and safely than ever before.

LEADER is a sophisticated train management system that improves the locomotive engineer's ability to handle trains more economically and safely.

LEADER accomplishes this improvement by displaying train-handling recommendations in the locomotive cab designed to save fuel, reduce in-train forces and assist in schedule compliance. LEADER's fuel savings also directly leads to emissions reduction by as much as 15%.

The largest order for LEADER came from North American freight rail operator Norfolk Southern Railway, operating over 34,000 kilometers of track in 22 US states representing the most extensive rail network on America's east coast. In all, Norfolk Southern Railway has ordered 1,125 LEADER systems from NYAB, just over 1,000 of which were in use at the end of the year under review.

NYAB has also received an order from the Union Pacific Railroad for 760 LEADER systems, approximately 375 of which had been installed by the end of 2012. Burlington Northern Santa Fe has ordered 200 systems, more than 160 of which were installed by the end of 2012. Brazilian operator VALE operates 260 LEADER systems in service at year's end.

NYAB also concluded a framework marketing agreement with major North American locomotive builder Progress Rail Services – EMD. In the near future, plans envisage installing LEADER in the customer's new diesel-electric locomotives in the factory during production.

In 2012, NYAB delivered LEADER Driver Assist (DA) software to Rio Tinto for use in its Australian mining fleet. Initial field demonstrations were successful and full field trials are underway. Software and hardware were delivered and installed on the 68-unit Rio Tinto locomotive fleet and will be operational in 2013. NYAB has begun the design requirement phase for the Rio Tinto AutoHaul project that will lead to driverless trains in 2014 using LEADER software in conjunction with Ansaldo's Automatic Train Operation (ATO) deployment.

In a further evolutionary development a new functionality was added to LEADER in 2012 in the form of a cruise control system known as "Auto Throttle", which will go into volume production in 2013.

Knorr-Bremse supplies brakes, doors and HVAC systems to Los Angeles

In the year under review, Knorr-Bremse benefited from an order placed by Los Angeles metro with Kinkisharyo International, the US subsidiary of Japanese manufacturer Kinki Sharyo, for 78 light rail vehicle car sets. Knorr Brake Corporation in North America was awarded the contract to supply the brakes, doors and HVAC systems for the new car sets with which the operator, Los Angeles County Metropolitan Transportation Authority, is expanding its capacity and modernizing its fleet.

Delivery of the car sets is due to begin in the last quarter of 2015, but Knorr-Bremse is to supply initial subsets for installation in two prototype vehicles in the first quarter of 2014. On top of the 78 car sets ordered, the metro operator has taken out an option on a further 157 units.

Knorr-Bremse to equip new light rail vehicles in Honolulu and Houston

Knorr-Bremse is to equip the light-rail vehicles (LRVs) for two new mass transit lines being added to the commuter networks of the cities of Honolulu and Houston in the USA.

The operating company in Honolulu, Honolulu Authority for Rapid Transportation, placed an order for 80 driverless vehicles with Italian manufacturer AnsaldoBreda. The new LRVs are to handle commuter traffic in several years from now, on a 32-km line which is still to be built, running east-west through the city. US-based Knorr-Brake Corporation is to equip the vehicles with brakes, doors and HVAC systems. Deliveries are scheduled to start in 2015.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Knorr-Brake Corporation will also be supplying the brakes and door systems for the CAF LRVs destined for new mass transit lines in Houston. A total of 39 vehicles have been ordered and are also scheduled to enter service in 2013.

Merak equips Washington Metro with HVAC systems

The Metro in Washington D.C. transports about 800,000 passengers a day, making it the second largest metro network in the USA after New York. Links between Knorr-Bremse subsidiary Merak and the Metro's operator, Washington Metropolitan Area Transit Authority (WMATA), stretch back over 15 years. In the year under review they were further reinforced as Merak began supplies of initial HVAC units for test purposes. The tests are in preparation for delivery of volume-built systems for almost 430 metro cars from the new 7K series manufactured by Kawasaki.

Traditionally, Washington Metro cars have used split HVAC systems, with one unit in the ceiling area and the other mounted under the floor. In the new 7K cars, both HVAC units are to be installed in the roof. With this in mind, Merak developed a new, extremely low-profile unit with a maximum height of just 290 millimeters that takes account of the very restricted installation envelope in metro car roofs.

In the year under review, the new HVAC unit successfully completed a series of tests, including initial testing in the presence of operator WMATA. Start of production for the volume-built HVAC units is scheduled for January 2014, with the final systems due for delivery in 2016.

Frenos supplies systems to Lima Metro

Line 1 of the metro system in the Peruvian capital is to be extended, and the metro operator has ordered nineteen new trains from vehicle manufacturer Alstom. Knorr-Bremse's Spanish subsidiary Frenos is to supply the air supply and brake control systems, both of which are further developments of equipment already in use in the latest metro trains in Barcelona, Spain.

The air supply system is integrated into the vehicle frame and uses tried-and-tested VV 120 compressors. The ESRA brake control system, which is also attached to the vehicle frame, is an EP BGE system. Knorr-Bremse France is responsible for the bogie equipment. The systems are slated for delivery by the end of May 2013, and delivery of the metro vehicles will start thereafter.

Knorr-Bremse receives order for Brazilian monorail project

Monorails operate above ground on special guideways and, as such, can be built relatively quickly and at reasonable cost. These were the main reasons why the city of São Paulo decided to build a second monorail line. The operator, CIA Do Metropolitano de São Paulo, ordered 54 trains from Canadian vehicle builder Bombardier for the new "Expresso Tiradentes". Knorr-Bremse was responsible for developing and manufacturing the brake discs, calipers and control units for the hydraulic braking system, which is designed for speeds of up to 80 km/h.

The new monorail line in São Paulo is to be equipped with Knorr-Bremse braking systems.

The rubber tires of monorails make acceleration and braking much more efficient than in the case of the steel wheels on trains or metros, which means this type of vehicle is particularly suited for operating with short distances between stops.

The combination of rubber tires and rails means that Knorr-Bremse is an ideal partner for the development of monorail braking systems. Even though monorails themselves have only started to be used in significant numbers in recent years, Knorr-Bremse is able to draw on decades of experience with its commercial vehicle and rail vehicle divisions and combine components from both these areas.

Order placed for braking, door and HVAC systems for first metro line in Qingdao

In 2012, for the first time ever in a single Chinese metro project, Knorr-Bremse successfully obtained the contract for the braking, door and HVAC systems – a further confirmation of the company's successful strategy in the Chinese metro market. As a result, Knorr-Bremse will be supplying Line 3, the first metro line to serve the east coast city of Qingdao with its 8 million inhabitants. The line is scheduled to open in 2014, serving 22 stations along more than 25 kilometers of track and carrying approximately 230,000 passengers a day.

The cars for the new metro line are being built by Chinese OEM Sifang Locomotive and Rolling Stock Co., Ltd. The order received by Knorr-Bremse covers equipment for 144 metro cars to operate as 24 six-car sets. All of the braking systems are to be manufactured at the Knorr-Bremse plant in Suzhou. Merak-Jinxin will be producing the HVAC systems in Wuxi, while IFE-VICTALL is to manufacture the door systems almost on the customer's doorstep in Qingdao.

Knorr-Bremse achieves further successes in the Chinese metro sector

In addition to Qingdao Metro Line 3, where for the first time ever in a Chinese metro project Knorr-Bremse was able to obtain the contract to supply not only the braking and door systems but the HVAC system as well, the company also secured many further orders for Chinese metro projects in 2012.

Knorr-Bremse was commissioned, for example, to supply braking systems for 276 new cars for Wuxi Metro, 162 for Hangzhou Metro, 115 for Suzhou Metro, as well as 90 cars for the Nanjing airport link. Orders for HVAC systems came for 138 new cars for Wuxi Metro, and 30 for Hong Kong South Island Line East. Knorr-Bremse also supplied door systems for 96 new cars for Changsha Metro Line. Knorr-Bremse subsidiary Westinghouse Platform Screen Doors received orders for 1,248 platform screen door systems for Metro Line 2 in Hangzhou and for 480 systems for Metro Line 1 in Zhengzhou.

The E7 and W7 Shinkansen trains are also to be equipped with Knorr-Bremse systems.

Knorr-Bremse receives further high-speed orders from Japan

Knorr-Bremse has already supplied systems for Japan's Shinkansen E5 and E6 high-speed trains. Clearly impressed with this equipment, operator JR East placed a further order with Knorr-Bremse in the year under review. At the time of the InnoTrans fair in September 2012, JR East and Knorr-Bremse signed a contract for the supply of bogie equipment for the Shinkansen E7. The order received by Knorr-Bremse includes brake discs, ultra-compact, weight-optimized brake calipers and high-performance ISOBAR sintered brake pads for all motor cars for 17 trainsets. Each 12-car trainset comprises 10 motor cars and 2 driving trailer cars. The first trains are scheduled to go into service in the spring of 2015 on a new high-speed route between Tokyo on Japan's east coast and Kanazawa in the west.

Shortly after signing the contract with JR East, Knorr-Bremse received a further major order from Japan as operator JR West opted also to equip its new W7 Shinkansen trainsets with bogie equipment from Knorr-Bremse. In this case the order covers ten trainsets, each also with ten motor cars.

Knorr-Bremse achieves market successes with locomotive CCB systems in India

In the year under review, Knorr-Bremse India was able to secure two substantial orders for Computer-Controlled Brake (CCB) systems for different types of locomotive. Electro Motive Diesel (EMD), the world's second-largest locomotive builder, placed an order with Knorr-Bremse India for 259 CCB systems for diesel locomotives, almost 200 of which had been delivered by year-end. In addition, EMD ordered a further 106 CCB systems which Knorr-Bremse tailored to the customer's specifications. Together, these two orders give the company a 100% share of the Indian market for such systems.

Knorr-Bremse India also notched up a noteworthy success in the electric locomotive sector in 2012. Shortly after being accredited as a tier-1 supplier to OEM Chittaranjan Locomotive Works (CLW), Knorr-Bremse received an order from CLW for 68 CCB systems for electric locomotives. To qualify for the prestigious status of preferred supplier to CLW, Knorr-Bremse India first had to obtain certification from the Research Design & Standards Organization (RDSO) of India's national rail operator, Indian Railways.

India Rail orders brake calipers and discs for passenger trains

During the year under review India's state railway operator India Rail ordered 550 new passenger train cars from manufacturer Rail Coach Factory (RCF), which build the vehicles in collaboration with Alstom at its Indian plant in Kapurthala. As part of this order, Knorr-Bremse is to equip the trains with brake discs and calipers, with deliveries starting in spring 2013. In the course of its expansion of the national rail infrastructure, India is planning to buy up to 2,000 new passenger cars per year in the medium term – and Knorr-Bremse stands to benefit from these orders as well.

Smart Car application added to EP 60

Etihad Rail, the newly created operator of the United Arab Emirates (UAE) national rail network, has ordered 240 bulk freight cars from Chinese manufacturer CSR Yangtze Rolling Stock for the transportation of pelletized sulfur. The cars are equipped with the field-proven EP 60 electro-pneumatic braking system from Knorr-Bremse subsidiary New York Air Brake (NYAB). EP 60 transmits the air brake signal from the locomotive to the cars over the train's wired communication network. The brake signal reaches every car at virtually the same time, so that the brakes are applied on each car simultaneously. This prevents the typical train-handling challenge for pneumatic brakes on long, heavy trains where the brakes on the front cars are applied while the rear cars remain momentarily unbraked, resulting in potentially dangerous run-in force events.

In conjunction with Australian mining giant Rio Tinto, NYAB is working on controlling driverless trains with LEADER.

In a major technology step, NYAB added Smart Car functionality to its EP 60 braking system. The 240 cars for Etihad Rail will be the first in the world where wireless Smart Car capability has been installed. This new application utilizes the train's existing EP 60 train-line communication network to both control and verify the open/closed status of the loading hatches and unloading doors on the cars. Perhaps the most important feature in the new Smart Car is the wireless hot-bearing sensors included on each car. Along with the bulk freight cars, the operator's seven new Progress Rail – EMD locomotives will also be equipped with the appropriate Smart Car software, interfaced to the EP 60 system.

Knorr-Bremse develops LEADER AutoPilot for Rio Tinto

Knorr-Bremse's LEADER system is a unique measuring and control technology for trains that results in reduced fuel consumption, more efficient schedule management and a reduction of in-train forces. It does so by evaluating the dynamic state of the train in real time and determining driving strategies to improve overall energy efficiency. LEADER enables fuel savings of between 8% and 12% to be achieved and also reduces in-train forces by up to 50%. The system also has a positive impact on schedule management, helping to improve network utilization.

In the field of heavy freight trains Knorr-Bremse is currently supplying six major customers with LEADER systems. One is for Anglo-Australian mining group Rio Tinto and represents the greatest challenge so far in this field. Rio Tinto's goal is to operate driverless trains by 2015, with LEADER taking over control – which will involve extensive further technical development of the current LEADER system. However, the operational improvements it promises are so convincing that the effort is well worthwhile.

The LEADER application being developed for Rio Tinto extends the system's function from making recommendations to taking over complete control of the train. "Leader AutoPilot", as it is known, requires active communication links with the network management system and the locomotive control system in order to directly trigger train commands. LEADER optimizes the train setup, including several locomotives and ECP braking systems.

The system's core software is already capable of taking over this sort of control task, but at present only passes on recommendations to the driver. In order to meet the safety standards necessary for

driverless trains the entire software program is currently being completely rewritten to meet CENELEC standards. The Rio Tinto project started in 2011 with a series of studies and tests. In 2012 LEADER entered service in conventional assistant mode, and the level of automation will increase up till 2015, when driverless trains controlled by LEADER will finally be achieved.

Prizes and awards

Budapest 5-day factory is voted "Factory of the Year"
Every year, the trade journal "Production" and management consultants A.T. Kearney hold a competition to find the most progressive production facilities. In the German-speaking world and Eastern Europe the competition is regarded as the toughest and best-established benchmark for the industry. The 2012 winner in the "Excellent Value Stream" category was Knorr-Bremse Rail Vehicle Systems' production site in Budapest – the division's largest European facility.

As a result of steady growth in demand the existing plant had reached the limits of its capacity, and in 2010 Knorr-Bremse reopened its production site. The plan was to completely reorganize processes along the value stream with a focus on greater flexibility and efficiency by shortening throughput times, maximizing schedule effectiveness and further improving the already high standards of product quality.

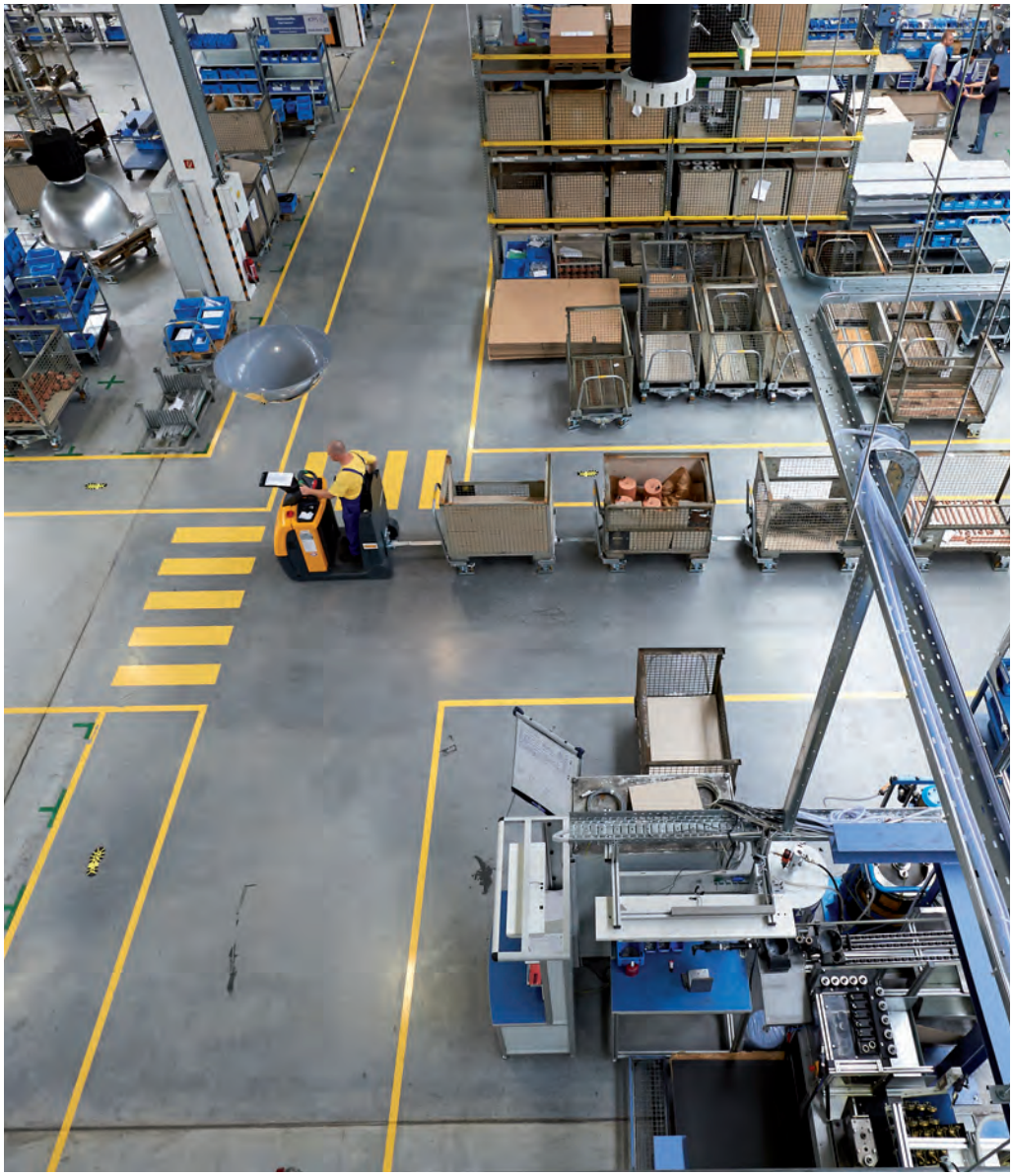
Three years on, product throughput times have been reduced from 25 to five days – a unique achievement for a factory producing low unit volumes for the rail market. It was during the planning phase for the construction project that the concept of the "5-day factory" was developed – 80% of production volume was to pass through the factory within five days, from the start of production via surface treatment and assembly to final delivery.

With this new concept – which was the clinching factor in winning the "Factory of the Year" accolade – Knorr-Bremse managed to unite two important elements: high numbers of multiple variants with low unit volumes on the one hand, and very short throughput times combined with high flexibility on the other.

This was achieved by ensuring that supplier and procurement processes guaranteed virtually 100% availability of materials and by carrying out all the relevant processing steps in on-site production cells. To do this, Knorr-Bremse integrated a Shared Technology Center (STC) into the factory. Single-piece production is carried out on the basis of standardized work processes, and Heijunka planning identifies the optimum quantity and sequence for manufacturing products. Development work is also integrated into day-to-day activities at the plant in order to rapidly and efficiently utilize feedback; and transparent information processes improve communication in all areas.

Knorr-Bremse Suzhou wins Management Innovation & Excellence Award
With the opening of its new Suzhou II plant in 2011, Knorr-Bremse became one of the biggest suppliers in the Chinese rail market. One year later, the site won the coveted Management Innovation & Excellence Award from the province of Jiangsu.

The project submitted for the award was the so-called "Knorr Suzhou Design Team Innovation Plan". The R&D team for the project was set up in 2009 and tasked with aligning localization of Knorr-Bremse products as closely as possible with the needs of local customers. This involved, amongst other things, pre-development, design proposals, validation and error analysis.



In its Rail Vehicle Systems plant in Budapest, Knorr-Bremse reduced throughput times from 25 to 5 days.

Commercial Vehicle Systems

Knorr-Bremse involved in new Volvo platform

Knorr-Bremse has contributed a highly innovative gearbox and clutch change module to the ground-breaking dual clutch system developed by Volvo for heavy trucks.

Lower fuel consumption, unique safety systems, first-class handling and enhanced cab comfort – Volvo set new standards with the innovative truck platform and completely new electronic architecture that it presented at the 2012 IAA Commercial Vehicles in Hanover. Knorr-Bremse has contributed a range of key technologies to the new platform.

One of these is the EBS7 – the latest generation of Knorr-Bremse's electronic braking system. The particular advantage of the new system is that the control unit is mounted outside the driver's cab on the vehicle frame, freeing up more space in the cab and simplifying the vehicle's cabling system, as there are in any case multiple connections located around the frame. Like its predecessors, the EBS7 integrates an ABS anti-lock system, ASR traction control and the ESP electronic stability program into a single safety system.

Knorr-Bremse is also supplying all the air processing units and 100% of the new pedal units with master cylinder. With the introduction of Euro VI engines Knorr-Bremse will also be supplying dual-cylinder compressors – with or without clutch depending on the vehicle type. Another Knorr-Bremse product is the new ELC valve for the pneumatic suspension. The system uses new 4-channel valves made of plastic – a completely new departure for such truck applications. A single valve block is used to serve two axles simultaneously. The new valve unit is easier to install and the use of plastic means it is corrosion-resistant. It is also lighter because of the plastic material used and reduction in the use of solenoid valves.

Knorr-Bremse has contributed a highly innovative gearbox and clutch change module to the ground-breaking dual clutch system developed by Volvo for heavy trucks. The module operates the dual clutch unit and various additional elements, making it possible to change gear without any interruption in power delivery, thereby enhancing performance and drivability. Installed in the new Volvo truck platform, the automatic dual clutch system is a key element in Volvo's overall powertrain concept, which is designed to significantly reduce fuel consumption and emissions. The concept is being gradually rolled out in all Volvo vehicle categories.

During 2013 Knorr-Bremse will also be delivering the latest version of its anti-lock braking system ABS8 – mainly for installation in vehicles for the BRIC states.

Trailer EBS G2.2 becomes standard equipment for Schmitz Cargobull

Based in Altenberge, North Rhine-Westphalia, Schmitz Cargobull is the European market leader for semitrailers, trailers and bodies. Knorr-Bremse and Schmitz Cargobull can already look back on a long partnership that has seen both companies launch important innovations on the market, and in 2012 Schmitz Cargobull continued the tradition by adopting the upgraded Trailer EBS G2.2 system as standard equipment.

Trailer EBS G2.2 is to have a number of extra functions added in 2013 that will also be used by Schmitz Cargobull. The main new feature will be a new type of electronic leveling control using two practical functions – iLvl and iTAP. iLvl (Intelligent Leveling Control System) is an electronic suspension system for trailers that enables the trailer ramp height to be easily changed through modifying the pressure in the air springs. Whereas the ramp height is currently adjusted using a lifting/lowering valve on the side of the vehicle, the driver will in future be able to use iTAP (Intelligent Trailer Access Point) to control it from several meters away using a mobile device such as a smartphone or tablet PC. This means he has a much better overview of the situation and is also able to adjust the height without himself standing

in the trailer danger zone. The mobile device uses an app to communicate via WLAN with an electronic module that relays the control commands to the brake and chassis control system via a CAN bus.

New Holland introduces ABS as standard equipment

Tractors are becoming increasingly powerful and capable of towing heavy trailers at increasing speeds. As a result, high-performance tractors with top speeds of 60 km/h are increasingly being used in areas other than agricultural operations – for example for winter road maintenance, in forestry, and in the construction and transportation sectors. This means the safety requirements of such vehicles are increasingly similar to those of normal commercial vehicles. Already more than 90% of accidents involving agricultural tractors in Germany occur on public roads. Safety-relevant products are therefore becoming increasingly important.

In response to this trend Knorr-Bremse launched volume production of an ABS system for agricultural vehicles in 2011. And during the year under review, vehicle manufacturer New Holland decided to include ABS as standard equipment on its new T7 tractors.

Tractors are becoming faster and more powerful – which is why the latest T7 generation from New Holland is equipped with Knorr-Bremse's ABS for agricultural vehicles.

A number of factors have to be taken into account when installing ABS in agricultural vehicles. Amongst other things the different size and weight of the wheels and the use of double tires can cause moments of inertia that do not occur in other vehicles. In addition, the wide variety of different equipment that can be added to the front and rear of the tractor and the different types of trailer that can be attached result in huge differences in center of gravity and axle loads.

All these aspects have to be factored into the ABS logic to ensure that the vehicle can be kept under control on both dry and wet surfaces even when braking heavily. The vehicle must also be able to brake safely on loose surfaces such as gravel or snow without any danger of the wheels locking.

Bendix ESP becomes standard equipment at Peterbilt

Knorr-Bremse subsidiary Bendix has further reinforced its market leadership in North America. In May 2012, the Bendix ESP Electronic Stability Program full-stability system with Automatic Traction Control (ATC) became standard on the majority of US commercial vehicle manufacturer Peterbilt Motors Company's Class 8 trucks and tractors. Other manufacturers offering Bendix ESP include International, Kenworth, and Prevost.

Bendix was the first North American brake system manufacturer to make full-stability solutions widely available for the commercial vehicle market, introducing Bendix ESP in early 2005. In September 2012 the company reached 200,000 units sold.

Comprehensive full-stability systems – such as Bendix ESP – address both roll and directional stability. While roll-only options function on dry surfaces, full-stability systems recognize and mitigate conditions that could lead to rollover and loss-of-control situations sooner on dry surfaces, and in a wider

range of driving and road conditions, including snowy, ice-covered, and slippery surfaces. Full stability typically assesses situations quicker – due to additional sensors that measure driver intent and vehicle direction – and then delivers automatic brake interventions involving the steer, drive, and trailer axles.

Bendix ESP is the foundation for Bendix advanced active safety technologies, such as Bendix Wingman ACB – Active Cruise with Braking adaptive cruise control technology, and Bendix Wingman Advanced – a collision mitigation technology which combines both adaptive cruise control and collision mitigation to help drivers mitigate or reduce the intensity of potential rear-end collision situations. In the year under review, the Bendix Wingman Advanced safety system also became available as an option in the full range of Peterbilt's on-highway truck models. The Wingman Advanced system is also an option for most popular on-highway models at International, Kenworth, Mack and Volvo.

Bendix safety technologies are options at Kenworth

Customers ordering new Class 8 trucks from US manufacturer Kenworth Truck Company can now also opt for safety technologies from Knorr-Bremse subsidiary Bendix. Since the end of 2012, Kenworth has been offering the innovative collision mitigation technology Bendix Wingman Advanced, as well as the SmarTire Tire Pressure and Temperature Monitoring System (TPMS) by Bendix as optional equipment.

Since the end of 2012 Kenworth has offered Knorr-Bremse safety technology as optional equipment.

Bendix Wingman Advanced is a further development of the company's Bendix Wingman Active Cruise with Braking (ACB) technology, which combined the functionalities of automated cruise control with technology that helps drivers potentially avoid rear-end collisions. A radar sensor mounted on the front fender or the cab air intake grille constantly measures the distance to the forward vehicle and automatically regulates the speed in accordance with the data acquired. If the distance closes too fast, the system first sounds the alarm. If the driver fails to respond adequately, ACB will actively intervene, reducing throttle, engaging the engine retarder or, if necessary, applying the foundation brakes.

SmarTire TPMS can be retrofitted to almost any commercial vehicle. The system continuously monitors the pressure and temperature of each tire, providing real-time status information. If the tire pressure falls below a set value, posing a potential safety hazard, the system alerts the driver. As a result, the driver can accurately maintain pressures at the optimum level. In addition to the safety aspect, the system also makes a valuable contribution to cutting fleet operating costs: tire wear and fuel consumption can be substantially reduced by maintaining correct tire pressures.

Bendix supplies bus door modules to Navistar

US commercial vehicle builder Navistar International Corp. has opted to rely on the expertise of Knorr-Bremse subsidiary Bendix to supply the door systems for its school buses. In the year under review, the two companies signed an agreement that established Bendix as the exclusive provider of door modules for the 15,000 school buses Navistar produces annually. The modules consist primarily of air-powered and electric versions, plus a small number of manual models. The systems are manufactured at the Bendix facility in Huntington, Indiana.

Knorr-Bremse launches preparations for DAF systems production in South America

For some time now the established European truck manufacturer DAF has been selling Euro V CF and XF trucks in Europe, with Knorr-Bremse extensively involved, supplying the brakes and air treatment units. Now DAF is planning to launch production of the CF and XF models in South America, probably in the second half of 2013. In the year under review, to ensure its eligibility for the tendering process

for this new project, Knorr-Bremse began to adapt the air treatment system used in Europe in line with the needs of the South American market. At the same time it started to investigate the extent to which – in line with local content requirements – the systems could also be manufactured in Brazil in future.

Ford Otosan orders braking systems

Ford Otosan is the leading commercial vehicle manufacturer in Turkey, with an annual output of some 280,000 units. Until recently the company had not made much use of Knorr-Bremse products, but in 2011 it placed a major order for braking systems for the new semitrailer tractor units in its heavy truck program.

What ultimately won Knorr-Bremse the order was not just the company's high quality standards but also its across-the-board systems competence. After modification to meet the particular requirements of the new vehicle, the components were subjected to exhaustive summer and winter testing that was successfully completed in 2012.

Ford Otosan is planning to bring production levels up to 12,000 heavy trucks and some 3,000 semitrailer tractor units in 2013. But there is even more scope for future cooperation between Knorr-Bremse and the Turkish company, as it is planning to further expand its heavy truck production over the coming years.

Knorr-Bremse starts preparing for new bus platform in Russia

At Knorr-Bremse Russia, preparations have begun to equip a new bus family built by GAZ Group Russian Buses. The new bus platform comprises several different model series, from city, local and regional buses to long-distance touring buses up to 18 m long. Knorr-Bremse is to supply the complete braking systems for the entire vehicle platform. The new models are due to enter volume production in 2014. GAZ Group Russian Buses is planning to build a total of 15,000 to 20,000 units between 2014 and 2016.

In addition, Knorr-Bremse Russia is working on a project to supply disc brakes for a new minibus series from bus manufacturer Pavlovo Bus. With an annual output of approximately 11,000 units, Pavlovo is the largest bus builder in the CIS states. Start of production for the new minibus series is set for 2013 and Knorr-Bremse is to supply the brakes for between 2,000 and 3,000 vehicles. Pavlovo Bus belongs to GAZ Group Russian Buses which is part of the GAZ Group, the leading bus manufacturer in Russia and the CIS states, with a market share of around 65%.

In 2012 Knorr-Bremse Russia began construction of the prototypes for both of these projects.

Start of series production for Indian lift axle system

Lift axles are additional axles that the driver can lower to distribute the weight of a heavy payload more evenly across the axles.

Production of the second generation of a pneumatic lift axle system for the Indian commercial vehicle market is off to a successful start. Knorr-Bremse India is supplying the system to Tata Motors for installation in selected model series. Lift axles are additional axles that the driver can lower to distribute the weight of a heavy payload more evenly across the axles. This not only helps reduce tire wear but also serves to provide better grip, which is very important for the optimal performance of the braking system.

With the second generation of the pneumatic lift axle system, Knorr-Bremse was able to introduce numerous improvements, reducing the number of parts and the overall system costs. In addition, the company also developed an anti-tire-theft system, while new valves make for faster activation.

Knorr-Bremse supplies pedal units to Ashok Leyland

Indian commercial vehicle manufacturer Ashok Leyland is currently developing a new generation of driver's cabs – the Next Generation Cabin or NGC – for heavy trucks. In the first quarter of 2013, the manufacturer will start to fit the new cabs in selected models. Over time they will gradually become the standard cabs for the company's full range of vehicles. Knorr-Bremse won the contract to supply all of the pedal units for the NGC program. By 2016, Ashok Leyland is planning to install approximately 80,000 of the new cabs.

Knorr-Bremse becomes preferred supplier to Indian manufacturers

Knorr-Bremse was able to further improve its position in the Indian commercial vehicle market in the year under review, as two major Indian manufacturers awarded the company preferred supplier status. In the case of Mahindra Navistar this concerns the supply of brake control valves, air supply units, actuators and ABS systems for installation in all of the manufacturer's commercial vehicles in the 40 to 49 tonne range.

In the case of Daimler India Commercial Vehicles, Knorr-Bremse was awarded preferred supplier status for braking systems for light and medium-heavy trucks, as well as for parking brake valves for heavy trucks. In the future, the company is also to supply viscous torsional vibration dampers and air pressure sensors for the full Daimler India Commercial Vehicles model range.

Disc brakes for Yutong buses in China from Knorr-Bremse

In the year under review, Knorr-Bremse succeeded in further strengthening its position with Chinese bus manufacturer Yutong. With an annual output of around 47,000 vehicles, Yutong is one of the world's largest bus builders. In 2012, Knorr-Bremse once again supplied the company with a large number of pneumatically activated 22.5-inch disc brakes. The brakes are mainly destined for Yutong buses over 10 meters long. In the year under review, Knorr-Bremse increased its share of the 22.5-inch disc brakes supplied to Yutong to approximately 80%.

The brakes are manufactured on a newly commissioned production line at the Knorr-Bremse plant in Dalian. The new line was developed with support from the lead plant for disc brakes in Aldersbach, Germany, thereby ensuring that the same high standard of quality can be assured for these disc brakes as throughout the world of Knorr-Bremse.

Knorr-Bremse supplies systems for Foton's H4 Platform

After providing an extensive range of components for the H3 generation of trucks from Chinese manufacturer Foton, Knorr-Bremse was able to further strengthen its links with the customer in the year under review. In February Knorr-Bremse commenced shipments of pedal units, power clutches and handbrake valves for Foton's new H4 platform, the Auman GTL Heavy Truck. Knorr-Bremse is the exclusive supplier of pedal units and handbrake valves for the H4 platform.

Foton is building the new heavy truck series for customers in Europe and the Americas. The engines have relatively low fuel consumption and are compliant with the Euro IV and Euro V standards.

The Knorr-Bremse components are produced locally in China at the Knorr-Bremse plant in Dalian. For the start of production of the H4 platform, Knorr-Bremse supplied 2,500 units of each product. When production has been ramped up to full speed in 2013, the company will be supplying approximately 4,500 units a year.

Starting with the H4 platform, local assembly operations were joined by the increasingly localized procurement of components. In this way Knorr-Bremse has laid the foundation for the industrialization of additional product variants in China, which will enable the company to cover an even wider market for high-quality components.

PBS is successfully tested in China

Knorr-Bremse's Pneumatic Booster System (PBS), for which a worldwide patent application has been filed, solves the problem of so-called turbo-lag in commercial vehicle diesel engines during drive-off, overtaking and on uphill gradients. PBS boosts performance and enables down-speeding and engine-downsizing – which can cut fuel consumption.

Parallel to PBS being rolled out as standard equipment in Europe, it was also subjected to successful system testing and extensive road testing by various Chinese commercial vehicle manufacturers. The verdict was that markets in the Far East can also expect to see a significant improvement in performance and a cut in fuel consumption from using PBS.

Prizes and awards

Knorr-Bremse is voted "Best Brand" for the seventh year running

Once a year, readers of trade journals "lastauto omnibus", "trans aktuell" and "FERNFAHRER" are invited by DEKRA, the vehicle inspection experts, and publishers ETM to choose the best brands in the commercial vehicle sector. Some 8,000 readers took part in 2012 and declared Knorr-Bremse Commercial Vehicle Systems "Best Brand" in the "Brakes" category for the seventh year in succession.

The "Best Brand" award is regarded as a reliable indicator of quality and recognizes the reliability and safety of the products. But the awards are not just about brand profile – there is also a strong focus on customers' assessment of brand value and the degree of confidence they have in products from the companies concerned.

In 2012 Knorr-Bremse achieved a record result of 67.1%, giving it a clear lead over its competitors. The fact that the award comes from experts in the field is a huge incentive for the company to continue to develop innovative, cutting-edge products.

Awards for Knorr-Bremse from Tata Motors in India

Tata Motors Limited (TML) is widely perceived as the innovation leader in the Indian commercial vehicle market – a status in which the company's suppliers play an important part. Knorr-Bremse, for example, developed an ABS-based Electronic Stability Program (ESP) and an Anti Roll-Back system (ARB) for Tata Motors, specially designed to meet the regional requirements of the Indian commercial vehicle sector.

Technologies like these led TML to present Knorr-Bremse with two excellence awards in the year under review. At the National Level Supplier Meeting, the most important event staged by Tata Motors for its suppliers, the company won an excellence award in the category "Technology & Innovation". On top of this, the Tata plant in Jamshedpur presented Knorr-Bremse's Indian subsidiary with 1st prize for the innovative technologies it showcased at the plant's "Innovendor Competition".

The readers of "lastauto omnibus", "trans aktuell" and "FERNFAHRER" declared Knorr-Bremse Commercial Vehicle Systems "Best Brand" in the "Brakes" category for the seventh year in succession.

Responsibility

"As a globally operating company, Knorr-Bremse encompasses employees with a wide range of cultures and strengths. We value this diversity and promote the personal development of every member of the workforce – which is the key to our success. Fairness is the basis for the way we work together, and our internal control systems ensure that we comply with the regulations. In our day-to-day work we also assume responsibility not only in social but also in environmental terms."

Julia Thiele-Schürhoff, Vice President Corporate Responsibility, Knorr-Bremse AG, Germany

Corporate Responsibility

Economic and social developments in recent years have demonstrated that responsible conduct is an important element in long-term corporate success. A company like Knorr-Bremse, which can look back over more than 100 years of doing business successfully, has always assumed responsibility as a matter of course. As a manufacturer of safety-critical technologies that more than a billion people depend on daily, Knorr-Bremse regards thinking and acting responsibly as an integral part of its day-to-day core activities.

Corporate Responsibility at Knorr-Bremse

"Responsibility is an integral part of our corporate strategy".

Sustainability and corporate responsibility (CR) are part and parcel of Knorr-Bremse's corporate strategy. Knorr-Bremse is convinced that by systematically taking into account economic, environmental and social factors, it can both ensure the long-term success of the business and at the same time generate benefits for society. With the future in mind the company actively pursues a sustainability program focused on environmental compatibility and social commitment as well as innovation and value creation.

CR strategy articulates understanding of corporate responsibility at Knorr-Bremse

Ever since the company adopted its CR strategy in 2010, Knorr-Bremse has been systematically implementing its commitment to responsible corporate conduct. The strategy articulates the company's understanding of its responsibilities towards employees, society and the environment and the particular focus this takes. Every year Knorr-Bremse sets itself measures and goals for implementing the task of sustainability management in each of the defined CR fields of action – "Strategy and Management", "Products and Partners", "Employees and Management", "Environment and Climate", "Social Commitment" and "Communication and Cooperation".

Knorr-Bremse prioritizes particularly important CR issues on the basis of a materiality analysis, comparing the environmental and social challenges of its activities with the demands of the various players involved and assessing their relevance. This also ensures that responsible conduct at Knorr-Bremse is constantly evolving.

In 2012 Knorr-Bremse adopted a comprehensive CR policy in which the company articulated its understanding of responsible conduct in the context of sustainability and laid down a clear framework for action in each field. The policy is supplemented through internal company guidelines and standards such as corporate health and safety and environmental policy or the quality management guidelines on procurement.

Knorr-Bremse introduces Group-wide binding Code of Conduct

During the year under review Knorr-Bremse introduced a Group-wide Code of Conduct that contains general principles and rules aimed at ensuring that our business processes are exemplary in terms of compliance with the law. In it the company explicitly undertakes to respect the law and internal guidelines and to promote diversity and equality of opportunity, fair working conditions, positive partnership with customers and suppliers, protection of the environment and climate and social responsibility. The Code of Conduct is binding for all employees and promotes a consistent Group-wide understanding of how Knorr-Bremse manages its relations with customers, suppliers and business partners – as well as ordinary people and the environment. The Code of Conduct has been communicated to the entire workforce and in 2013 will be incorporated step by step into internal processes.

Corporate Responsibility established at central management level

Knorr-Bremse has a separate department at the level of central management devoted to Corporate Responsibility. It is responsible for identifying appropriate areas and developing specific measures which are then jointly implemented with the specialist departments concerned. As the central body for discussion and decision-making the CR Council decides on strategic orientation and objectives. It consists of a representative of the Executive Board, two members of management from the two divisions and the CR department. During the year under review the CR Council met twice and amongst other things discussed Group-wide CR policy and the scope for expanding CR communication activ-

ities. To boost Group-wide dialogue between the regions and achieve agreement on strategic objectives and current CR projects, the so-called CR Round Table – an international telephone conference – took place twice during the course of the year.

Product responsibility

Products from Knorr-Bremse meet the highest standards of quality in terms of technical requirements and safety as well as climate and environmental protection. Sustainability plays a key role at the development stage and during the production process. Knorr-Bremse's product portfolio covers a wide range of energy-saving and emission-reducing technologies designed to help rail and road transportation become more sustainable. With innovations such as the "whisper brake pad", which has been in operation on the "Italo" high-speed train since the end of April 2012 in Italy, Knorr-Bremse has paved the way for new types of noise reduction in rail transportation. In the commercial vehicle sector, the latest version of the Electronic Air Control System (EAC2) achieves a considerable reduction in fuel consumption and CO_2 emissions. And by reducing the weight of components and using environmentally-friendly materials the company further contributes to improving the environmental compatibility of modern transport systems.

"We work on developing products that combine a high degree of customer benefit with a contribution towards sustainable development".

Knorr-Bremse makes road and rail travel safer

Making mobility safer is a daily task for Knorr-Bremse. But the company has long since gone further than just manufacturing its tried-and-tested braking systems. It now also offer customers systems for steering vehicles and avoiding collisions or for intelligently linking up other safety-critical systems – both for rail and for commercial vehicles. Knorr-Bremse sees its clear duty as being to further develop such systems in the interests of improving the safety of passengers and vehicles.

Procurement according to the principles of the UN Global Compact

To achieve sustainable production you need the right materials – and Knorr-Bremse has therefore decided to expand its own commitment to responsible conduct to cover its suppliers as well. To ensure implementation of the principles of the UN Global Compact the company revised its quality management guidelines for both the Rail Vehicle and Commercial Vehicle Systems divisions in 2012 adding information from the supplier questionnaires and making them binding for all suppliers of production materials. Knorr-Bremse reserves the right to verify adherence to them by means of audits and self-disclosure.

Employee responsibility

The Knorr-Bremse Group employs more than 19,000 people worldwide. The company is concerned to be a responsible employer and offer its workforce an attractive working environment. Satisfied and committed employees who are passionate about their work for the company are the cornerstone of Knorr-Bremse's business success, and the company therefore supports employees at all company sites to achieve their personal and professional goals. In addition to existing care and support mechanisms to improve work-life balance, the company's German sites introduced more flexible part-time working options in 2012. In addition, Knorr-Bremse gave its employees the option of tele-working and unpaid leave lasting several months ("sabbaticals").

"We wish to create an attractive working environment and assume responsibility for our employees".

Equal opportunities and equal treatment, commensurate levels of pay based on performance and not differentiated according to gender – and respect for other cultures and life situations are part and

parcel of the Knorr-Bremse ethos and laid down in the Code of Conduct. In order to encourage respect for one another within the company, Knorr-Bremse encourages members of its workforce to spend periods living and working abroad. It also offers intercultural training and ensures that local management is appointed at site level. One example of this attitude of operating as a responsible partner within a region and contributing to local value creation was the development of the Knorr-Bremse Technology Center in Pune, India. Since 2012 this has housed development engineers working for various Knorr-Bremse subsidiaries. By 2015 some 200 places will have been made available here for highly qualified workers.

Knorr-Bremse also attaches great importance to health and safety at work. In addition to systematic work safety management, the Group also carried out various different campaigns such as health days, health advice and special medical checks at its various sites.

Knorr-Bremse creates attractive prospects for the future

Like any successful business, Knorr-Bremse needs high-skilled specialist workers. The company organizes its own in-house training provisions that offer attractive career opportunities to young people. In Germany, the company works with a vocational academy to offer practical, vocationally-oriented study courses. Graduate recruits to the company can also join the international Management Evolution Program (MEP) that offers insights into the work of the Group. Knorr-Bremse also works with universities and "dual system" colleges to ensure early contact with students offering key qualifications and to raise the company's profile as an attractive employer. It also actively participates in personnel and recruitment fairs for the same purpose.

Environmental and climate protection

As a globally operating company Knorr-Bremse is aware of its responsibility to protect the climate and ensure a clean environment. In addition to developing and promoting environment-friendly technologies, the Group also pursues active environmental management, waste, energy and water management as well as optimization of its logistics and transport processes. The basis for this is the mandatory Group-wide health, safety and environmental policy of Knorr-Bremse, which goes well beyond compliance with national laws and regulations. The company systematically manages and improves its corporate standards of environmental protection by setting targets and performance indicators that are reviewed by means of internal and external audits and comparisons with best practice elsewhere.

"We publicly acknowledge our responsibility for ensuring a clean environment and protecting the climate".

Knorr-Bremse encourages environmental awareness and action

Knorr-Bremse uses communication measures and training to raise awareness of environmental issues amongst its employees. Training needs are assessed on a site-by-site basis and targeted further training measures developed. Special campaigns and initiatives – and also incentives to make use of public transport – encourage appropriate patterns of behavior. Knorr-Bremse also presents an annual internal CR Award for outstanding projects in the categories "Environment" and "Social Commitment". During the year under review there were two winners in the "Environment" category: the LEADER driver assistant system for rail vehicles received the prize for its significant contribution towards reducing fuel consumption and CO_2 emissions; and the second winner was the Knorr-Bremse subsidiary IFE VICTALL for its optimization projects under the $ECCO_2$ initiative and its comprehensive environment awareness-raising program for its employees and their families.

Energy efficiency initiative contributes to protecting climate and environment

First launched in 2009, the $ECCO_2$ (Efficient Cut of CO_2) energy efficiency campaign is Knorr-Bremse's way of contributing towards protecting the climate and the environment. Using 2009 as the base year, the idea is to increase energy efficiency by 20% by the year 2020 and cut related CO_2 emissions by 20%. As party of the program, scope for making savings was identified in all parts of the company, suitable measures were incorporated into processes and successful projects transferred to other sites.

The measures introduced have already enabled energy efficiency to be increased by more than 20% and CO_2 emissions reduced accordingly. In absolute terms the Knorr-Bremse Group achieved savings of almost 10% of its annual energy consumption and related CO_2 emissions during the year under review.

This was achieved with the help of a wide range of projects at the various Group sites, including optimization of compressed air generation and distribution, renewal of lighting systems, more efficient regulation of HVAC systems and optimization and renewal of production technologies.

To maintain the momentum of these improvements Knorr-Bremse intends to continue these campaigns and introduce a Group-wide system of energy management.

Social responsibility

For Knorr-Bremse, corporate responsibility also means participating in the life of the community, actively helping shape social development and having a positive impact on the social environment. The company is determined to contribute towards positive development in the regions of the world in which it operates and improve the lives of the people who live there. The company not only supports

"As part of the community we involve ourselves in social issues".

large-scale, centrally controlled projects but also local activities as well. And it encourages the personal social involvement of its employees.

During the year in question, the internal CR Award in the category "Social Commitment" went to Knorr-Bremse's site in Nankou, China. Employees there have been supporting the Sun Village organization, which works on supporting and providing education for children whose parents have been sentenced to imprisonment.

Employees take on responsibilities in Local Care projects

So-called Local Care initiatives involve employees at individual sites supporting and becoming personally involved in social projects. Thus, for example, in July 2012 trainees on the Knorr-Bremse Management Evolution Program spent their free time working on renovating a hostel for asylum seekers in Munich with support from Knorr-Bremse.

Under the "Formare" project more than 120 young people from disadvantaged backgrounds have received one-year training as technicians at Knorr-Bremse Brazil since 2005, with Knorr-Bremse employees acting as instructors and teaching the young people technical and social skills.

In November of the year in question, colleagues at Knorr-Bremse's US subsidiary Knorr Brake Corporation (KBC) in Westminster organized a major campaign to donate food to people in New York and New Jersey who had been affected by Hurricane Sandy. A total of two tonnes of food donated by employees and topped up by KBC itself was collected and distributed to the affected people.

Knorr-Bremse Global Care e. V. supports worldwide aid projects

Knorr-Bremse's global involvement in social projects is handled by the charitable association Knorr-Bremse Global Care e. V. Originally founded in 2005 following the tsunami disaster in South-East Asia, Knorr-Bremse Global Care last year spent EUR 1.6 million helping people all over the world who through no fault of their own are in need as a result of environmental disasters, accidents, armed conflict, poverty or disease. During 2012, 50,000 people in 23 countries all over the world benefited from a total of 46 projects.

Apart from emergency disaster relief, the main focus of the association is on education and infrastructure projects aimed at promoting the independence and self-determination of disadvantaged people. By helping people to help themselves, the idea is to achieve structural change and achieve a lasting impact on their lives. To achieve this, the association works with the local population from the very outset, so that the beneficiaries identify more closely with the project and take more responsibility for it themselves, once it has officially been completed. Experience in many cases has shown that this has a very positive affect on the long-term success of projects.

In 2012, in the wake of the famine in East Africa, Knorr-Bremse Global Care launched four long-term projects in the region aimed at ensuring secure food supplies and preparing those affected to cope with future droughts. For example the association worked in Kenya with World Vision to support the agricultural development of an entire region. Once again, the beneficiaries of the project were involved from the outset, receiving training in new and efficient agricultural methods that included improved methods of cultivation, poultry-rearing and the processing of goat's milk. Experimental fields were set up so that the lessons learned could be immediately put into practice and participants exchanged ideas about the latest insights and the traditional skills they had brought with them. The first results can already be seen: the framers' groups have now planted the seed in so-called water basins designed to retain water, so the soil remains moist and the plants can benefit from scarce rainwater for longer. Vegetables planted in greenhouses can be stored for longer following harvesting and therefore sold for a better price, depending on the state of the market.


CROP MAIZE
VARIETY KDVI
PLANTED ON 5-11-2012
RAINED ON 3-11-2012
GERMINATED ON 12/11/12
HARVESTED ON


KNORR
BREMSE


Growing with Values


KNORR-BREMSE

Employees

All employees of the Knorr-Bremse Group have made a vital contribution to our positive growth in recent years. Their outstanding work ethic and dedication have made 2012 a successful year as well. Motivated employees who identify with the organization are the driving force behind the innovation, quality and sustainable growth of the Group. To create a fair and motivating work environment for all its employees, Knorr-Bremse assigns especially high priority to its responsibility towards the workforce.

Employment situation

Employment at the Group and by division

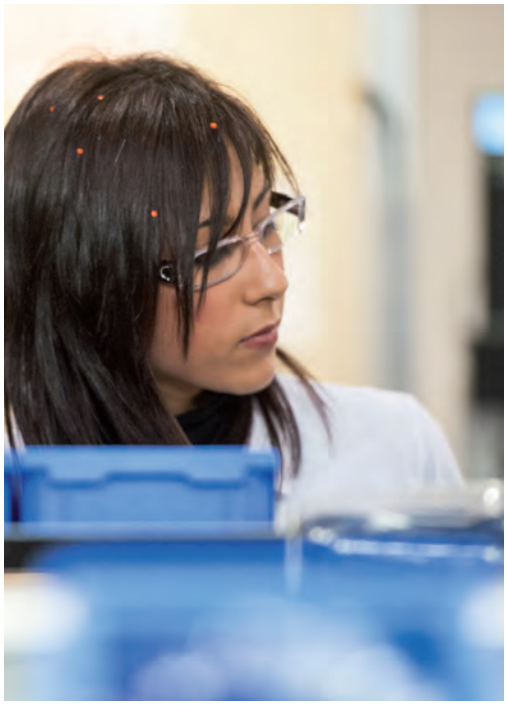
At the end of 2012, the Knorr-Bremse Group employed 19,120 people (17,539 excluding leasing). This represents a 4.6% decrease (2011: +11.1%) in staffing levels compared to December 31, 2011, when the Group had 20,050 employees (18,143 excl. leasing).

In Knorr-Bremse's two divisions, this breaks down as follows: In the Rail Vehicle Systems division the number of employees fell from 11,083 (9,955 excl. leasing) at the end of 2011 to 10,840 (9,781 excl. leasing) at the end of the year under review. The Commercial Vehicle Systems division employed 7,941 people (7,422 excl. leasing) on December 31, 2012, compared to 8,636 (7,858 excl. leasing) one year earlier. The number of employees in the holding companies increased from 331 (330 excl. leasing) to 339 (336 excl. leasing) at the end of 2012.

Employment by region

On December 31, 2012 the Group had 10,251 employees (9,766 excl. leasing) in the Europe/Middle East/Africa region, down 1.83% from 2011. This region represents 53.6% (2011: 52.1%) of the Group's total workforce. Knorr-Bremse employed 3,750 (3,541 excl. leasing) people in Germany at the end of the year under review, a 2.55% decrease compared to the previous year. Germany accounted for 19.6% of all Knorr-Bremse employees. Excluding Germany, in the Europe/Middle East/Africa region the number of employees sank from 6,594 (6,370 excl. leasing) to 6,501 (6,225 excl. leasing), which equates to 34.0% (2011: 32.9%) of the total workforce.

The Group had 3,578 employees in North America on December 31, 2012 (3,449 excl. leasing), down 4.8% from the previous year. The proportion of Group employees in North America remained stable at 18.7%. The Group had 607 employees in South America in 2012 (562 excl. leasing), compared to 811 in 2011 (805 excl. leasing).



Staffing levels also decreased in the Asia/Australia region. While the Group had 5,039 employees in the region at the end of 2011 (3,823 excl. leasing), on December 31, 2012 it had a workforce of 4,684 (3,762 excl. leasing). This represents a reduction of 7.04%. The proportion of the Group workforce employed in the Asia/Australia region dropped to 24.5% (2011: 25.1%).

Knorr-Bremse works on becoming a more attractive employer

A look at new jobs in the Knorr-Bremse Group reveals a significant increase in the number of white-collar jobs and engineering and service positions. This increase in qualified staff indicates the attractiveness of Knorr-Bremse as an employer. At the same time, it underscores the need to further intensify efforts to recruit engineering graduates. In Germany, Knorr-Bremse is pursuing this objective by partnering with universities, offering work-study programs, expanding marketing activities aimed at students and sharpening the focus of its employer branding.

Positions for qualified professionals are not only created in Knorr-Bremse's central divisions, but at its various locations as well – in keeping with its commitment to sustainable local development in the regions where it does business. For example, a new Knorr-Bremse Technology Center is to open for business in Pune, India. By 2015 this joint product development center for the Rail Vehicles Systems and Commercial Vehicle Systems divisions is planning to employ a total of 200 development engineers, who will contribute their knowledge and expertise to the overall success of Knorr-Bremse.

Human resources planning and management optimized

In 2012 most industrial enterprises saw an increase in their personnel costs due to collective bargaining agreements in several industrialized nations and in particular to wage increases in the BRIC nations. In addition, increasing competition for qualified professionals and managers have made it necessary to adapt to the prevailing market conditions. To reward good performance and stay abreast of the changing parameters of the labor market, in the year under review Knorr-Bremse reviewed job classifications and pay grades for management positions around the world. In addition, human resources planning and management were optimized, with worldwide employee fluctuation recorded on a monthly basis, starting in February 2012. This makes staffing levels more transparent and allows for more efficient management of future requirements.

Human resources development

Focus on professional and personal goals

Shared success calls for dialogue – a trust-based exchange between supervisor and employee. Dialogue is essential not only for giving feedback and making certain that everyone is on the same page, but also for recognizing previously untapped potential, identifying new development opportunities and working together to achieve professional and personal goals. This is the objective of Knorr-Bremse's Staff Dialogue, which provides a framework for an annual, comprehensive, one-on-one discussion between employees and their supervisors.

Knorr-Bremse improves career development

To better identify employee potential and support the career development of junior managers, in 2012 the Staff Dialogue was expanded to become a standardized Group-wide performance evaluation process. The employee perspective is brought into the dialogue in the form of a self-assessment as well as employee suggestions for setting targets. In the performance appraisal, performed by the

supervisor, defined criteria and a shared data pool ensure transparency and uniform evaluation standards regardless of location and division. This allows employees to optimize their professional development on an international scale and apply special experience and skills in different areas of the Group. The third step involves a panel round, in which the assessments of the employee and supervisor are examined and validated by other managers. This lends the performance evaluation an additional degree of objectivity, making the early identification of valuable high potentials even more precise. Knorr-Bremse aims to fill as many of its worldwide management positions as possible with internal talent. A new three-stage assessment focuses on actively fostering the career development of talented individuals.

Knorr-Bremse successfully trains young managers

Knorr-Bremse has been running its Management Evolution Program (MEP) for more than a decade now, offering a special opportunity to management trainees as they start their careers. MEP trainees participate in three six-month placements within the Group, working on important projects and gaining valuable insights into operations. Special focus is placed on the international nature of the training program. In addition to MEP, Knorr-Bremse's subsidiary Bendix has rolled out the Engineering Development Program (EDP) in the USA. EDP targets US college graduates, offering them the opportunity to participate in a comprehensive technical qualification program.

An attractive employer

Satisfied employees are important to business performance

Knorr-Bremse sees satisfied and motivated employees as valuable assets who make a significant contribution to corporate performance. With this in mind, the Group offers numerous benefits and works continuously to boost its attractiveness as an employer. In addition to many new programs to help employees balance career and family, in 2012 Knorr-Bremse scored highly in external audits and certifications.

Employees' opinions help shape the company's future

The regular Global Employee Survey offers Knorr-Bremse employees a chance to actively help shape the future of the company. After the fourth such survey was conducted in 2011, in the year under review Knorr-Bremse began to analyze the results in detail and act on the feedback in concrete activities. By October 2012, almost 120 workshops had been held in more than twenty countries. Taken together, all Knorr-Bremse locations rolled out over 600 individual measures for improving working conditions.

Knorr-Bremse improves measures for balancing career and family

As Knorr-Bremse worked to improve its attractiveness as an employer in 2012, special emphasis was placed on facilitating a better work-life balance. For example, at Group headquarters in Munich, Germany, an initiative was launched to introduce part-time models featuring very flexible terms and individually defined working hours. Sabbaticals lasting several months will also be possible. In this way, Knorr-Bremse supports employees who would like to focus more intensely on their families for a time, participate in continuing professional development activities or pursue volunteer work. Since July 1, 2012 employees have also had the option of working from home – by the hour or by the day. In Munich alone, 595 employees are currently taking advantage of the telecommuting model.

Knorr-Bremse certified in "berufundfamilie" audit

In Germany the Hertie Foundation's "berufundfamilie" (career and family) audit is a recognized seal of quality for family-friendly HR policies. Knorr-Bremse took part in the process for the first time in 2012. The audit looked not only at measures that make it easier to balance career and family, but also at other aspects such as flexible working hour models. In December 2012 the Munich facility received certification with outstanding scores for its excellent working conditions that allow employees to balance career performance and personal development.

Leadership excellence

Knorr-Bremse improves management development

The redefinition of Knorr-Bremse's corporate values also created a strong foundation for the Group's leadership culture. Building on this, an improved management development concept is being gradually rolled out.

At the beginning of 2012, all top executives worldwide received training in leading organizations and employees responsibly. To facilitate a uniform approach to management, the training program adhered to Group-wide standards while at the same time taking into account the cultural differences that prevail in each country. In addition to the corporate values, the focus was also on the concept of transformational leadership as well as the culture changes associated with Generation Y.

In the middle of the year under review, the core elements of the executive training sessions were transferred to the next level of the management hierarchy with the goal of sending a consistent message to the management team. A side benefit, facilitated by the international rollout of the training program, has been the creation of opportunities for managers to network and exchange ideas across the boundaries of departments and locations. In 2013 the management development program will be launched in the Americas as well. The third reporting level, i.e. team leaders, will also be included in the process in 2013.

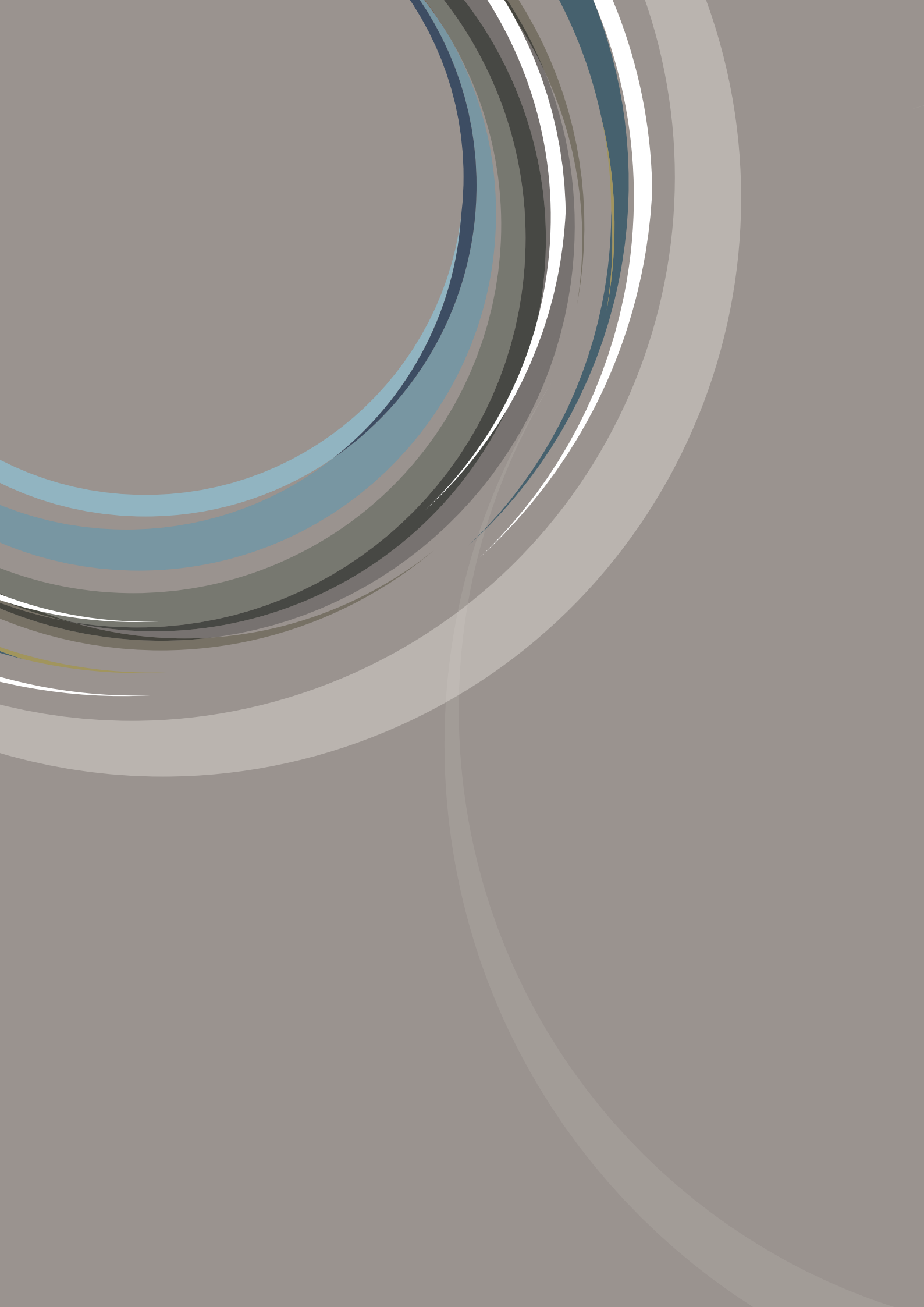
At Knorr-Bremse, the professional development of employees with management responsibilities is not limited exclusively to the management hierarchy. For example, six workshops were held in the Aldersbach plant to train shift, machine-shop and group supervisors in specific management techniques. Following the positive experience with this pilot project, the program will be introduced at other production facilities in the future.

New leadership principles introduced

Managers at Knorr-Bremse have a particular responsibility to ensure that the new corporate values are actually being lived. In this context, in 2012 Knorr-Bremse began developing new leadership guidelines to provide specific recommendations for management behavior. Over 100 managers from all regions and levels of the hierarchy took part in a series of workshops to establish what leadership excellence really means to Knorr-Bremse. Communication of the finalized leadership guidelines is scheduled for early 2013.

"Leadership in Dialogue" initiative launched

To facilitate communications between managers and establish a platform for cross-functional exchanges on relevant topics, the Leadership in Dialogue initiative was established in 2012. As part of this program, events are held in Munich as often as four times a year, and all managers from the first reporting level are invited to attend. In the context of these meetings, current leadership topics concerning mid-level management are presented and discussed. Managers at facilities outside Germany who are unable to attend the events are informed about the issues discussed in Munich by e-mail or by their local HR officer. This dialogue not only serves to launch new products, such as telecommuting, effectively, it is also a source of feedback that can be integrated in new professional development concepts.



Notes to the 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 lower 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 Article 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:	5.06% p.a.
Salary increases:	3.00% p.a.
Annuity trend:	1.50% p.a.

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 5.90%.

Liabilities are stated at their settlement value.

Consolidated companies

In addition to Knorr-Bremse AG, 20 German and 99 foreign subsidiaries over which Knorr-Bremse AG can exert a direct or indirect controlling influence are included in the consolidated financial statements.

Investments in one German and one foreign company are shown in the consolidated financial statements as investments in associated companies. Eight 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 2012 the Group founded the following companies, which are included in consolidation:

Knorr-Bremse Pensionsgesellschaft mbH, Munich/Germany
Knorr-Bremse Systeme für Nutzfahrzeuge Pensionsgesellschaft mbH, Munich/Germany
Knorr-Bremse Technology Center India Private Limited, Pune/India

The following company has been renamed:

Knorr-Bremse Railway Technologies (Shanghai) Co., Ltd., Shanghai/China
(formerly Merak Railway Technologies (Shanghai) Co., Ltd., Shanghai/China)

The following companies have been merged or sold:

Gorilla Brake & Components, Inc., Brantford, Ontario/Canada
ITERIS Europe GmbH, Bietigheim-Bissingen/Germany
Stahlwerk Volmarstein GmbH, Wetter (Ruhr)/Germany

This means that compared to the previous year, the number of companies included in consolidation has increased by one German company and one foreign company. 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 did not bring about any change in the balance sheet total.

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 amortization 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 192,655 in fiscal year 2012. This figure includes capital expenditure in the amount of TEUR 165,803.

In EUR thousands (TEUR)	Carried forward Jan. 1, 2012 *)	Additions *)	Reclassifications *)	Disposals *)	
Industrial property rights/trademarks	275,195	17,026	4,684	(503)	
Goodwill	294,110	643	0	0	
Purchased intangibles	**569,305**	**17,669**	**4,684**	**(503)**	
Land, equivalent rights to real property, and buildings, including buildings on land not owned	310,874	5,716	2,818	(559)	
Technical equipment and machinery	510,610	27,564	22,934	(23,696)	
Other equipment, plant and office equipment	437,306	43,649	12,063	(11,931)	
Advances to suppliers and construction in progress	76,744	98,057	(42,499)	(600)	
Fixed assets	**1,335,534**	**174,986**	**(4,684)**	**(36,786)**	
Investments in affiliated companies	6,834	800	0	(94)	
Investments in associated companies	4,326	0	0	(875)	
Miscellaneous investments	78,532	2,809	0	(2,308)	
Investments	**89,692**	**3,609**	**0**	**(3,277)**	
Intangibles, fixed assets and investments	**1,994,531**	**196,264**	**0**	**(40,566)**	

*) valued at acquisition or production cost

	Currency differences *)	Balance Dec. 31, 2012 *)	Accrued depreciation/ amortization	Net value Dec. 31, 2012	Net value Dec. 31, 2011	Depreciation/amortization during the fiscal year
	(2,411)	293,991	(222,940)	71,051	75,882	(18,870)
	(1,366)	293,387	(224,516)	68,871	113,456	(45,421)
	(3,777)	**587,378**	**(447,456)**	**139,922**	**189,338**	**(64,291)**
	377	319,226	(132,368)	186,858	185,916	(7,473)
	(1,707)	535,705	(341,567)	194,138	197,178	(47,695)
	(3,561)	477,526	(362,297)	115,229	114,177	(40,120)
	(3,318)	128,384	(6,212)	122,172	70,897	(261)
	(8,209)	**1,460,841**	**(842,444)**	**618,397**	**568,168**	**(95.549)**
	(74)	7,466	(2,794)	4,672	4,041	0
	0	3,451	0	3,451	4,326	0
	(1,847)	77,186	(16,082)	61,104	62,449	0
	(1,921)	**88,103**	**(18,876)**	**69,227**	**70,816**	**0**
	(13,907)	**2,136,322**	**(1,308,776)**	**827,546**	**828,322**	**(159,840)**

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 resulting goodwill is subject to scheduled amortization over a period of not more than 20 years. Other intangibles are subject to scheduled depreciation over periods of between three and 10 years.

In fiscal year 2012 an additional provision in the amount of EUR 18.7 million was made against goodwill in Knorr-Bremse Systeme für Schienenfahrzeuge Ibero Holding GmbH, Munich/Germany.

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 company Gorilla Brake & Components, Inc., Brantfort, Ontario/Canada, hitherto valued using the equity method, was sold in fiscal year 2012. Miscellaneous investments consist of miscellaneous loans (TEUR 16,624), loans to affiliated companies (TEUR 42,508), long-term investments (TEUR 1,823), 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/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

1 Consolidated affiliated companies (continued)	Share in capital in %
Hasse & Wrede GmbH, Berlin/Germany	100.0
Heine Resistors GmbH, Dresden/Germany	100.0
Heine Resistors (Suzhou) Co. Ltd., Suzhou/China	100.0
IFE-CR a.s., Brno/Czech Republic	100.0
IFE North America LLC, Westminster, Maryland/USA	100.0
IFE-Tebel Australia Pty. Ltd., Granville/Australia	100.0
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	70.0
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 Corporation Canada Holdings Ltd., Montreal/Canada	100.0
Knorr Brake Corporation, Westminster, Maryland/USA	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 / 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., São Paulo/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

1 Consolidated affiliated companies (continued)	Share in capital in %
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 Railway Technologies (Shanghai) Co., Ltd., Shanghai/China	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	70.0
Knorr-Bremse Sistemas para Veículos Comerciais Brasil Ltda., São Paulo/Brazil	100.0
Knorr-Bremse Sistemas para Veículos Ferroviários Ltda., São Paulo/Brazil	100.0
Knorr-Bremse Sistemi per Autoveicoli Commerciali S.p.A., Arcore/Italy	100.0
Knorr-Bremse System för Tunga Forden 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 Ltd., Bristol/United Kingdom	100.0
Knorr-Bremse Systems for Commercial Vehicles OOO, Moscow/Russia	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 Private Limited, 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 Jármü 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 Electromecãnicos Ltda., Barueri, São Paulo/Brazil	90.0
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	51.0
M.S. Resistances S.A.S., Saint-Chamond/France	51.0
New York Air Brake Corporation, Watertown, New York/USA	100.0

1 Consolidated affiliated companies (continued)	Share in capital in %
Oerlikon-Knorr Eisenbahntechnik AG, Niederhasli/Switzerland	100.0
Sigma Air Conditioning Pty. Ltd., Wetherill Park, Sydney/Australia	100.0
Sigma Coachair Group (China) Co. Ltd., Changzhou/China	100.0
Sigma Coachair Systems (US) Inc., Chicago/USA	100.0
Sigma Transit Systems Pty. Ltd., Wetherill Park, Sydney/Australia	100.0
Skach Ges.m.b.H., Mödling/Austria	100.0
Sociedad Española de Frenos, Calefacción y Señales S.A., Getafe/Spain	100.0
STE Schwingungs-Technik GmbH, Klieken/Germany	100.0
Sydac Ltd., Manchester/United Kingdom	100.0
Sydac Pty. Ltd., Adelaide/Australia	100.0
Technologies Lanka Inc., La Pocatière/Canada	75.0
Techtrain Associates Ltd., Doncaster/United Kingdom	100.0
Unicupler GmbH, Niederurnen/Switzerland	100.0
Westinghouse Brakes Australia Pty. Ltd., Concord West/Australia	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 %
Icer Rail S.L., Pamplona/Spain	50.0
Webasto Kiekert Bustüren GmbH, Karlsfeld/Germany	50.0

3 Affiliated companies not included in consolidation	Share in capital in %
Black River Air Logistics Corp., Watertown, New York/USA	100.0
Di-Pro LLC., Fresno, California/USA	100.0
Freios Knorr Argentina S.A., Buenos Aires/Argentina	100.0
KB Investment UK Ltd., Chippenham/United Kingdom	100.0
Knorr-Bremse RUS OOO, Nizhny Novgorod/Russia	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

	2012 TEUR	2011 TEUR
Materials and supplies	198,088	244,436
Work in process	54,989	58,010
Finished products, merchandise	195,072	214,838
less advances received on orders	(177,738)	(227,500)
Total	**270,411**	**289,784**

7 Receivables and other assets

	2012 TEUR	2012 TEUR	2011 TEUR
	Remaining term more than 1 year	in total	in total
Accounts receivable, trade	4,191	663,928	695,183
Other assets	8,225	100,237	109,341
Total	**12,416**	**764,165**	**804,524**

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 15,507 (2011: TEUR 12,337).

10 Deferred taxes

At the balance sheet date deferred tax assets amounted to TEUR 53,533 (2011: TEUR 63,030). 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 26,235 (2011: TEUR 32,728) relate to deferred taxes on individual balance sheets of group companies and TEUR 27,298 (2011: TEUR 30,302) 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 ca. 35%.

Capital stock 11

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.

Capital reserves 12

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).

Retained earnings 13

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 8,607 (2011: 8,883). The statutory reserves (TEUR 7,147) rose by TEUR 278 compared to the previous year (TEUR 6,869). Miscellaneous retained earnings amounted to TEUR 519,761 (2011: 415,978) at the balance sheet date.

Pension plan accruals 14

Pension plan accruals are valued according to the provisions of the German Accounting Law Modernization Act.

	2012 TEUR	2011 TEUR
Pension plan accruals	202,202	199,667

The shortfall in cover for pension funds in United Kingdom amounted to TEUR 6,862 as at year-end 2012.

Other accrued liabilities 15

	2012 TEUR	2011 TEUR
Provisions for taxes	81,394	78,940
Miscellaneous accruals	639,598	564,351
Total	**720,992**	**643,291**

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

	2012 TEUR	2012 TEUR	2011 TEUR
	Remaining term less than 1 year	in total	in total
Accounts payable, banks	**25,707**	**132,915**	**135,394**
Accounts payable, trade	**470,244**	**471,346**	**514,410**
Other liabilities:			
Liabilities from accepted bills	700	700	6,063
Miscellaneous liabilities	88,014	89,322	126,319
(thereof for taxes)	(22,626)	(22,626)	(51,513)
(thereof for social security)	(11,940)	(11,940)	(11,443)
	88,714	**90,022**	**132,382**
Total liabilities	**584,665**	**694,283**	**782,186**
(thereof with a remaining term of more than 5 years)		(6,020)	(2,075)

17 Contingencies and miscellaneous financial commitments

	2012 TEUR	2011 TEUR
Warranties	9,025	8,262
Guarantees	14,643	14,332
Leasing commitments	210,230	190,669

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 210,230; maturities range from one year or less (TEUR 32,236), to between one and five years (TEUR 93,141), to over five years (TEUR 84,853). 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 accruals, income from disposals of fixed assets and rental income. The heading also carries gains on currency differences amounting to TEUR 40,052 (2011: TEUR 65,237)

Income relating to other accounting periods in the amount of TEUR 30,362 (2011: 42,531), generated primarily from the reversal of accruals, is also shown under Other operating income.

Cost of materials 19

	2012 TEUR	2011 TEUR
Expenditure on materials, supplies and merchandise	2,095,331	2,123,014
Expenditure on services purchased	104,926	88,709
Total	**2,200,257**	**2,211,723**

Personnel expenses/staff 20

	2012 TEUR	2011 TEUR
Wages and salaries	703,439	649,496
Statutory social welfare contributions and expenses relating to pensions and employee benefits	158,024	155,320
Personnel costs	**861,463**	**804,816**
(thereof for retirement benefits)	(22,312)	(39,788)
Average number of employees during the fiscal year	**Number**	**Number**
Wage earners	8,507	8,634
Salary earners	9,186	8,669
Apprentices	177	205
Total	**17,870**	**17,508**

Depreciation 21

	2012 TEUR	2011 TEUR
Depreciation and amortization on purchased intangibles and on fixed assets	159,840	164,619

In addition, rental and leasing expenses totaling TEUR 56,764 (2011: TEUR 51,079) were incurred during the reporting period.

Other operating expenses 22

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 18,499 (2011: TEUR 15,420). Expenses resulting from foreign exchange fluctuations during the fiscal year amounted to TEUR 44,197 (2011: TEUR 62,346).

The fee paid to the independent auditors, KPMG AG Wirtschaftsprüfungsgesellschaft and their affiliates, amounted to TEUR 494 for fiscal year 2012. Of this TEUR 407 was paid out for audit services and TEUR 87 for other services.

23 Financial results

	2012 TEUR	2011 TEUR
Miscellaneous interest and similar income	13,608	14,065
Depreciation on investments	0	(6)
Interest and similar expenses	(17,231)	(18,005)
(thereof for discounts on accruals)	(10,876)	(9,932)
Income from associated, affiliated and other companies	(657)	(181)
Total	**(4,280)**	**(4,127)**

24 Taxes on income

Taxes on income and earnings amounted to TEUR 168,432 (2011: TEUR 168,794), and included deferred taxes in the amount of TEUR 7,696 (2011: TEUR 9,340).

25 Net income

	2012 TEUR	2011 TEUR
Net income	**295,027**	**329,296**
Minority interests in earnings of consolidated subsidiaries	(40,220)	(38,198)
Retained earnings brought forward from the previous year (after distribution of dividends)	107,924	106,556
Transfers to retained earnings	(121,713)	(133,730)
Unappropriated consolidated net income (Knorr-Bremse AG unappropriated retained earnings)	**241,018**	**263,924**

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 40.2 million. Financial instruments amounting to EUR 857.5 million in total (representing hedged risks) are included in macro hedges. Of this amount, EUR 285.2 million is attributable to the hedging of assets (micro hedges), EUR 56.7 million to the hedging of open contracts (micro hedges) and EUR 515.6 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 totaling EUR 4.5 million are carried in full in macro hedges.

The nominal and market values of financial instruments as at December 31, 2012 break down as follows:

	Total Dec. 31, 2012	Total Dec. 31, 2012	Total Dec. 31, 2011	Total Dec. 31, 2011
in EUR millions	Nominal value	Market value	Nominal value	Market value
Foreign exchange contracts				
Forward exchange transactions	530	7	611	(26)
Currency options	200	1	170	(3)
Interest rate contracts				
Cross currency swaps	132	(24)	125	(30)
Interest rate swaps	36	(7)	36	(4)
Commodity-related contracts				
Swaps	4	0	7	(1)

Negative market values correspond to the risks associated with financial derivatives; of these, EUR 0.05 million are recorded under accrued liabilities. 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 3.0 million.

27 Research and development expenditure

In fiscal year 2012, Group expenditure on research and development amounted to TEUR 249,729 (2011: TEUR 208,823).

28 Miscellaneous

The Group financial statements are published in the official electronic 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 333 and the total remuneration of the Executive Board to TEUR 3,888. Pension commitments to former members of the Executive Board and their surviving dependents are covered by an accrual of TEUR 24,769; payments in the fiscal year amounted to TEUR 3,379.

Munich, March 1, 2013

Knorr-Bremse AG
Executive Board

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.

	2012 TEUR	2011 TEUR
Result for the period (including minority interests in consolidated results)	295,027	329,296
Depreciation and amortization on/Additions to intangibles and fixed assets	159,840	164,625
Increase in accruals	87,846	110,699
Income from disposals of intangibles, fixed assets and investments	2,032	(25,542)
Decrease (2011: increase) in inventories, receivables and other assets not related to investing or financing activities	52,109	(70,092)
Decrease (2011: increase) in payables and other liabilities not related to investing or financing activities	(81,460)	33,315
Cash flows from operating activities	**515,394**	**542,301**
Disbursements for investments in intangible assets	(8,375)	(10,472)
Proceeds from disposals of intangible assets	154	854
Disbursements for investments in fixed assets	(157,428)	(148,391)
Proceeds from disposals of fixed assets	3,841	36,669
Disbursements for investments in financial assets	(2,809)	(6,855)
Proceeds from disposals of financial assets	3,089	592
Disbursements for the acquisition of consolidated companies and other business units	(7,836)	(52,423)
Proceeds from disposals of consolidated companies and other business units	194	
Cash flows from investing activities	**(169,170)**	**(180,026)**
Proceeds from additions to shareholders' equity	210	114
Disbursements to company owners and minority shareholders	(184,933)	(177,415)
Proceeds from borrowings	8,091	59,463
Disbursements for the redemption of borrowings	(10,138)	(36,938)
Cash flows from financing activities	**(186,770)**	**(154,776)**
Change in cash funds resulting from exchange rate movements and changes in group structure	(7,979)	12,018
Changes in cash funds resulting from cash-relevant transactions	**151,475**	**219,517**
Cash funds at the beginning of the period	532,396	312,879
Cash funds at the end of the period	683,871	532,396

Interest paid out in fiscal year 2012 amounted to TEUR 5,832 (2011: TEUR 7,588), interest received to TEUR 10,323 (2011: TEUR 11,759). Income tax paid out in 2012 amounted to TEUR 116,251 (2011: TEUR 111,577), tax refunds received to TEUR 6,893 (2011: TEUR 12,760).

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 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	0	(687)
Result for affiliated and other companies	30	0	0	30
Assets	1,305,541	589,035	720,457	2,615,033

Fiscal Year 2011	Europe	Americas	Asia/ Australia	Knorr-Bremse Group
in EUR thousands (TEUR)				
Sales by region	2,582,660	1,064,929	1,078,656	4,726,245
(thereof net sales with third parties)	2,169,485	1,020,007	1,051,305	4,240,797
(thereof net sales with other segments)	413,175	44,922	27,351	485,448
Net income	173,881	76,043	79,372	329,296
Income tax charge	89,130	38,979	40,685	168,794
Investments (excluding financial investments)	85,307	38,086	35,471	158,864
Depreciation (excluding financial investments)	76,145	33,269	55,205	164,619
Result for associated companies	(200)	0	0	(200)
Result for affiliated and other companies	19	0	0	19
Assets	1,235,951	602,726	691,716	2,530,393

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

Fiscal Year 2011	Net sales	Investments (excluding financial investments)	Depreciation (excluding financial investments)	Assets
in EUR thousands (TEUR)				
Rail vehicle systems	2,186,898	65,932	97,738	1,476,974
Commercial vehicle systems	2,068,223	74,686	60,776	1,136,804
Miscellaneous/consolidations	(14,324)	18,246	6,105	(83,385)
Knorr-Bremse Group	4,240,797	158,864	164,619	2,530,393

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 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

Changes in group equity 2011	Capital stock	Capital reserves	Retained earnings	Net income	Minority interests	Knorr-Bremse Group
in EUR thousands (TEUR)						
As at Dec. 31, 2010	67,600	153	313,008	262,556	110,544	753,861
Dividend payments				(156,000)	(21,415)	(177,415)
Net income 2011				291,098	38,198	329,296
Transfers to retained earnings			133,730	(133,730)		0
Currency fluctuations			(1,371)		1,031	(340)
Other fluctuations			(13,637)		10,610	(3,027)
As at Dec. 31, 2011	67,600	153	431,730	263,924	138,968	902,375

Group equity includes capital differences arising on foreign currency translation in the amount of TEUR -6,859, of which TEUR -846 relates to minority interests.

Other changes in minority interests result primarily from the purchase of former minority interests in Heine Resistors GmbH, Dresden/Germany. Following the purchase, the Group holds a 100% interest 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, 2012. 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 1, 2013

KPMG AG
Wirtschaftsprüfungsgesellschaft

signed Rupprecht,
Independent auditor

signed Peth,
Independent auditor

Consolidated Balance Sheet as at December 31, 2012

Assets	Notes	Dec. 31, 2012 TEUR	Dec. 31, 2011 TEUR
Purchased intangibles	(3)	139,922	189,338
Fixed assets	(4)	618,397	568,168
Investments	(5)	69,227	70,816
Intangibles, fixed assets and investments		**827,546**	**828,322**
Inventories	(6)	270,411	289,784
Accounts receivable, trade	(7)	663,928	695,183
Other assets	(7)	100,237	109,341
Other marketable securities		15	18
Cash and cash equivalents	(8)	683,856	532,378
Current assets		**1,718,447**	**1,626,704**
Prepaid expenses	**(9)**	**15,507**	**12,337**
Deferred tax assets	**(10)**	**53,533**	**63,030**
Balance sheet total		**2,615,033**	**2,530,393**

Equity and Liabilities	Notes	Dec. 31, 2012 TEUR	Dec. 31, 2011 TEUR
Capital stock	(11)	67,600	67,600
Capital reserves	(12)	153	153
Retained earnings	(13)	535,515	431,730
Unappropriated consolidated net income	(25)	241,018	263,924
Minority interests		150,921	138,968
Group equity		**995,207**	**902,375**
Pension plan accruals	(14)	202,202	199,667
Other accrued liabilities	(15)	720,992	643,291
Accruals		**923,194**	**842,958**
Accounts payable, banks		132,915	135,394
Accounts payable, trade		471,346	514,410
Other liabilities		90,022	132,382
Liabilities	**(16)**	**694,283**	**782,186**
Deferred income		**2,349**	**2,874**
Balance sheet total		**2,615,033**	**2,530,393**

Consolidated Statement of Income for the Fiscal Year from January 1 to December 31, 2012

	Notes	2012 TEUR	2011 TEUR
Net sales		4,300,108	4,240,797
Changes in inventories		(13,005)	11,756
Own work capitalized		466	395
Total operating performance		**4,287,569**	**4,252,948**
Other operating income	(18)	126,408	191,467
Cost of materials	(19)	(2,200,257)	(2,211,723)
Personnel expenses	(20)	(861,463)	(804,816)
Depreciation and amortization on purchased intangibles and fixed assets	(21)	(159,840)	(164,619)
Other operating expenses	(22)	(724,678)	(761,040)
Financial results	(23)	(4,280)	(4,127)
Income before taxes		**463,459**	**498,090**
Taxes on income	(24)	(168,432)	(168,794)
Net income	**(25)**	**295,027**	**329,296**
Minority interests in results of consolidated subsidiaries		40,220	38,198

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