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INFORMER

The customer magazine of Knorr-Bremse
Rail Vehicle Systems

Project

EU-MODURBAN project
COPE

Sites

IFE acquisitions

Product

EP 2002 Cube brake control

Quality

International certification

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Metro-Station Herrera Oria in Madrid
Photo: Antonio de Santiago Laporte



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Editorial

Rail is the transport mode of the future – and Knorr-Bremse is contributing to its development by investing heavily in increasingly sophisticated vehicle systems. The MODURBAN project offered a welcome opportunity for us to coordinate our efforts with other players in the rail sector: Manufacturers, suppliers, operators and research organizations from all over Europe and beyond have been working together within this project to establish across-the-board standards that will encourage the development of new products. Knorr-Bremse was the lead company for the MODACCESS module, in which the door system, platform screen door and passenger information system packages were headed up by our subsidiaries IFE, Westinghouse und Frensissemi. And as one of the participants in the MODENERGY module, Merak made important contributions towards achieving energy savings in HVAC systems.

Sector-wide standardization is also called for when it comes to introducing uniform certification systems for the rail vehicle industry, and once again Knorr-Bremse is setting a good example: By the end of this year, all the companies within our rail vehicle division will have been certified to the new IRIS rail standard. This impressive achievement is due not least to our internal quality project COPE, which has improved processes and brought customers the benefits of high-quality, reasonably-priced solutions.

It goes without saying that the same high standards of quality and reliability also apply when new subsidiaries are integrated into the Knorr-Bremse Group. Their customers can count on us to honor all existing obligations in the aftermath of a takeover. The most recent example of this was the smooth transition following our acquisition of the rail vehicle door division of Hübner GmbH.

The latest stage in the success story of EP2002 shows what is possible when development and production processes are carefully coordinated: The EP2002 Cube – the smallest ever brake control unit for the metro segment – has had a sensational impact worldwide. This compact, lightweight unit offers considerable energy savings, and its size means it can be easily installed in any type of vehicle architecture.

As you can see – this current edition of the Informer is brimming over with interesting and exciting themes: I hope you enjoy reading it!

Dr. Frank Gropengießer



Dr. Frank Gropengießer,
Chairman of the Executive Board
Knorr-Bremse Systeme für Schienen-
fahrzeuge GmbH

EU-MODURBAN project

Ideas for the future

First launched in January 2005, MODURBAN is due for completion in March 2009. It has brought together around one table companies that would normally be in competition with one another. On December 16 and 17, 2008 almost 150 specialists came together for the final conference in Madrid, where they exchanged experiences and reviewed the project's progress.

Europe is growing closer together – in the rail sector as elsewhere. Throughout Europe, the rail industry, operators and research organizations are looking for ways to improve the attractiveness of rail-based mass transit systems. And their efforts are being supported by UNIFE. The Brussels-based Union of the European Rail Industries is the coordinator for the MODURBAN project, which involves 39 companies and organizations from 12 EU countries plus Chile and Canada working closely together to create a common foundation for high-quality, attractive rail-based mass transit systems.

MODURBAN final conference a huge success



Dr. Manfred Walter, of the MODURBAN Supervisory Board, has been Head of Innovation at Knorr-Bremse Systeme für Schienenfahrzeuge GmbH since January 2006. Born in Stuttgart in 1953, Dr Walter studied physics and was awarded a doctorate in 1983. Up to 1986 he was in charge of the Central Electronic and Development Laboratory at the University of Stuttgart Institute of Physics.

In 1986 he moved to Robert Bosch GmbH, where he joined the testing technology department. In 1988 he was posted by Bosch for 5 years to Nippon-ABS in Japan and subsequently became head of component development for commercial vehicle brakes until 1997.

Between 1997 and 1999 he worked in Japan for Nippon-ABS and subsequently, till 2000, for Bosch Braking Systems Japan Ltd. as the member of the board of management responsible for development. Up to 2003 he was product manager for thermo systems and, finally, Head of Hybrid Systems Research at Robert Bosch GmbH in Schwieberdingen.

His many successes include introduction of EBS and other new technologies, introduction of processes in partner companies and the development of a center of competence.



MODURBAN brings together leading manufacturers, suppliers, operators and research organizations

Uniform Europe-wide standards

UNIFE has been in agreement with UITP - the International Association of Public Transport – for many years: If Europe is to significantly develop its public transport systems it needs joint projects such as MODURBAN, in which the leading players in the sector collaborate over developing pre-competitive standards and generate a common vision. One important goal that MODURBAN has achieved is the fact that European operators have transcended national, linguistic and cultural borders and agreed on the core requirements for the metro system of the future. The rail industry is supporting this process and developing technical standards on this basis. But over and above this, a joint vision for the rail-based public transportation systems of the future is emerging – a crucial task in view of growing urbanization.



Foto: Emiliano Durán

MODURBAN

MODURBAN, a project in receipt of 50 % EU funding, brings together the major players in the rail industry, operators and research institutions in order to draw up an open common core system architecture for European local rail transportation. The work has been divided into six modules:

- MODONBOARD: On-board intelligent interfaces (lead player: Alstom Transport)
- MODWAYSIDE: Way-side intelligent interfaces (lead player: Ansaldo STS)
- MODCOMM: Communication systems (lead player: Thales Rail Signaling Solutions)
- MODACCESS: Passenger + access related items (lead player: Knorr-Bremse)
- MODENERGY: Energy-saving aspects (lead player: Siemens AG)
- MODSYSTEM: Functional and technical system specifications, dissemination of project results (lead player: RATP)

MODACCESS

Knorr-Bremse has taken over the lead role for one of the modules: In MODACCESS new standards for interaction with passengers are being defined. MODACCESS is divided into three work packages, all of which are being managed by subsidiaries of Knorr-Bremse: door systems by IFE, platform screen doors by Westinghouse and passenger information systems by Frensisitemi.

Door systems

Door systems for urban trains have to consistently meet demanding specifications: frequent opening and closing means they have to be extremely robust and offer a long service life; after all – passenger flows are badly affected if a door fails to function, and boarding and alighting have to be rapidly completed as any delay negatively impacts on the capacity of the network. On the other hand, the door systems must be designed to make sure that the train only moves off when it is certain that no passengers are endangered. A particular challenge for door systems are driverless trains: even without the presence of a driver the doors have to function safely in all situations.

Under the leadership of IFE Automatic Door Systems, MODACCESS has therefore defined strict criteria to ensure that door systems for the European urban train market meet all the relevant requirements.

Platform screen doors

Platform screen door systems are increasingly in demand, as they effectively separate the track from the platform, ensuring rapid and safe arrival and departure of trains on heavily used mass transit systems. They also reduce train noise, enhance the cleanliness of platforms and make it possible for platforms to be air-conditioned. Driverless metro systems with trains running at frequent intervals would be difficult to operate without platform screen doors. It goes without saying that a signaling system capable of controlling the simultaneous opening and closing of platform and train doors with a high degree of precision and reliability is also required.

Under the leadership of Westinghouse Platform Screen Doors the MODACCESS sub-project has drawn up proposals for a European standard and, together with operators, has developed a vision for future developments.

Passenger information and interactive systems

Passenger information systems can make an important contribution to enhancing the attractiveness of rail-based mass transit systems compared with other transportation systems. Attractive audiovisual systems on the platform and in the train can supply passengers with the information they require during normal operations but also in the case of breakdowns. In critical situations, well-designed passenger information and interactive systems help passengers to keep calm and make the right decisions.

Under the leadership of Frensisitemi, the MODACCESS sub-project has carried out an extensive review of passenger information systems on leading European networks, analyzing the theoretical and legal aspects and developing a definition for the interface with the rest of the MODURBAN system.

The MODENERGY sub-project has been examining the potential for achieving energy savings on metro systems. In addition to looking at components that consume energy it has also considered the scope for achieving weight reductions and encouraging energy-efficient driving.

The lead companies for the MODACCESS packages



First set up in 1947 as a research and development Institute, IFE is today one of the world's leading manufacturers of automatic electro-pneumatic and electrical door systems for rail vehicles, including ramps, steps and other access aids. IFE is a division of the Austrian company Knorr-Bremse GmbH, which has its headquarters in Waidhofen an der Ybbs and subsidiaries in the Czech Republic, Spain, the Netherlands, the USA, Australia and China



Westinghouse Platform Screen Doors, with its headquarters in Wiltshire, UK, is the world's leading manufacturer of platform door systems. As a Center of Competence for Knorr-Bremse Rail Systems (UK) Limited, Westinghouse develops new door systems that make an important contribution to enhancing platform safety and comfort. The first Westinghouse systems were delivered in 1987 to Singapore, and today they can be found in increasing numbers of cities all over the world.



Founded in 1990, Frensisitemi, the Italian subsidiary of Knorr-Bremse, is a manufacturer of braking and on-board systems for rail vehicles. In the on-board segment the company produces passenger information systems and toilet systems. Customers in Italy, Switzerland, France, Germany and other countries have come to value the company as a producer of reliable solutions for urban and mainline trains.

MODENERGY

The MODENERGY sub-project focuses on the potential for making energy savings in metro systems. Air-conditioning systems are becoming increasingly important in modern metro systems. In addition to on-board HVAC systems, operators are also beginning to consider air conditioning on platforms in response to passenger demand, particularly in southern climates. All this means that air-conditioning systems are increasingly responsible for high levels of energy consumption. In addition to technical improvements to the performance of HVAC systems the MODENERGY sub-project also carried out simulative optimization of the overall system from the point of view of air conditioning. Knorr-Bremse subsidiary Merak was able to contribute its expertise in the field to the process.



One of the world's three leading suppliers of air-conditioning systems for rail vehicles, Merak Sistemas Integrados de Climatización, has been part of the Knorr-Bremse Group since 2005. Merak HVAC systems can be found on all types of vehicle world-wide. As a specialist in the field, the Knorr-Bremse subsidiary supported the MODENERGY sub-project.

Testing MODURBAN in practice

The achievements of MODURBAN were demonstrated in the practical tests on Madrid Metro carried out on the occasion of the final conference. It also offered an opportunity for participants to inspect passenger information systems developed according to the MODACCESS criteria that are compatible with the MODURBAN system architecture. The specifications drawn up as part of the MODURBAN project are now available to the industry for further development of its product range. They will also help operators with future tendering processes and are intended to provide input for the development of European standards. The MODURBAN documentation is publicly available from UNIFE.

MODURBAN umbrella organizations

UNIFE

UNIFE, based in Brussels, is the umbrella organization for the European rail industry and maintains close contacts with companies and institutions in Europe and elsewhere with a view to encouraging improvement of rail vehicles and the rail infrastructure.

UITP

The Union Internationale des Transports Publics (UITP) based in Brussels is the international organization for public transport. Founded in 1885, UITP comprises more than 3,100 organizations from over 90 different countries, including transport companies and suppliers as well as researchers and public bodies.



Herrera Oria metro station was the location for the practical part of the MODURBAN final event



Bernard von Wullerstorff, MODURBAN coordinator, Head of Railway Systems at UNIFE

"With MODURBAN we managed to bring together leading manufacturers of vehicle and process control technology, central supply companies, ten of the leading European metro operators and prestigious research institutions to develop a forward-looking functional specification and draw up proposals for the system architecture of future rail-based mass transit systems. This should simplify tendering processes in the future and make the systems easier to use for passengers. The project also made an important contribution towards improving mutual understanding between operators and the industry and creating an atmosphere of trust between a wide variety of different partners. I expect it to have a long-lasting positive impact – not only on rail-based mass transit systems but also on the European rail industry in general."

Rainer Döge, BVG

"The project structure covers 6 sub-projects, including the important "MODACCESS" sub-project under the leadership of Knorr-Bremse. The goal is to improve the ease and quality of access for passengers, operators and industrial suppliers. From the point of view of operators we can say that these goals have now been achieved. Upgrading of existing networks or lines and specifications for new systems will be greatly facilitated. We expect a reduction of implementation costs, cheaper, more reliable operation and improved interoperability."

"I am delighted"

How well did MODURBAN

go down with participants?

Here are some reactions:



Paolo Mattera, Cosimo Francini, Frensistemi

"The MODURBAN project offered an opportunity to focus on integrating PIS and video surveillance into a more complex urban transportation system – both wayside and on-board. Starting with in-depth analysis of the functions of PIS, the main requirements for system architectures and component characteristics have been defined – that is the main achievement of WP13. The tests at Metro de Madrid were an important demonstration of the concepts developed by WP13 over a four year period and gave Frensistemi an opportunity to develop and test innovative concepts and architectures."



Hubert Pöchhacker, IFE, Senior System Engineer Electrical

"The aim of the IFE working group was to draw up proposals for standardization of door systems in the metro segment. In the first work package the focus was on door functions (opening, closing, emergency operation, alarm system etc.), and manually-controlled and driverless operation, and in the second package it was on the interface between the train and platform doors, especially in the case of driverless operation. The involvement of big names like RATP (Metro Paris) and London Underground made it possible for IFE to draw up aims and requirements for door systems that will benefit not just IFE but especially the passengers served by our customers."



Carlos Rodriguez, Metro de Madrid New Rolling Stock Engineering Manager

"The cornerstone of the project, and indeed the major result after almost 4 years, is undoubtedly the FRS – a complete set of 'ready-to-use' requirements suitable for all urban rail operators and covering systems ranging from manually driven trains to fully driverless operations. The benefits are crystal clear: a comprehensive set of requirements and a real performance specification. In the case of passenger information systems, as we saw in Madrid, MODURBAN has delivered an overview of PIS, defined the interfaces to other MODURBAN subsystems and provided a functional description of the system architecture as well as a useful overview of regulations in EU member states in the field of video surveillance."



Andrew Cheetham, Knorr-Bremse Rail Systems (UK) / AMC Ltd.

"KBRS took part in the MODURBAN project which commenced in January 2005 and concluded in December 2008. The company was responsible for Work Package 15 within the MODACCESS sub-project. The research tasks completed were:

- D53 - Define PSD functional requirements, including interface requirements
- D54 - Installation requirements for PSD/PED systems for new and existing stations
- D55 - The development of future PD control requirements for modern metro systems
- D53 has the potential to form the basis for an EN standard and has been noted by the project as such."



Pablo Bronchalo, Merak

"MODENERGY developed a dynamic model of the train tunnel system that enables us to calculate the development of temperatures in the entire system, depending on the ambient temperature outside and also taking into consideration the heat generated by the train traction, braking system, passengers, auxiliary equipment and air conditioning. We managed to identify the major factors influencing attempts to reduce the energy consumption of air-conditioning systems both in vehicles and in stations. This global approach was based on close and fruitful cooperation between all players in the metro segment."

Interview

Bridging system divisions

What has MODURBAN and in particular the MODACCESS sub-project achieved? The editors of this Informer spoke to Dr. Marco Nock, the man responsible for innovation at Knorr-Bremse Rail Vehicle Systems, and MODACCESS project leader.



Informer: Dr. Nock, what exactly was your role as MODACCESS project leader?

Dr. Nock: I coordinated the work for the three packages that MODACCESS was divided into. I had to ensure that submission deadlines were adhered to and qualitative requirements met. I also had to make sure the necessary funding was released and provide administrative support for our subsidiaries. I also represented MODACCESS within the overall MODURBAN project with the task of maintaining consistent interfaces between the various parts of MODURBAN. In this function I was also a member of the technical management group of the MODURBAN project.

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Informer: What, in your view are the most important results achieved by MODURBAN?

Dr. Nock: Urban public transport systems now have a standardised core of operator requirements in many fields. This makes it easier for operators when it comes to calls to tender and helps industry develop and manufacture its products. In some areas we also developed a joint vision for future developments, and I'm sure these will soon result in new products and services. But just as important is the network of companies and individuals that developed as a result of our collaboration.



Informer: Have MODURBAN and in particular MODACCESS changed the way the various players in the European passenger rail sector work together?

Dr. Nock: Definitely. We all tend to look at rail transportation through the particular lens of our own experience and aspirations and forget that operators, manufacturers and suppliers in some cases associate very different expectations with urban rail transportation. These differences were openly discussed within MODURBAN. There was sometimes heated debate and we did not end up agreeing on all points, but what we did learn was to understand the point of view of others better. And only by doing so will we be able to overcome the system's limitations in the future and successfully develop products.

Informer: What particularly impressed you?

Dr. Nock: Oh – I could give you a whole list. We made considerable technical progress. One high point was the final event in Madrid. All the companies involved worked very hard to ensure that the field tests and the conference itself were a huge success. Madrid Metro made an important contribution to this. I also found the spirit of MODURBAN developed during the project hugely impressive. This is bound to have a lasting positive influence on very many aspects of urban rail systems. Operators and the rail industry as a whole will benefit equally from this – and of course, last but not least, the passengers themselves.



Acquisitions

Growth on track

Last year once again saw Knorr-Bremse's growth strategy pay dividends: With effect from January 2009 IFE Automatic Door Systems, a division of Austrian Knorr-Bremse GmbH, acquired the rail vehicle door division of Hübner GmbH. And since early 2008 former competitor IGE-CZ s.r.o. has also been helping strengthen IFE's presence in eastern European markets.



When a company changes ownership, its customers want to know one thing: Will they be able to count on the same standards of quality as in the past? If the company concerned is joining the Knorr-Bremse Group, then the answer is yes: We respect the legacy that we take over and can be relied on to adhere to all existing agreements.

Hübner GmbH rail vehicle door division

When Hübner GmbH, an established manufacturer of innovative technical products, decided to sell its rail vehicle door division, the company was keen to find a reliable partner that would continue to serve its customers in the future. And managing partner Reinhard Hübner was in luck: IFE agreed to continue to offer Hübner products at least for the duration of existing contractual commitments and also to fulfill all the company's service and spare parts obligations. By the end of March 2009 IFE will decide whether to continue to use the products, after detailed analysis of the situation and consultation with customers. By then the takeover of customer projects including all procurement and service activities will have been completed. Manufacture and assembly of Hübner systems at IFE's Czech Republic plant started at the end of 2008.

Following acquisition, customers benefit from the joint expertise of the new partnership.

The smoothness of the handover is demonstrated by the way the transfer of current customer projects was handled. Hübner has thus been able to guarantee full customer support in the future. In addition to this, customers now also benefit from IFE's years of experience in developing and manufacturing rail vehicle door systems all over the world.

IGE-CZ

With its acquisition of Czech company IGE-CZ s.r.o., IFE has gained access to new markets in Eastern Europe. Based in the city of Brno, IGE-CZ manufactures street car and metro door systems tailored to the company's main markets in the Czech Republic, Poland, Slovenia, Serbia and Latvia – but also Switzerland. IGE-CZ thus represents an ideal addition to IFE's portfolio: Both partners can join forces without IGE customers having to deal with new contact persons within the company, as it continues to serve the market independently.



Hübner door actuator



Work starts with Hübner equipment at the IFE plant in Brno

Innovation in the metro segment

The world's smallest complete brake control unit

Ever since it was first introduced in 2002, EP2002, the intelligent brake control unit for metro-systems, has enjoyed huge international popularity. Now, with EP2002 Cube, this success story enters a new phase. As soon as it became available the first orders started coming in for the smallest bogie-mounted control unit for metro vehicles.



EP2002 Cube can be installed close to the bogie whatever the vehicle architecture.

EP2002 Cube: summary of advantages

- small
- lightweight
- value for money
- maintenance-friendly
- tried-and-tested control elements
- optimum three-dimensional layout
- all functions in a single module
- minimized development costs

From the very outset the international response to EP2002 was enormously enthusiastic, with more than 13,000 units already sold worldwide. Purchasers have included many Chinese cities, including Beijing, host of the 2008 Olympic Games, London, Manila and Dubai, where the Middle East's only metro system will go into operation in September 2009. With EP2002 Cube all those elements not yet integrated into EP2002 are included in a single unit that is smaller and lighter but still based on tried-and-tested components. It has already impressed high-end customers like the Chinese city of Guangzhou, where it is being used on the new line to Foshan, and the city of Hangzhou.

EP2002 Cube – small in size, big on performance

Multitalented EP2002

But first things first: EP2002 was a compact, space saving unit from the very outset. Whereas traditional braking systems distribute electronic and pneumatic control functions across several bulky units, EP2002 accommodates them in compact modules located close to the bogie on each rail car. The components for load-compensated braking, traction control and the emergency and service brake are installed under the floor, reducing the amount of piping and cabling required.

The performance data for EP2002 are impressive too: During braking the intelligent control system balances different wheel loads and traction characteristics to achieve optimum braking force along the entire length of the train.

Compact control intelligence

Knorr-Bremse presented its latest development – EP2002 Cube – at the end of 2008. With this new unit the entire pneumatic system has been made even more compact than before, with a wide variety of different functions contained in a single cube with integrated piping that also serves as a mounting and pneumatic interface. The usual flanged components such as valves, isolating devices or inspection T-pieces are attached to the cube - and of course the EP2002 brake valve itself. Brake equipment panels or auxiliary component subframes are no longer required; neither is there any need for piping and cabling between the various modules. The maintenance-free air reservoirs can now be

optimally positioned by the vehicle manufacturer, which means that on every vehicle there are now only two installation points required for the service, emergency and parking brake and pneumatic suspension supply control system.

Small cube with a big heart

The new cube combines more functions than the EP2002 control units alone – and at the same time is significantly smaller than an EP2002 with additional units attached. Its virtually quadratic form also enables it to be installed in front of transversely positioned air reservoirs, which means that when new vehicle platforms are developed there is no need to allow for additional longitudinal installation space.

Shedding weight!

The new system architecture of EP2002 Cube also means that the brake control unit is considerably lighter. By getting rid of the component sub-frame and mounting and reducing the piping, some 100 kg have been saved per vehicle. For a metro with six cars this means 600 kg less bulk to accelerate and brake every 60 to 90 seconds.

Minimized development costs

The compact design of EP2002 Cube also brings advantages when it comes to developing new vehicle platforms. Whatever parameters the engineers change during the course of the development process, there is no need for any complicated modification of the brake control system: The installation dimensions and interfaces always remain the same. Changes in the size and configuration of the air reservoirs are also possible without additional development cost, and the developers can also choose between the various versions of EP2002 control valves at the last minute.

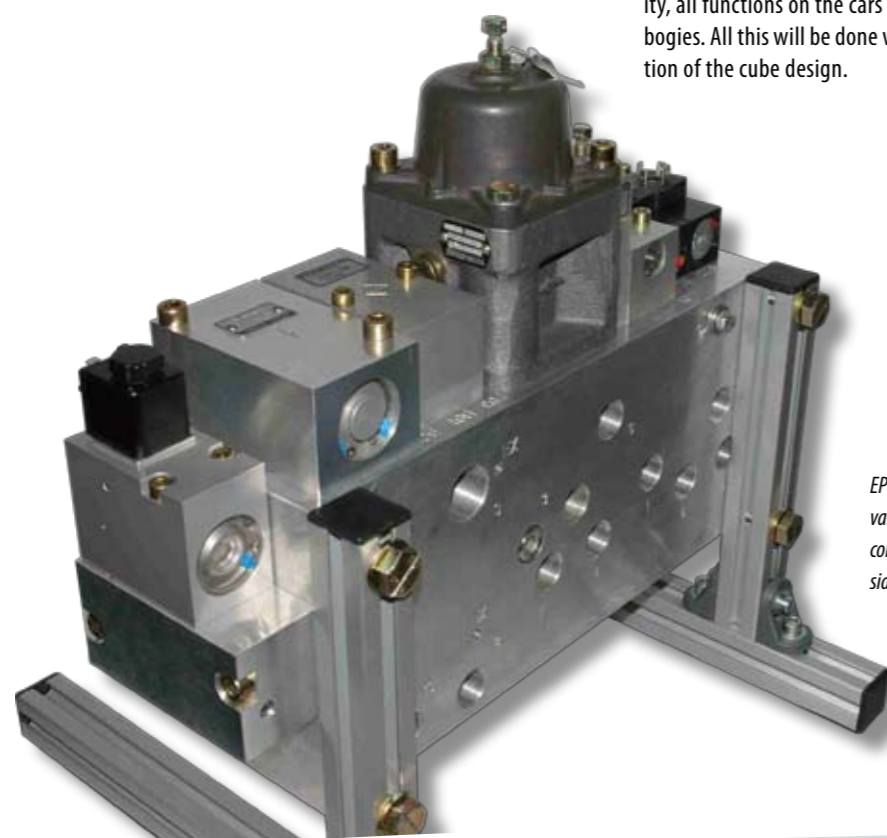
In addition to the basic control functions, the design of the multi-function block enables it to be flexibly adapted to specific customer requirements in terms of isolation and inspection processes. So EP2002 Cube is not just more economical than previous systems and those of rivals – development costs are also significantly reduced.

Maintenance-friendly

The diminutive brake control unit is also a winner when it comes to installation and maintenance. To remove the control valve or one of the flanged components all you have to do is to loosen a couple of screws. All the electrical connections can also be opened and closed without the need for special tools. And the layout of the components has also been designed to be user-friendly. The isolation cocks and manual operation point for the parking brake are easily accessible from the side of the vehicle. And elements that have to be regularly checked are on the top side of the block, with maintenance-free components behind the EP2002 control valve. All the inspection nozzles face downwards and are concentrated in an easily accessible position.

EP2002 Cube wins friends

The market was quick to recognise the advantages of EP2002 Cube. The new system had hardly been introduced before two high-end customers decided to opt for it: The city of Guangzhou in southern China ordered 108 units for 27 trains, each with four cars (which incidentally are also being equipped with air supply and bogie equipment by Knorr-Bremse) for the new line to Foshan. And the eastern Chinese city of Hangzhou is equipping its metro Line 1 with no fewer than 288 EP2002 cube units for 48 trains, each with six cars. European rolling stock manufacturers are also currently considering EP2002 Cube for two further projects, one of which will even have a completely decentralized system architecture in which, to maximise operational reliability, all functions on the cars will be controlled from the two bogies. All this will be done without requiring any modification of the cube design.



EP2002 Cube without control valve – rear view with pneumatic connections. Installation in vehicle sideways from above.



Traditional central sub-frame with reservoirs and piped components. EP2002 Cube replaces the visible lengths of piping with the boring in the cube.



Traditional mounting of a EP2002 control valve in front of a horizontal reservoir EP2002 Cube can be installed in the same space.

COPE – Competence in Product & Project Engineering

Better is better

Global rail markets continue to grow, with massive demand for rail systems, particularly in the booming Asian regions. Regulations are also becoming increasingly strict. The COPE project draws together all the technical and organizational improvement schemes that help Knorr-Bremse consolidate and extend its technological and market leadership.

COPE

- Optimized processes and products
- Efficient project management
- Consistent quality standards world-wide
- Locally rooted



The Corporate Route

Base Camp

High Camp

Summit

The "Extra Mile"

The sub-projects within COPE cover all technical and organizational aspects of importance for successfully handling customer orders and development projects.

Top quality at affordable prices can only be achieved by constantly improving efficiency. Resources have to be optimally deployed and tools and employee training levels fine-tuned to cater for the latest developments. The COPE project enables Knorr-Bremse to make use of the scope for further optimization and creates the methods and processes required to achieve this on a long-lasting basis.

Closely interlinked processes, systems and solutions

The acronym COPE stands for Competence in Product & Project Engineering, and the project forms part of the Knorr-Bremse Group's strategy for excellence. There is also an ongoing exchange of ideas with the corresponding project in the Commercial Vehicle Systems division.

In the rail division, COPE is divided into 15 sub-projects, nine of them in sales and systems. Process structures are simplified and standardized, individual processes and role profiles precisely defined and supported by appropriate tools. Individual sub-projects in the three centers of competence focus on improving development processes and their links to production. The basis for fourteen of the sub-projects is provided by the fifteenth: "Systems Engineering Qualification". No process or tool can exist on its own – it is crucial for the employees who use them to be properly trained. There is thus a seamless link between standardization of processes, tools, products and systems and high levels of employee training. By closely linking development and production it is possible at a very early stage in the development process to reach well-informed product decisions that would be difficult to reverse if they were made further down the line.

Consistently high level world wide

COPE ensures that globally consistent quality standards are applied to the entire rail vehicle sector world-wide. Compliance is monitored by REX reviews and audits using a standardized system of key data for measuring implementation and effectiveness. All areas make their resources available and agree on mission commitments based on their particular targets. 18 project leaders world-wide ensure that the system is properly established at local level. Project headquarters in Munich offer guidance and support, but actual implementation and change management occurs at site level. This is crucial to ensure the wide levels of acceptance of COPE that are needed if the measures are to have any impact.

Support for COPE amongst employees is all the stronger because the project was drawn up in close consultation with the workforce and not only offers improvements in day-to-day processes but also further training measures.

Review and prospects

Much has happened since COPE Rail was first launched in Munich in early 2007: structures have been designed with sustained implementation in mind, and a team entitled PM@Rail has established processes and tools for achieving greater efficiency in project management. Cross-departmental competence teams have introduced standards, drawn up guidelines and passed on project management expertise to others. Success of the measures is gauged using KPI-Cockpit. In future, the regional approach is to be continued, with international training sessions bringing all sites up to speed and promoting an exchange of best practices.

COPE promotes product and process quality, technological competence and company-wide collaboration

Wide range

In order to promote product and process quality, set high standards and establish these in the market, COPE applies leverage at various different points:

- Product development processes are divided into clearly-defined phases separated by quality gates as a method of risk management and error-reduction.
- A system of requirement management (STARS – Standard Requirement Structure) uses a standardized technical and commercial requirement structure to meet customer wishes.
- Parallel to this a risk management system monitors technical and commercial risks and actively comes up with solutions.
- An all-embracing, multi-level project management system structures all relevant development and production processes into a series of manageable stages.
- Customers and suppliers are closely involved in order to ensure that processes and interfaces are optimally coordinated.
- All measures are supported by an excellent IT infrastructure that includes an internationally fully accessible SAP project system, an SAP IPPE module for managing and commenting on customer specifications and a continuously updated knowledge database.

Certification

Quality signed and sealed

As a developer and manufacturer of safety-critical systems, Knorr-Bremse has always attached enormous importance to quality – and this is demonstrated by its participation in globally recognized certification processes. The company's high standards often preempt developments that are only introduced as industry-wide requirements at a much later date. For example, Knorr-Bremse Systeme für Schienenfahrzeuge GmbH in Munich achieved IRIS (International Railway Industry Standard) certification back in September 2006 even though this new industry standard only became a requirement for rail vehicles in 2009.

Across-the-board certification

- ISO 9001: Quality in all processes
- ISO 14001: Saving resources by defining and implementing environmental targets
- OHSAS 18001: Health and safety at the workplace
- IRIS: Specific requirements of the rail vehicle industry



Certification to globally recognized ISO and OHSAS standards enables Knorr-Bremse to demonstrate that it meets exacting management system requirements applicable across all industrial sectors. But rail vehicle manufacturers also require a certification system for sector-specific standards, and this is why the IRIS regulations were introduced. By the end of the year, all companies in Knorr-Bremse's rail vehicle division will have demonstrated their fulfillment of the IRIS requirements.



Quality: ISO 9001

Knorr-Bremse is certified to the globally recognized ISO 9001 standard, which provides the basis for a process-oriented quality management system that serves customers by improving management structures and decision-making processes and enhances supplier relations.

Environment: ISO 14001

Knorr-Bremse's environment management system is certified to ISO 14001. The company has established corporate environmental policy targets that are implemented via a process of continuous improvement accompanied by regular monitoring of progress. In 2008, New York Air Brake, Knorr-Bremse Canada and Knorr-Bremse Poland achieved first-time certification to both ISO 14001 and OHSAS 18001.

Health and safety: OHSAS 18001 (Occupational Health and Safety Assessment Series)

Parallel to ISO 14001 certification, Knorr-Bremse also meets the specifications of the process-oriented OHSAS 18001 standard, which demonstrates the company's successful introduction of a health and safety management system aimed at reducing workplace-related risks for employees, visitors and customers. Virtually all European sites have now successfully undergone certification audits, and in 2008 Knorr-Bremse Brazil also met the OHSAS requirements for the first time. In the case of both OHSAS 18001 and ISO 14001 Knorr-Bremse applies the principle of matrix certification throughout Europe: if one location fails an audit, then all of them lose their certificates according to the principle of "one for all and all for one"! To date this has never happened.

Sector-specific: IRIS

Because ISO and OHSAS standards apply across all industrial sectors it is not possible for them to incorporate important rail-specific requirements. That is why the Union of European Railway Industries (UNIFE), together with leading rail systems manufacturers and operators, drew up the International Railway Industry Standard IRIS. To achieve IRIS certification a manufacturer or supplier of products or services has to provide wide-ranging proof of the high quality of its processes, particularly in the fields of project, configuration and obsolescence management.

Rail systems manufacturers have required their A-suppliers to produce a valid IRIS certificate during the course of this year. Knorr-Bremse Munich has already been certified since 2006, and certification of its subsidiaries and national companies is currently running to schedule. Six sites achieved the coveted status in 2007, followed by a further ten in France, Italy, Spain, Austria, Poland and two companies in China in 2008. Together with our companies in North and South America and Africa we are the first to be certified according to this new standard, and currently account for about 10% of all such certificates issued world-wide! This year, the Knorr-Bremse sites in Sweden, Switzerland, Hungary, India and further ones in China will follow suit.

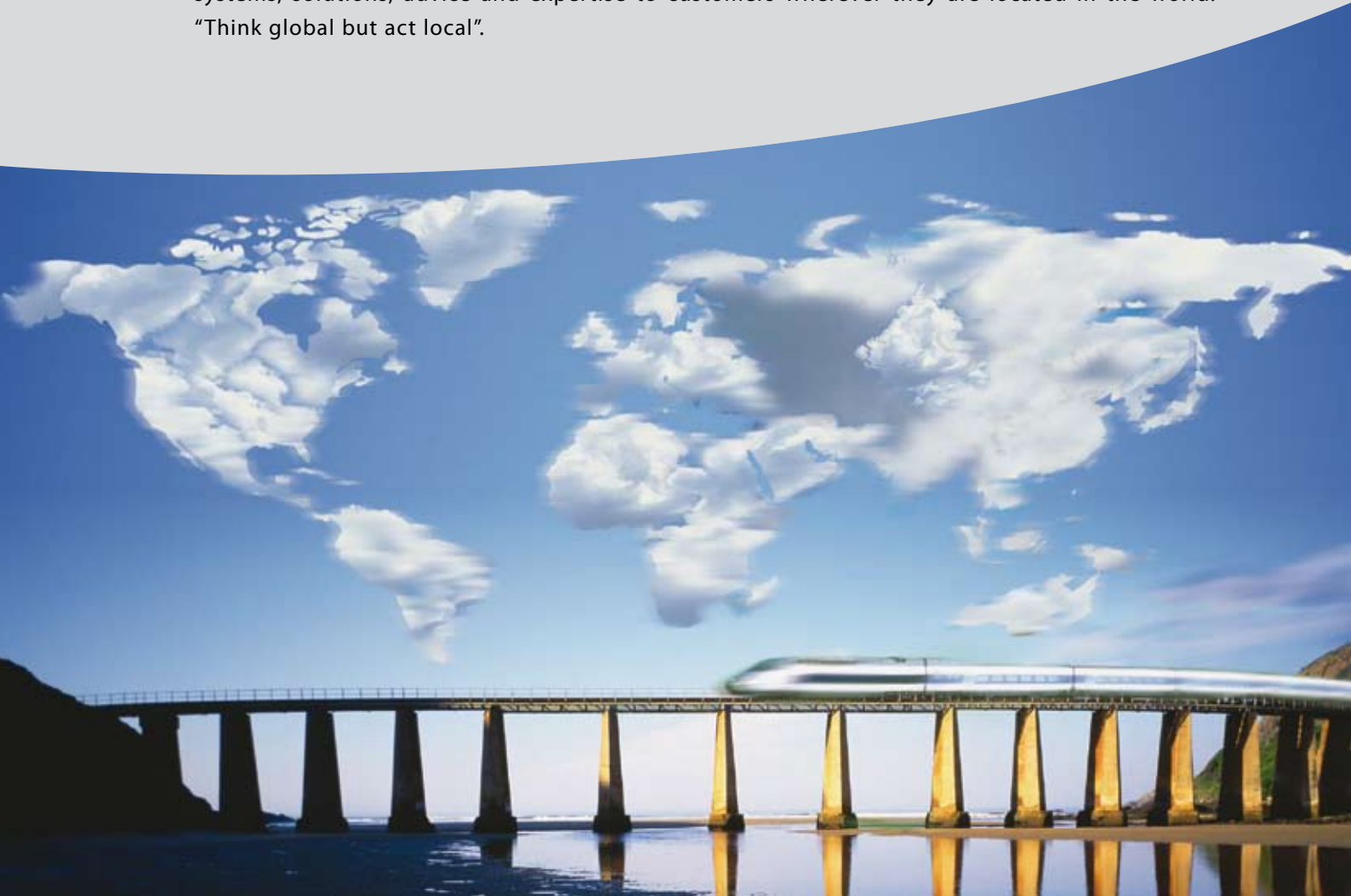
All European, North American and South American sites are ISO 14001 and OHSAS 18001 certified. The remaining certification processes for sites in Asia and Africa will take place step by step over the next years. And by the end of 2009, all Knorr-Bremse companies world-wide will also have IRIS certification.

Knorr-Bremse's IRIS certificates

By the end of the year, all Knorr-Bremse's rail division sites should have achieved IRIS certification. Review audits are carried out every year, and all certificates acquired in 2009 will either confirm to the current Revision 01 of November 2007 or Revision 02, which is due for publication in June 2009.

Around the world.

As the world's leading manufacturer of braking and on-board systems, we offer products and solutions for rail vehicles all over the globe. With a truly global production, sales and service network Knorr-Bremse can offer products, systems, solutions, advice and expertise to customers wherever they are located in the world. "Think global but act local".



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