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Strategies and Opportunities.

Innovations

Profiles and Technical Innovations
of the German Supply Industry.

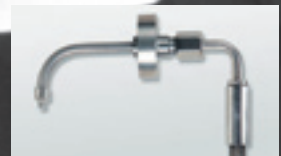
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“The magazine auto.world enables German automotive suppliers to present their services and innovative power to an international audience..”

Matthias Wissmann, President, VDA

EDITORIAL

German Suppliers: Leaders in Technology

In 2006 as well as in the first half of 2007, the German automotive supply industry has once again demonstrated its innovative and competitive ability with great success. Thanks in particular to the strong export business and the shift in responsibilities from vehicle manufacturers to suppliers, it was possible to increase revenue by six per cent to 72 billion EUR compared to 68 billion EUR the year before. Business with foreign customers went particularly well – export sales rose by nine per cent.

But global markets are not only important as sales markets, they are also attractive locations. Besides the often mentioned markets in Asia, numerous German suppliers are quite active on the nearby Eastern European markets. Poland, Hungary, Slovakia and the Czech Republic have become important production locations, due to low labour costs combined with excellent infrastructure and transport connections as well as skilled engineering workers.

This issue of auto.world analyses the current developments in Eastern Europe as well as in Spain and Egypt and evaluates the opportunities and challenges for German suppliers.

The current issue also focuses on innovative technological solutions made in Germany. In many markets, German automotive suppliers are not just leaders but constitute the benchmark, for example, in diesel technology, the avoidance of CO₂ emissions, in safety and comfort technologies. German suppliers and OEMs will continue to lead the way.

I hope you enjoy reading the new issue of auto.world. ■



Russian Roulette?

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Central and Eastern Europe are the future growth markets within Europe. German OEMs and suppliers are making use of the strong export and profitable investment opportunities.

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The German auto industry can look back on an extremely successful 2006. This positive performance was driven by demand from both the domestic and foreign markets.

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German suppliers have already come up with trumps in delivering a number of pioneering innovations and solid technological expertise for the reduction of emissions.

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Swabian Accuracy

Baden-Württemberg is a prime automotive location: innovative and internationally competitive. p. 26, 28



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A Home-Story

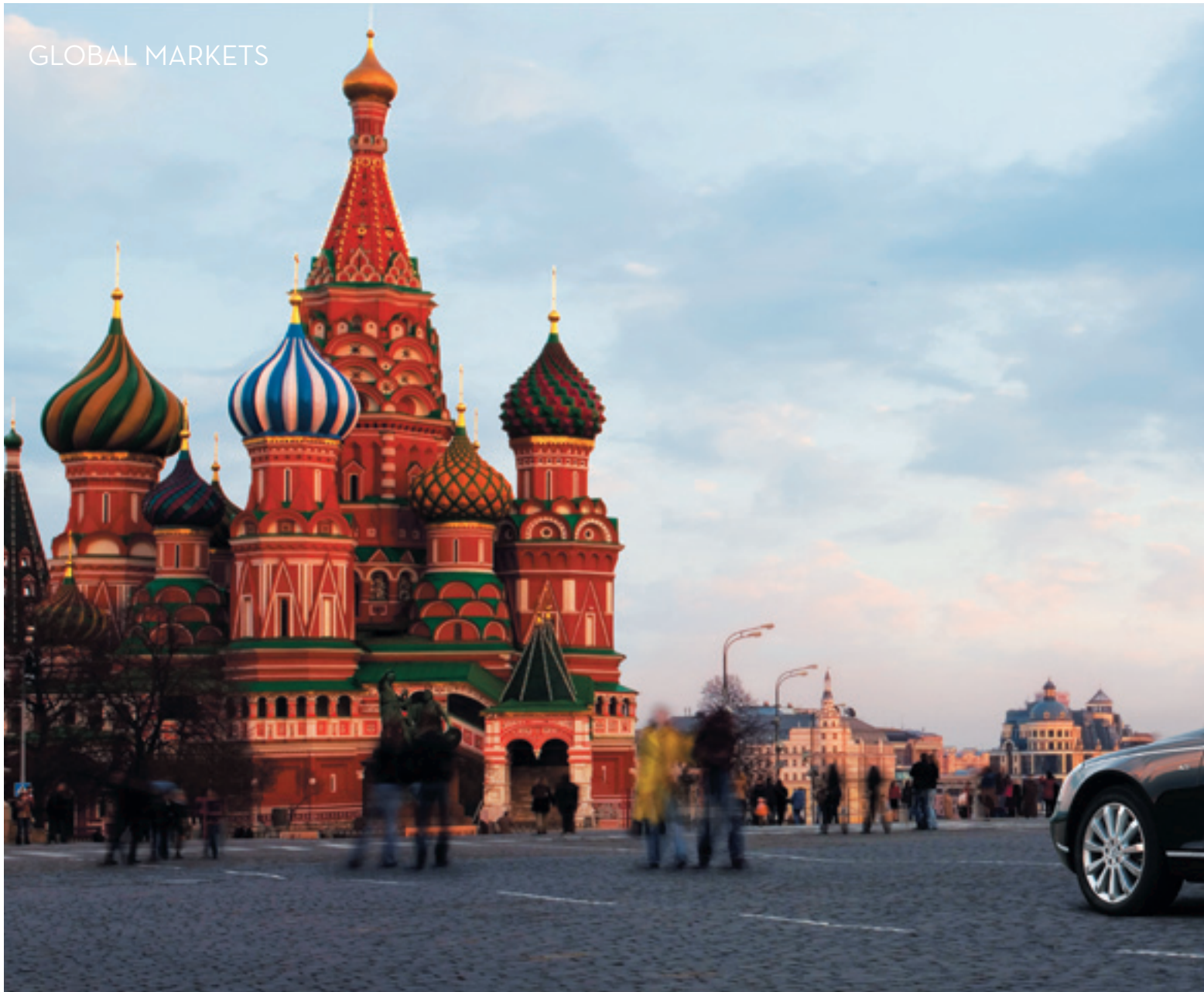
Dr. Wendelin Wiedeking, CEO of Porsche, on the evolution of the automotive location Baden-Württemberg. p. 24



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Climate Discussion

Spiralling oil prices, CO2 emissions, pollution and congestion charges face the world's automobile industry. Solutions from Germany. p. 34 et seqq.



Going East

The [Central and Eastern European markets](#) are the future growth areas within Europe. Regime changes, EU membership ambitions of various countries and the general opening to world markets does not just evolve into a Central and Eastern European threat but also gives the German industry strong export and profitable investment opportunities.

TEXT: HENNER LEHNE • MANAGER, EUROPEAN ADVISORY SERVICES. CSM WORLDWIDE • AUTO.WORLD 2.2007



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► Major German OEMs and suppliers have already reacted quickly to the opening of the eastern markets. They invested into either existing companies via joint ventures respectively takeovers or even by building up new production facilities. The argument that jobs in Germany are cut and therefore it harms the economy, only applies to a certain extent. As always, there are two sides of the coin. By transferring parts of the assembly into low-cost countries within that region, the engineering and technology site in Germany is actually supported, because German companies will still be able to compete on global markets. At the

end of the day, a competitive sales price is what counts in the modern supplier industry. That applies especially for high volume products and for the parts that the end-consumer cannot see in a car. High technology engineering from Germany can be combined with low cost production. A competitive advantage is created which would not be available if they had stayed exclusively in Germany.

Rising Demand for Cars

Furthermore increasing disposable incomes will lead to new car sales demand, which is another growth opportunity for the German automotive companies.

The relatively low levels of vehicle ownership in the Central and Eastern European regions offer great potential for foreign OEMs. And just as in every other region around the world, as incomes rise, demand for more upscale vehicles increases as well. Since the German core competence in vehicle production is the engineering and manufacturing of upscale and premium automobiles, the upcoming demand potential from Central/Eastern Europe is essential. Vehicle ownership is no longer seen as a mere means of transportation in these developing countries. Due to an increase in living standards and a better quality of life, the demand for

a car as a status symbol is increasing in importance.

But not only in premium segments are there incremental sales opportunities for German OEMs opening up. The main driver of volume growth in this region is going to be the mid and low-cost vehicles. The upcoming volume potential for light vehicles of 6.4 million units until 2013 for Central/Eastern Europe is enormous.

Flood of Used Car Imports

First half 2007 light vehicle sales in Central Europe increased by 10.4 per cent for same period last year, resulting in a year-to-date volume of 482,000 units sold. As expected, a ►

CAR PRODUCTION IN CENTRAL AND EASTERN EUROPE



Source: CSM Worldwide

► slow but steady recovery can be witnessed in a very volatile sales region. One of the main reasons for volatile new vehicle sales in Central Europe is the flood of used vehicles imported from Western Europe. Despite retaining an import duty that some feel is punitive and out of sync with EU regulations, it is estimated that Poland has imported about 2.5 million used cars since 2004. Even though the European court of Justice pointed out that Poland's import duty for used cars is an illegal practice, there has been no government legislation thus far that would curb this trend in 2007.

Poland: Sales of More Than 322,000 Units Expected

Poland, the largest country of the region, posted a year-to-date growth of 24.6 per cent versus the first six months of the last year. That is more growth in six months from one country than the whole region recorded from 2005 to 2006. Nevertheless sales in Poland are still off by more than 60 per cent in comparison to 1999. By the end of 2007, Poland is expected to

reach more than 322,000 units sold. In Hungary, political reassurance and stable reforms are desperately needed to increase regional living standards and narrow the gap in comparison to other EU member states. Year-to-date through June 2007, Hungary sales are down 11.2 per cent and are forecast to finish near 185,000 units by year end. This figure is about 20,000 units less than calendar year 2006. Vehicle demand in the Baltic nations is thriving due to strong economic growth.

Cyclical recovery within the region is postponed until 2010. By the end of 2013, CSM expects sales to reach 1.37 million units.

Eastern Light Vehicle Market

Sales demand for new light vehicles in Eastern Europe continued to grow in the second quarter, leading to an 8.7 per cent increase versus the first six months of last year. A total volume of 3.77 million unit sales is forecast by the end of this year. The largest mar-

kets in the region are Russia, Turkey, Ukraine and Romania. Together, they currently represent over 93 per cent of total light vehicle sales.

Longer-term, the Eastern European light vehicle market is forecast to expand to about five million units by 2013. A big chunk of that growth is based on the strong performance of the Russian market. CSM has increased its 2013 Russia forecast by about half a million units versus our first quarter forecast. A solid economic outlook leading to an increase in purchasing power will fuel the demand for new vehicle purchases. Strong replacement sales will also contribute to growth as a large portion of the current cars were first registered more than ten years ago. From 2007 to 2013, a compound annual growth rate (CAGR) of 4.8 per cent for Eastern European light vehicle sales is expected.

In Russia, year-to-date sales are up 15.9 per cent in first half of 2007. In 2006, sales reached 1.86 million units, an increase of 19.8 per cent over 2005, underlining the country's position as the region's number one engine for growth. The appeal of Russia's market potential is based, for the most part, on its population size. Current car ownership levels of 231 per 1,000 inhabitants are effectively two-thirds those of Poland, yet the population of more than 140 million is considerably larger than Poland's 39 million. Given



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“The relatively low levels of vehicle ownership in the Central and Eastern European region offer great potential for foreign OEMs. As incomes rise, so does the demand for more upscale vehicles.”

a reasonable economic outlook, light vehicle sales are forecast to grow at a five per cent compound rate, reaching three million units in 2013.

High Volatility in Turkey

Turkey is viewed as part of the Eastern European region and provides the second largest vehicle market. After an unsustainable rate of growth in 2005 (artificially high due to incentives promoting old vehicles to be scrapped and the reduction of corporation tax), demand decreased as expected in 2006, resulting in about 66,000 fewer units sold. About half of that loss was generated in Q4 2006 while in Q1 2007 demand further decreased by 11.9 per cent compared to same period last year. Going forward, the sales outlook remains cautious due to the historically high volatility of vehicle sales. For the first half of 2007, the market is down 14.4 per cent year-over-year and therefore not expected to turn around by the end of the year. Total sales for 2007 are forecast to fall approximately 140,000 units versus 2006. Longer-term, the outlook is expected to support sales of up to 676,000 units by 2013.

Good Beginning in Romania

New EU member Romania increased its new car sales demand by 14.7 per cent and therefore contributed about 36,000 units to the region's incremental growth in 2006. In the first half of 2007, sales further increased by 15.1 per cent over the same period vs the previous year. Even though Romania had a good start into the new year, CSM does not expect sales to continue at that strong pace year-over-year due to the increased imports of used cars. Lost new car sales can be witnessed in most of Central Europe, home of the EU's newest member states. The same outcome is expected for Bulgaria as well. Lastly, first half 2007 sales in Ukraine soared 10.7 per cent when compared to same period last year, continuing positive growth reported in 2006.



Russia remains the **number one engine** for growth in the region. Year-to-date sales were up by 15.9 per cent. German OEMs such as BMW with its Kaliningrad plant (pictured) have started to manufacture in the country and benefit from rising demand.

© FORD

Similar to Western Europe, there has been broad based segment development in Central Europe. While many consumers used to enter the new vehicle market through the B-segment, most future growth in the region is now forecast in the A-segment, followed by the C-segment. The SUV trend experienced in Western Europe has also arrived in Central Europe, but is not expected to achieve the same growth performance. E- and F-segment growth points to an expanding upper class in the region, which demonstrates its wealth, to a certain extent, by purchasing upscale vehicles.

Sale-Segment Growth

Volkswagen Group's Skoda, the leading brand based in the region, is under heavy attack from Asian and European competitors. Nevertheless, the brand continues to fare well in key B- and C-segments. The 2006 launch of Roomster and the upcoming 2007 launch of the Praktik, ensure Skoda a solid portfolio. Furthermore, indications of exciting niche vehicles such as the concept Joyster and Yeti SUV showcased at international motor shows, suggest that Skoda is preparing to defend its market position against future competitors in the long term as well. Looking across the

Eastern European region, B- and C-segments are dominant and account for 66 per cent of sales in 2007. As observed in Central Europe, the D-segment is under-represented when compared to Western Europe. However, due to the influence of the Russian market, the E- and F-segments are achieving solid growth levels. Sales in the A-segment are accelerating again and are forecast to show the strongest growth until 2013. SUV sales are increasing in line with regional sales growth and continued growth will come mainly at the expense of the D-segment throughout the forecast period.

Without any major indigenous automakers, the Turkish market has long been influenced by global players, particularly Fiat, Ford and Renault that have local manufacturing operations. Toyota, Honda and Hyundai are also present and their local facilities are set to expand to support greater exports as well as to strengthen their position in the domestic market. Ford Group is currently the strongest selling OEM in Turkey, followed by Renault/Nissan and Volkswagen. By 2013, Ford will lose its number one status to Renault/Nissan. Hyundai and Fiat will take third and fourth position, respectively.

LIGHT VEHICLE SALES IN CENTRAL AND EASTERN EUROPE

	East Europe	Central Europe
1998	1,773,063	1,001,360
1999	1,863,549	1,146,040
2000	1,968,887	993,293
2001	1,744,489	856,746
2002	1,685,560	864,404
2003	2,018,111	955,441
2004	2,640,254	928,692
2005	3,008,297	840,549
2006	3,431,393	869,920
2007	3,765,810	937,324
2008	4,107,949	1,006,151
2009	4,318,658	1,066,292
2010	4,497,033	1,153,363
2011	4,721,122	1,234,471
2012	4,872,945	1,345,358
2013	4,989,138	1,369,313

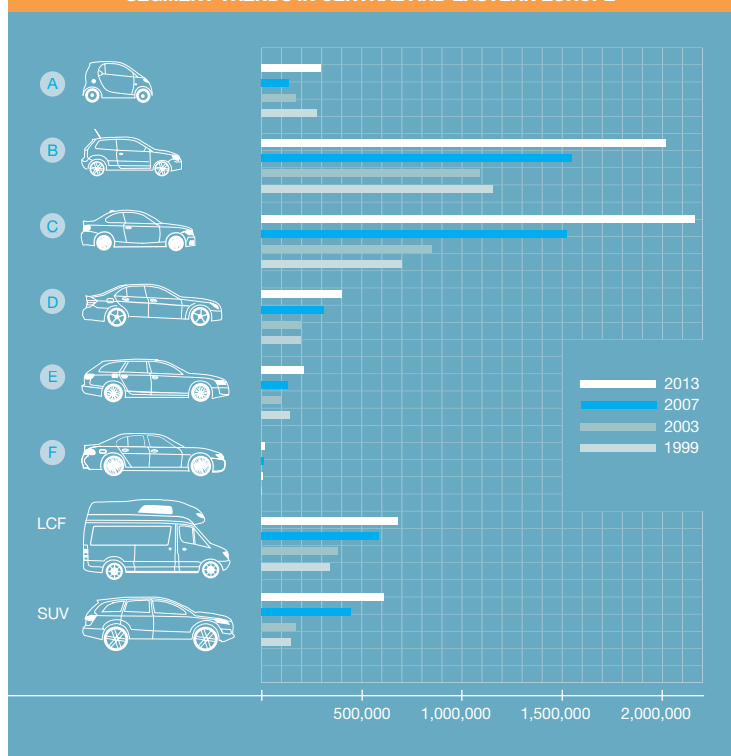
Source: CSM Worldwide

In contrast to foreign manufacturers in Turkey, the old Soviet era groups have dominated Russia and Ukraine, most notably the Lada badge of AutoVaz. Sadly, these local makers are unable to keep up with the changes in the market. In Russia, imports and local manufacturing of Western OEMs had already taken more than 50 per cent of the market at the end of 2006. That market share is expected to accelerate to over 67 per cent by 2013 as manufacturers such as Ford and Renault



© BMW

SEGMENT TRENDS IN CENTRAL AND EASTERN EUROPE



Source: CSM Worldwide

► look to increase local capacity. Also, Chinese OEMs such as Changcheng with their Great Wall brand and SAIC with Ssangyong are starting production in the Russian market and using these facilities as entry points for the overall European market.

Asian Competition

Furthermore, the decisions from Toyota, GM and Volkswagen to invest in building assembly plants have underlined the growing Russian consumer demand for foreign labeled vehicles as well. Lastly, Hyundai Group sales have skyrocketed, reaching 215,000

units in 2007 from just 2,000 units in 2000. In 2004, the Hyundai Group surpassed Ford for the title of number one foreign OEM in Russia. By 2013 Hyundai Group is forecast to more than double their current volume again, reaching more than 455,000 new vehicle sales.

Large Investments

Central and Eastern Europe has become aside of China the largest investment area for the global automotive production. The rush of the OEMs for low cost vehicle sourcing is one of the main drivers to invest into that

region. German OEMs already have a solid position in many countries of Central/Eastern Europe. Nearly every important German supplier is present in the region or will build-up/extend capacity along with the growing production landscape. But as good as the opportunities may look, risk is always involved. Moving production east into low-cost regions does not necessarily guarantee success. Economic stability of those countries is not always a given, skilled labour shortages can limit the up-staffing of those investments or complex bureaucracies can end investments faster than desired. A long term view on the respective company's objective and strategies has to be taken, in order to avoid rushing into a fatal mistake.

Regarding the type of investments, there are severe differences within that region. In the opposite to Central Europe, where full production facilities are build up, the main growth in Eastern Europe is build on the so called kit assembly, where pre-manufactured parts/cars are imported and assembled in the respective country with some local sourcing.

Advantages of Local Assembly

The main reason for the difference within the region is that in Eastern Europe still import tariffs on imported vehicles apply. But by moving the final assembly of those vehicles into the respective countries within that region, those tariff are decreased or even do not apply at all anymore. And since most of the vehicles offered in that region compete on a price level, local assembly is a strong competitive advantage for foreign brands competing in that region. Furthermore an unpredictable political situation is another factor which lets foreign investors hesitate to build up full production facilities in Eastern Europe.

In Central Europe, mainly consisting now of new EU members, a more stable political basis is available and therefore it is more secure for large

plant build-up investments in that region. In 2007 the total production output for light vehicles in Central/Eastern Europe will be more than 5.6 million units. That is nearly 1.5 million units more than in 2005. By 2013 a total volume of 8.1 million units is forecast. The growth will come entirely from foreign OEMs pushing into that region. Domestic OEMs, mainly Russian, will not participate in the market growth.

“The German automotive industry already benefits strongly from its operations in the Central- and Eastern European markets.”

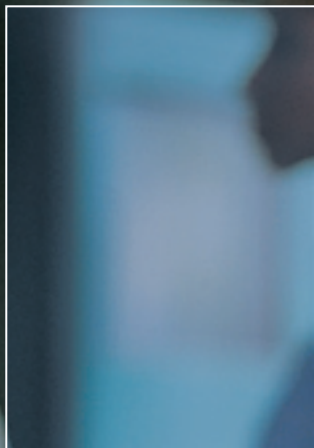
Volkswagen Group is currently the largest western OEM in the region and will keep that status throughout the forecast horizon. The Group is forecast to produce more than 1.2 million light vehicles by 2013 in Central/Eastern Europe. Hyundai Group, which was is the fastest growing OEM in the region, is going to produce close to one million units by 2013. All Chinese OEMs together are expected to hit by 2013 an assembly volume of 180,000 vehicles.

Export Dependence

The gap between production and local vehicle demand is growing strongly over the forecast horizon. That makes the region highly dependable on its exports. The automotive industry is not only benefiting from the economic situation in of that region, but also actively influences it, by being one of its main drivers. Today the German automotive industry is already benefiting strongly from its operations in the Central- and Eastern European markets and is likely to profit even further with the upcoming economic growth and political stability of that region. ■

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Moving into Russia

The Russian market has become quite attractive.

ZF already supplies all of the major OEMs operating in Russia, but plans further expansion.

TEXT: WOLFGANG VOGEL • EXECUTIVE VICE PRESIDENT, ZF • AUTOWORLD 2.2007

► Russia has a population of approximately 145 million. According to current statistics, only 206 automobiles are registered per 1,000 citizens. High growth rates are expected and the country is clearly capable of financing this expansion with oil and gas exports. By 2014, Russia will become one of the world's fastest growing vehicle markets. This information is based on a joint survey of 55 leading international automobile companies conducted by Roland Berger Strategy Consultants, the Committee on Eastern European Economic Relations, and the German Association of the Automotive Industry (VDA). The survey indicates that the number of new vehicles sold

annually in Russia will increase by around six per cent per year. According to estimates by the VDA, Russia accounts for 1.9 per cent of international automobile production placing the country in the number 13 position worldwide. For commercial vehicles, Russia ranks in 12th place. Russian vehicle production in 2006 reached 1,530,000 units. This figure includes 1,360,000 cars and light commercial vehicles, 24,000 buses, and 83,000 heavy-duty trucks.

Sharp Increase in ZF Sales

ZF supplies all of the major car, light- and heavy commercial vehicle manufacturers operating in Russia. The pro-

duction figures in all three segments point to a very healthy upward trend. ZF sales volume in the Russian market totaled around 60 million EUR last year. Half of this amount was generated by the ZF Aftermarket Trading business unit. The ZF Commercial Vehicle and Special Driveline Technology Division, ZF Sachs, ZF Lenksysteme and the Off-Road Driveline Technology and Axle Systems Division are all extremely active on the Russian market. According to in-house forecasts, ZF sales in Russia are expected to increase by more than 50 per cent to around 91 million EUR by the year 2010. The Russian automotive industry is on the threshold of a comprehensive transformation. Market structures, processes, and above all, manufactured vehicles will soon be brought in line with Western standards. Industry suppliers can thus look forward to a booming business in Russia. The world's 20-largest automotive suppliers currently have 150 production sites in Eastern Europe. According to experts, automobile manufacturers are planning to involve their

suppliers more directly in the creation of value added. As a result, the suppliers' share of the real net output from Russian vehicle manufacturers will increase from 26 per cent in 2004 to 43 per cent in 2010. International car manufacturers will have to triple their procurements from local suppliers in order to satisfy demand in Russia. The share of local procurement volume will then increase from twelve per cent in 2004 to 36 per cent in 2014.

Excellent Joint Venture Opportunities

According to the survey, the expansion of international manufacturers in Russia by 2014 will lead to the development of a highly productive supplier industry. The transformation within the industry will also open new doors for Russian manufacturers and suppliers. In this context, joint ventures offer excellent opportunities. ZF has already taken the initial step in this direction with ZF Kama. This joint venture with Kamaz, Russia's largest truck manufacturer, was set up in 2005 at the Naberezhnye Chelny



LOCATIONS OF ZF IN EASTERN EUROPE



Source: ZF



„With its internationalisation strategy ZF is taking a decisive step toward market penetration in Russia.“

Wolfgang Vogel,
Executive Vice President of
ZF Friedrichshafen AG

© ZF

plant where commercial vehicle transmissions are produced. Kamaz is one of the world's ten largest heavy truck manufacturers and the eighth-largest manufacturer of diesel engines. ZF Kamaz generated sales of 12.3 million EUR last year.

Major Expansion

A major expansion of the joint ZF and Kamaz assembly plant in Naberezhnye Chelny, Tatarstan (Russian Federation) is planned for completion by 2010. Kamaz, the market leader for heavy-duty trucks in the Russian Federation, has announced plans to completely change over all vehicle models to ZF transmissions. The workforce at the ZF Kamaz plant in Russia will be increased over the next three years from the current 60 to around 700 employees. With this internationalisation strategy, ZF is taking a decisive step toward market penetration in Russia and, in cooperation with the market leader, has gained an optimal starting position in another growth market. The world growth markets for commercial vehicle production are in

the so-called BRIC countries, i.e. Brazil, Russia, India, and China. In January 2006 ZF Kamaz launched production operations. The plant currently produces 9,000 Ecosplit manual truck transmissions annually. ZF production for Kamaz includes transmissions for heavy- and medium-duty commercial vehicles. Kamaz plans to produce 54,000 vehicles this year.

Moving Beyond Assembly

The ZF Kamaz plant currently focuses on assembly operations. Following further expansion, it will also handle manufacturing for the company starting in mid-2008. Some 160 million EUR will be invested in the joint venture by 2010 when the targeted sales volume is expected to reach 250 million EUR. The expansion of manufacturing operations and subsequent series production operations will require parts supplied from ZF plants in Friedrichshafen, Bouthéon (France) and Eger (Hungary). These plants will provide around 25 per cent of the parts required by the joint venture in Tartastan. The additional volume produced for Kamaz will increase long-term sales as well as the number of jobs at ZF plants in Western Europe. ZF also supplies transfer cases and clutches to Kamaz. Additional projects for truck steering systems, and driveline and chassis technology for buses, have already been launched.

Alliance with Bus OEMs

ZF is planning to join forces with a Russian bus company. The ZF Commercial Vehicle and Special Driveline Technology Division signed a declaration of intent with a Russian bus manufacturer at the end of 2006. The plan focuses on more direct collaboration in the development of new bus models and includes an arrangement for supplying driveline and steering technology. This deal will also benefit the ZF Off-Road Driveline Technology and Axle Systems Division, ZF Lenksysteme, and ZF Sachs. ■

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Viva Catalonia

Catalonia with its centre Barcelona has developed into a powerhouse of the Spanish automotive industry. Many international suppliers and vehicle manufacturers have established subsidiaries in the region. In particular, Barcelona has become a leading location for automotive design.

TEXT: CLAUDIA JEHL • AUTOWORLD 2.2007

TEXT: HENNER LEHNE, MARKET ANALYST, EUROPEAN VEHICLE FORECASTS, TSM WORLDWIDE • AUTOWORLD 2.2007

► “Quality of Life generates quality ideas. A Mediterranean climate. A rich, varied landscape. Light and colour. There can be no better context for using the imagination and developing ideas. That’s Catalonia,” says at least the Investment Promotion Agency of Catalonia CIDEM.

In fact, Barcelona’s economic growth is well above that of the main European capitals, with more than 30,000 companies created annually. In that sense, Barcelona is the fourth best European city in which to locate a business according to Healey & Baker’s European Cities Monitor 2006. The Financial Times and Foreign Direct Investment (FDI) magazine, chose Barcelona as the European City of the Future 2004/2005.

The automotive sector is extremely important for the national economy. In 2006, Spain was the world’s seventh-largest car producer with more than 2.7 million cars produced. The automotive industry accounts for more than ten per cent of Spanish GDP, over ten per cent of the active population and generates 22 per cent of exports.

The autonomous region Catalonia accounts for 37 per cent of this turnover and ranks among one of the most

important automotive regions in Spain especially in the production of bodywork components, chassis and construction of motor components and metallic sets.

Not counting the three national vehicle production plants, the automotive component sector employs more than 100,000 people who contribute eight per cent to the Catalan GDP and are responsible for more than 20 per cent of the total exports.

Industrial Structure

More than 3,000 foreign companies are currently operating in Catalonia: 40 per cent of them have been established for more than ten years, which shows the high degree of stability, return on investment ratio and satisfaction. Over the past decade Foreign Direct Investment in Catalonia has amounted to 30.5 billion EUR, i.e. 15.3 per cent of Spain’s total Foreign Direct Investment.

This international influence is represented also in the automotive sector – with production and technology plants of leading multinational companies: Bosch, Lear Corporation, Siemens VDO, Delphi, Pirelli, Magna, Behr, etc. Not to forget the multinational Catalan suppliers like Ficosa,

Estampaciones Sabaell, Idiada, or Zanini. Just to name some of them.

Gate to Latin America

The structure of the automotive industry can mainly be divided into three groups – the automakers Seat, Nissan and Irisbus, the multinational companies with local plants and finally the large network of Catalan small and medium-sized automotive suppliers. In addition to the local potential, there are some quite interesting aspects for Western European companies regarding access to Latin American markets. More than 36 per cent of offshore establishments of Catalan companies are located in Latin America and might provide an ideal platform to reach these markets. Cultural links, existing trade relations and business connections offer interesting cooperation options. Furthermore there are favourable tax treatments granted to holding companies and financial instruments available to support access to Latin American markets.

Subcontracting

The Catalan economy has a very important industrial structure. Over 182,000 people are employed in more than 9,700 subcontracting companies with a total turnover of more than 27 billion EUR. It is based on the manufacturing industry, which includes sectors such as cars and accessories, chemicals, food, shipbuilding, furniture etc. The manufacture of electrical appliances and hightech computer and telematics equipment is also becoming increasingly important. Graphic arts and the publishing industry constitute a decisive sector within the Catalan industry.

With relation to the automotive industry counting only First Tier and Second Tier suppliers there are about 500 small and medium-sized companies (SMEs). 80 per cent of the vehicles and 60 per cent of components made in Catalonia are exported, underscoring the sector’s high level of quality and competitiveness.

Although both automakers with technology and production plants in Catalonia are major corporations, they also work with a series of small and medium-sized local suppliers that play an important role in ensuring that their encouraging forecasts are met. Small and medium-sized companies have a marked presence in Catalonia. The weak point lies in the fact that many of them lack in size and capacity to tackle globalisation and future technological challenges with the degree of success desired.

Design

Design is one of the features that has made Barcelona one of the world’s famous cities. Barcelona is a trademark of quality, prestige and innovation that reflects the way of doing things and the style of the city. Independent design studios have been established in Barcelona, developing projects for international companies. Other international firms established in Catalonia, such as EDAG, Italdesign and R  cker, handle product development engineering, design and prototyping for the transportation industry, consumer electronics and industry in general, and provide the perfect complement to Catalonia’s extensive network of top-quality local design and engineering firms.

Numerous car manufacturers have chosen the Catalan region to be the right place for their design centres: the Audi Group, including SEAT, Audi and Lamborghini brands. FIAT has entrusted the design of its car to designers located in Barcelona, Nissan established a technical centre for commercial and industrial vehicles, Renault placed its first design centre outside France in Catalonia, Subaru has established a design centre to develop integral design projects in collaboration with local studios and Volvo has decided to open its first design centre outside Sweden in Catalonia. Furthermore, there are a great number of public R&D groups, university research departments and



  AUDI

KEY FIGURES OF THE SPANISH AUTOMOTIVE SECTOR

	2003	2004	2005	2006*
Turnover (in million EUR)	43,183	46,310	46,825	-
Productions (in units)	3,029,826	3,012,174	2,752,500	2,77,435
Exports (in units)	2,495,521	2,480,976	2,247,303	2,272,872
Employment (people)	71,038	72,453	72,015	-
New Registrations (units)	1,716,529	1,891,344	1,959,488	1,953,134
Vehicles in use (in units)	18,688,320	19,541,918	20,250,377	-

*Latest data, jun 2007. Source: ANFAC

“Design has made Barcelona one of the world’s famous cities. Numerous car manufacturers have chosen the Catalan region to be the right place for their design centres.”

technology and homologation centres giving support to industrial design activities. And Catalonia is increasingly becoming one of Europe’s major design centres in the sector.

Technology

Catalonia is the only Autonomous Region in Spain to have two car manufacturers with their own technology centres on site. Furthermore, it is also home to manufacturers of motorcycles, coach buses and special vehicles. This represents an extremely rich and varied industrial base and generates much more complex situations than in other parts of Spain. In this setting, concrete initiatives are put in place in order support the Catalan industry on its way to compete on the international level not only on subcontracting but to also be recognised as a high technology supply industry.

The Society of Automotive Technicians (STA) in Barcelona organises on a regular base technological forums and workshops to enhance the cooperation and knowledge of small and medium companies. In contrast to many European regions, in Catalonia there exists so far no cross-over cluster linking all automotive suppliers. The region opted for smaller cooperation units in type of Mini-Clusters to work together on projects and achieve greater competitiveness. Another initiative has been the installation of an Automotive relation office in Stuttgart by COPCA - the Catalan international trade promotion organisation - which was established as a joining element between the Catalan automotive component industry to German multipliers.

Catalonia also has a powerful network of twelve universities, all of

them with collaboration agreements with major university centres worldwide. Renowned R&D centres such as ASCAMM, LGAI Technology Centre or IDIADA with its own proving ground near Tarragona complete a network of high technology. All in all there are more than 120 public R&D centres in Catalonia.

Market Trends

On the one hand this situation leads to encouraging prospects for the future whilst, on the other hand, there are a few reasons for concern. On the positive side, thanks to their own technical centres, the local car manufacturers dispose of design and innovation capacity. Nissan for instance plans to invest 400 million EUR in the Zona Franca from 2008 to 2010. A new van to be launched in 2009 will represent half of the announced total investment of Nissan’s plant in Barcelona: 400 million EUR until 2010. Other investments will be assigned to infrastructures, to integrate more suppliers in the brand, and to increase the number of units produced in the plant to 216,000 by 2010.

However, in spite of the efforts made, uncertainty continues when it comes to SEAT and as a consequence to their supplier base. The way forward is to continue to focus on innovation, not just to apply in R&D but also to create own products and develop decision-making capacity. Furthermore, it is vital to enhance productivity in the widest possible sense and to engage in activities that involve highest level of technology. These factors that will generate opportunities in the medium term, and that will threaten the sector if they are not developed. ■

www.copca.cat



German OEMs have started to assemble luxury cars in Egypt. Now, the Egyptian government hopes to attract German suppliers to set up shop in the country.



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Desert Dreams

With a new initiative **Egypt** seeks to position itself as a regional production centre supplying components to the automotive industry. A new industrial zone as well as lower export duties are intended to attract investors.

TEXT: HANS SEIDENSTÜCKER • AUTO.WORLD 2.2007

► After years of isolation, the Egyptian automotive market is gradually opening up. In September 2004 high export duties were dramatically lowered, and turnover has been on the rise due to pent up demand and improving economic situation. According to the International Monetary Fund, the Egyptian economy grew by 5.6 per cent in 2006, the same figure is expected for 2007. At a rate of 6.2 per cent, inflation seems to be under control. And, with a population of around 75 million which is growing by two per cent annually, Egypt looks like a significant potential market. However, with an average annual income of 1,430 USD per capita only few Egyptians are in a position to buy a car. Since July 2004 reformers around prime minister Ahmad Nazif and minister of trade and industry Mohammed Rachid have succeeded in winning foreign investors' trust. In 2006 foreign investments amounted to 6.1 billion USD. In comparison, the figure was a mere 407 million USD in 2004. It is hoped that now international suppliers of components for the automotive industry can be convinced to join the investment trend. Due to growing international competition and the disappearance of customs restrictions, Egyptian automotive suppliers are finding themselves

increasingly under pressure: on the one hand they have to reduce costs while on the other hand they are expected to improve product quality. The government has responded with an initiative promoting the sector. In May 2006 Chancellor Angela Merkel and President Hosni Mubarak signed an agreement which aims at positioning Egypt as the production centre for automotive components in the region.

Attractive Conditions

Incentives are to draw international suppliers to the region. In the City of 6th October, a 220 hectare automotive industrial park is under construction. In the zone, which is located about 30 km southwest of the capital, manufacturers will amongst other things be able to take advantage of favourable leasing conditions as well as of a modern technology centre. The state has promised to provide the necessary infrastructure. In order to counteract the lack of a skilled labour force, the government has furthermore agreed to pay 80 per cent of the cost for professional training. It is true that the region's geographical location close to the Suez Canal makes for easy access to both European and Arabic markets. At the same time though it is difficult to

ignore complaints about excessive bureaucracy, inadequate transparency and somewhat arbitrary practices prevalent at Egyptian customs. Little wonder then that when it comes to choosing a location for a distribution centre many companies do opt for Dubai which offers free trade areas along with good connections via sea, land and air.

Arguments in Egypt's favour are low costs and the availability of a substantial workforce. Egyptian wages average about 100 USD per month, while electricity comes to around 3 ct/kWh.

Luxury Made in Egypt

The Egyptian Automotive Feeders Association estimates the market volume for automotive parts in Egypt at around 500 million USD, the annual growth rate is said to be 4.8 per cent. According to the association Egypt exports parts worth 150 million USD per annum, 90 per cent of which are for the European market. German automotive supplier Leoni for instance, produces in Egypt only for export. In five plants a total workforce of 3,500 workers make sets of cables as well as complete wiring harnesses for passenger cars and utility vehicles; ready-to-install battery cables are also part of the product range.

In the past Egyptian government policies have not always been predictable. Shortly after BMW started producing the 3 and 5 Series in the country, customs duties for cars with an engine smaller than 1.6 litres were slashed. To use available capacity, the Brilliance Zhonghua now comes off the production line there, too. Meanwhile, BMW also produces the 7 Series as well as the ATV X3 in Egypt. Since import duties for vehicles with engines larger than 1.7 litres are at 135 per cent and as there are no signs for a decrease in the foreseeable future, this promises to be rather profitable. While German manufacturers are trying their luck at the upper end of the product range – last year DaimlerChrysler began to assemble the S-class also in Egypt – their Asian competitors are putting their stake on the mass market. In April 2005 Nissan started producing pickup trucks in Egypt and in March 2006, the first Egyptian Nissan Sunny car came off the line. Egypt has declared the automotive sector to be a priority. There is hope to build a competitive industry and incentives are provided accordingly. But if the country is to reach its ambitious goals it will have to strengthen the private sector, and it will have to make further progress pruning bureaucracy and removing obstacles. ■



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Economic Integration at Last

After long being dismissed as an irrelevant talking club, **ASEAN** is finally moving ahead with economic integration. As a result, new opportunities for OEMs and suppliers arise in Southeast Asia.

TEXT: DR. THOMAS KIEFER • AUTOWORLD 2.2007

► After Japan, South Korea, China and India, a number of important automotive locations are being established in Asia. The ten member states of ASEAN (Brunei, Indonesia, Cambodia, Laos, Malaysia, Myanmar, The Philippines, Singapore, Thailand and Vietnam) with a total population of approximately 560 million people generate a GDP of circa 800 billion USD and its foreign trade volume

exceeds one trillion USD. The association had long been dismissed as little more than an irrelevant talking club. But as the speed of globalisation has increased, ASEAN has been forced to push for more integration. Particularly Thailand and Malaysia benefit from increased economic cooperation within ASEAN. More and more suppliers are competitive and manufacture at world market

prices. But Vietnam, The Philippines and Indonesia are also quickly modernising their economies. The future will be shaped less by national boundaries, protective tariffs are disappearing fast. By 2015, ASEAN together with China will form the world's largest contiguous economic area with a population of 1.7 billion people and tariffs will completely disappear.

The ASEAN countries are dependent on cooperation with foreign technology partners in order to survive in era of increasingly toughening competition. As a result, interesting business opportunities arise for German suppliers. The structures and degree of modernisation of the automotive sector in the individual ASEAN countries is quite varied.

Malaysia's goal was the creation of its own national automotive industry. To do so, the former Prime Minister Mahatir bin Mohammed founded

Proton in 1983. Proton's main factory is located in Shah Alam, Selangor, another factory in Tanjong Malim, Perak. The cars are mostly licensed Mitsubishi models, an imitation of the Citroen AX called Proton Tiara, and the Proton Waja developed in-house.

Imploding Proton

In 2002 Proton had a market share of over 60 per cent in Malaysia, which was reduced to 30 per cent by 2005 and may become smaller still when the duty rate decreases to a maximum of five per cent in the wake of the formation of the ASEAN Free Trade Area. Since the beginning of 2005, the duty for car imports from other ASEAN countries has already been decreased to 20 per cent. In particular, Proton is competing against the automotive concern Perodua (Perusahaan Otomobil Kedua Berhad), founded in

REGISTERED VEHICLES IN MALAYSIA

Year	Passenger Cars	Commercial Vehicles	4x4 Vehicles	Total Vehicles
1990	106,454	51,420	7,987	165,861
1999	239,647	26,171	22,729	288,547
2001	327,447	37,623	31,311	396,381
2002	359,934	42,727	32,293	434,984
2003	320,524	50,882	34,339	405,745
2004	380,568	70,948	36,089	487,605
2005	416,692	97,820	37,804	552,316

Source: www.maa.org.my

International OEMs are developing Thailand into their major production base in Southeast Asia. By 2010, Thailand seeks to double its car production to 1.8 million units.

1993. Perodua manufactures licensed Daihatsu models, which are also being exported to Europe. In April 2006, Perodua for the first time ever surpassed Proton in domestic sales. Their market share was at 27.4 per cent in comparison with Proton, which only achieved 26.6 per cent. Malaysia is the most important market within ASEAN with a share of 31.5 per cent.

Moving Upmarket

In Malaysia there are 350 to 500 efficient suppliers manufacturing around 4,000 different components. But this is not only about simple parts for the international market. Malaysia is not just extending its electronics industry to create new, cost-effective offers in the car electronics area. It is also an interesting place for buyers because of its products made of natural materials and natural rubber.

While a few years ago promotion and protection of the national industry by the state had been the basis for building up the automotive industry in Southeast Asia and China, these measures are becoming counter-productive now and prevent innovations. Therefore, particularly in ASEAN the further internationalisation of the industry is very likely. Countries will not be competitors in the future but regional locations with their specific location factors.

Thailand - Detroit of Asia?

International manufacturers are developing Thailand into their major production base in Southeast Asia. By 2010, Thailand seeks to double its

automobile production to 1.8 million units of which 800,000 units are to be exported. The exports of parts is set to reach approximately ten billion USD by 2010.

The automotive sector accounts for twelve per cent of Thailand's GDP. In total, 14 OEMs and more than 700 suppliers are located in the country. Today, there are no longer any barriers to entry. Thailand's government supports the sector's modernisation and expansion through tax rebates, tariff rebates and subsidies for research and development as well as for the training of employees.

"Thailand wants to become the Detroit of Asia", says Wisan Tanthawichian, Director of the Frankfurt office of Thailand's Board of Investment. "Free trade within ASEAN is being expanded. From Thailand the automotive sector has access to a market with more than 500 million people."

Vietnam: Looking for Speed

Vietnam's automotive sector is developing quite slowly. Many companies share a small market. In the supply industry, new, competitive production capacities for raw materials and labour intensive parts are being created. Not only the neighbours Japan and Korea bet on cheap production and sourcing from Vietnam. China and India are also establishing manufacturing facilities in Vietnam to benefit from low labour costs.

Market opening and increasing sales draw many international manufacturers to Vietnam. Together with Vietnamese partners, eleven foreign companies assemble passenger cars on the basis of CKD-kits, while manufacturers wholly-owned by Vietnamese focus on the manufacture of commercial vehicles. In addition, a number of tiny assembly companies for commercial vehicles exist. Currently, total manufacturing capacity amounts to approximately 234,000 units while total sales reach just 40,850 units (2006). In its efforts to modernise, Vietnam seeks to follow the Chinese model. All elev-

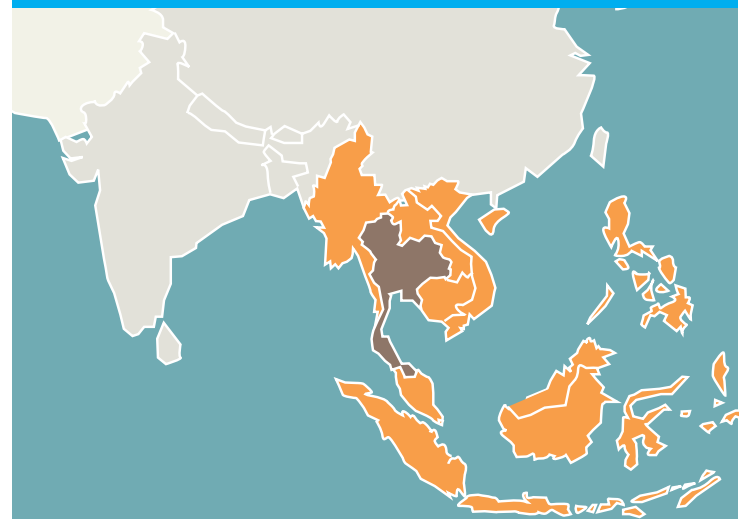
en foreign companies have to cooperate in joint ventures with state-owned Vietnamese companies. The German automotive sector's presence in Vietnam is limited. Near Ho Chi Minh City, Mercedes is building a 100,000 square metre large factory. But due to the low production numbers, the assembly costs in Vietnam are much higher than at other Mercedes' locations. Assembly is profitably only because of the high tariffs.

The seat manufacturer Vogelsitze is one of the few German suppliers present in Vietnam. But given current

developments in the sector, the country will probably become more attractive for German and European suppliers. However, competition is becoming tougher, especially since competitors from South Korea, China and India are entering Vietnam and are intensifying their cooperation within ASEAN.

Following Vietnam's accession to the WTO, tariffs and taxes are gradually being reduced. In 2006, import duties for vehicles decreased from 90 to 80 per cent, and for vehicles from China and the ASEAN countries from 90 to 50 per cent. ■

PRESENCE OF GERMAN SUPPLIERS IN THAILAND



ZF Lemförder (Thailand) Co., Ltd. located its plant right next to the BMW assembly plant Rayong. The Thai subsidiary of ZF Friedrichshafen concentrates on the production of axels.

MAHLE Engine Components (Thailand) Co., Ltd., manufactures pistons and MAHLE Siam Filter Systems Co., Ltd., Samutprakarn, fluid filters. About another dozen German suppliers have established subsidiaries in Thailand.

Bosch Automotive Thailand is a subsidiary of Bosch Automotive Japan. As "Japanese" company, Bosch has easier access to important OEMs in Thailand. Bosch seeks to significantly increase its business with Japanese firms, who dominate the Thai automotive sector. Bosch manufactures brake systems and parts for diesel motors in Rayong's Amata City Industrial Park.

Kern-Liebers (Thailand) Co., Ltd. manufactures return springs for safety belts. The main reasons for selecting Thailand were the proximity to the large OEMs. Only by being present in Thailand is the company able to deliver its parts just-in-time.



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On the World Standard

As niche supplier for the automotive industry, [Singapore](#) hopes to gain access to technology by attracting Western OEMs and suppliers to enter into joint ventures.

TEXT: IE SINGAPORE • AUTO.WORLD 2.2007

► Top quality, innovation, design and engineering expertise are key factors driving Singapore companies to build unique markets in the automotive manufacturing sector. These, plus its solid international reputation as a highly competent precision engineering centre for the world's manufacturers, have propelled the Singapore brand forward in the automotive industry globally. More than just another competitive Asian manufac-

turing base, the country's emphasis on nurturing innovation, cultivating research and development, as well as the management of intellectual property rights has enabled local companies to differentiate their services from the competition. Leveraging on their electronic manufacturing capabilities in high-end electronic components and strong business networks, these companies provide value-added technical support to

major automotive manufacturers and OEMs. Indeed, some of these companies, having built market share and engineering expertise in the tra-

ditional electronics industry, are now strategically diversifying their services, targeting niche segments of the automotive market.

Western companies maintain their Asian sourcing offices in Singapore. Siemens VDO's Asian research and development centre employs 150 people and is also based in the city state.

Capitalising on their technological know how and innovation, Singapore-based companies are establishing new capabilities, adding their experience in areas such as telematics to provide design-led, high quality precision products for the industry. Whether hybrid auto circuitry, metal stamped or plastic parts for vehicle interiors and body structures, or even electronic transmission systems, the companies' strengths in design and engineering are making the world's top auto makers like DaimlerChrysler and Toyota stand out. Singapore has long been established as a focal point in Southeast Asia for procurement houses or regional headquarters for auto suppliers and car manufacturers. Western companies including BMW, DaimlerChrysler and Bosch maintain their Asian sourcing offices in Singapore. Siemens VDO's Asian research and development centre employs 150 people and is also based in the city state.

Although the Singapore domestic market is relatively small, local players such as Allied Technologies, Intec, Innovalues and Rayco have focused on business economics and value creation, specially developing products and integrated solutions to expand their business and cater to the international market. Allied Technologies and Innovalues in particular, have established manufacturing presences in more cost effective regional bases to ensure their competitiveness and production quality control. Others like Intec and Rayco have gradually diversified into the lucrative automotive sector, seeking partnerships with established First Tier Suppliers like Bosch and Delphi to supply critical automotive components.

These home-grown companies are continually investing in R&D and developing higher quality products, which distinguish their offerings from other suppliers. Other than producing high end automotive components, these outfits are taking bold steps to increase their visibility, and looking to

engage clients right from the automotive conceptual stage.

Assisting the Car Industry

To this end, International Enterprise Singapore, an agency under Singapore's Ministry of Trade and Industry, is actively helping local automotive component suppliers increase their business exposure and build a solid reputation in the global arena. It has an assembly of programmes and assistance schemes to help domestic companies within the automotive industry market their products, competencies and capabilities internationally. One of these initiatives is 'BuySingapore', an online business matching platform (www.buysingapore.com), designed to help local companies seek global business opportunities, as well as match global market players in various industries including automotive component engineering, to suitable and relevant local partners for strategic alliances.

Western companies have also discovered Singapore as a gateway to China. With a unique blend of East and West, the island nation of Singapore has carved itself a reputation as enabling Western manufacturers to succeed in the Chinese market. With English being the business language of Singapore and the vast majority of locals speaking both Chinese and English, language barriers simply do not exist. Furthermore, Singapore is a free trade port holding bilateral free trade agreements with major global economies including the United States, Japan, EFTA (the European Free Trade Association) and Australia, and lies at a pivotal location.

Singapore's prime location and the efforts to assist local automotive component suppliers have revved up the automotive industry here, enabling Singapore companies to gain access to advanced technology, invest in R&D, and innovate their services, offering integrated solutions to niche segments, thus ensuring their ability to compete effectively on the world stage. ■

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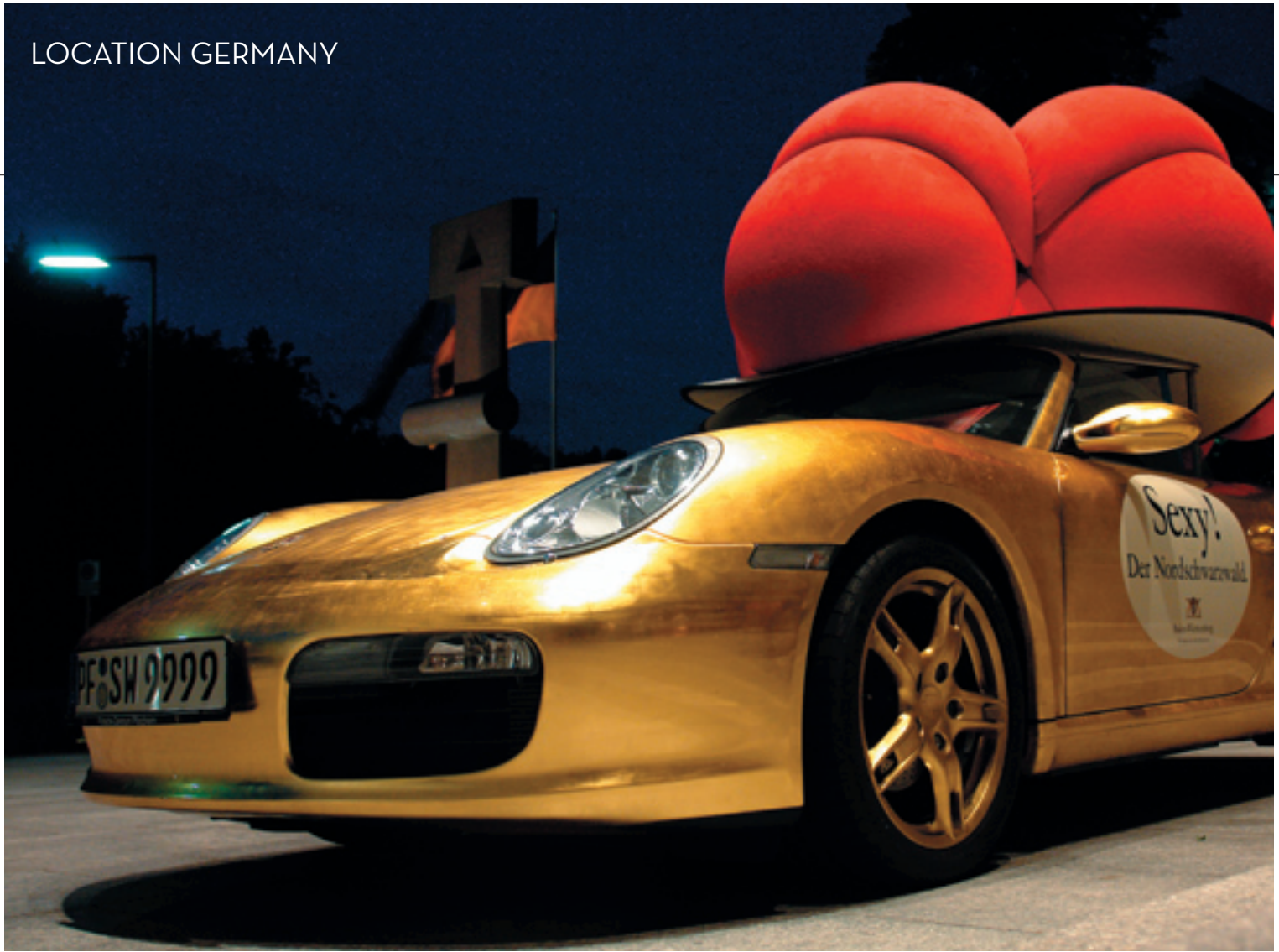
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Heartland of the Car Industry

In 1885 Karl Benz built the first three-wheeled vehicle with an internal combustion engine and electrical ignition and he called it an “automobile”. One year later Gottlieb Daimler managed to build his engine into a carriage, which made him the official inventor of the four-wheeled automobile.

Since then a lot has changed. A Portrait of the [automotive industry in Baden-Württemberg](#).

TEXT: DR. ALBRECHT FRIDRICH • AUTOWORLD 02.2007

► Baden-Württemberg remains the heartland of the automotive industry. Vehicle construction earns Baden-Württemberg an annual turnover of about 68 billion euros and the trend continues upward. About 60 percent of the turnover is earned from exports, which is proof of the worldwide demand for these products from Baden-Württemberg. About 400,000 people work in the roughly 1,700 businesses active in vehicle construction and the branches attached thereto. The automotive industry is most concentrated in the larger Stuttgart area, where almost 60 percent of the annual automotive turnover is produced. In second position is the region Heilbronn-Franken, accounting for about 13 percent of turnover.

Calling Baden-Württemberg Home

The automotive cluster Baden-Württemberg consists of prominent vehicle manufacturers and suppliers, automotive research institutes and university institutes, as well as associations and service-providers. In this state the manufacturers DaimlerChrysler AG, Porsche AG and AUDI AG are represented. DaimlerChrysler has its manufacturing plants for the finishing of complete vehicles and parts, such as engines and gearboxes, in Gaggenau, Mannheim, Rastatt, Sindelfingen and Untertürkheim. Focal points for the assembly of lorries and buses are in Mannheim, Wörth, Ulm and Rastatt. To that must be counted the locations Affalterbach, where high-performance sports cars, special equipment and accessories are manufactured, and Böblingen, where smart GmbH has its head office.

Porsche AG and AUDI AG each have two manufacturing plants in Baden-Württemberg. Porsche assembles the models 911 and Boxter in Stuttgart, as well as all engines of the different ranges of Porsche. AUDI AG produces the Audi A2, Audi A6 Limousine, Audi A6 Avant, the allroad Quattro and the Audi A8 in Neckarsulm. Two manufac-

turers, namely DaimlerChrysler AG and Porsche AG also have their headquarters in Baden-Württemberg.

Fertile Ground for Many Suppliers

Many suppliers of worldwide prominence could develop themselves in the shadow of these strong manufacturers. So, one finds many Baden-Württemberg suppliers in the list of Top 100 automotive suppliers. For instance, the ZF Group, Mahle, Behr, Getrag, Freudenberg, Eberspächer and Mann + Hummel. These companies benefit from the built-in strength of the cluster, namely the big number of mid-sized suppliers to the automotive industry. The big number of businesses creates a demand for highly

Vehicle construction earns Baden-Württemberg an annual turnover of about 68 billion euros and about 400,000 people work in the roughly 1,700 businesses active in vehicle construction and related sectors.

qualified employees. Thus, more than ten study courses focusing on the automotive sector have been established over the years for the education of new talents.

For instance, the University of Stuttgart offers the study course Vehicle and Engine Technology. Vehicle Technology can also be studied at the universities in Esslingen, Weingarten,

Offenburg, Ulm and Karlsruhe. In Ulm the study course Vehicle Electronics can also be selected. With the study course Automotive System Engineering the University of Heilbronn trains engineers to have an inter-disciplinary view of the whole vehicle. Since an automotive does not only consist of technology, but should also look good, the Universities of Reutlingen ►



PRODUCTION FORECAST BADEN-WÜRTTEMBERG

	Audi Neckarsulm 1	Audi Neckarsulm 2	Maybach Sindelfingen 2	Mercedes-Benz Rastatt	Mercedes-Benz Sindelfingen 1	Porsche Zuffenhausen	Total
2001	198.940	49.369	0	183.007	493.190	33.339	957.845
2002	188.300	37.578	47	156.495	512.229	34.192	928.841
2003	137.081	27.323	702	139.119	493.812	28.622	826.659
2004	177.025	19.745	566	138.493	461.568	31.861	829.258
2005	193.890	10.026	302	265.216	392.924	36.139	898.497
2006	187.835	134	310	285.603	386.164	38.111	898.157
2007	176.919	4.030	279	279.225	417.658	38.866	916.977
2009	175.737	5.313	205	235.032	473.179	35.872	925.338
2011	220.235	4.742	171	226.824	472.768	28.482	953.222
2013	230.769	4.470	473	313.730	448.576	41.238	1.039.256

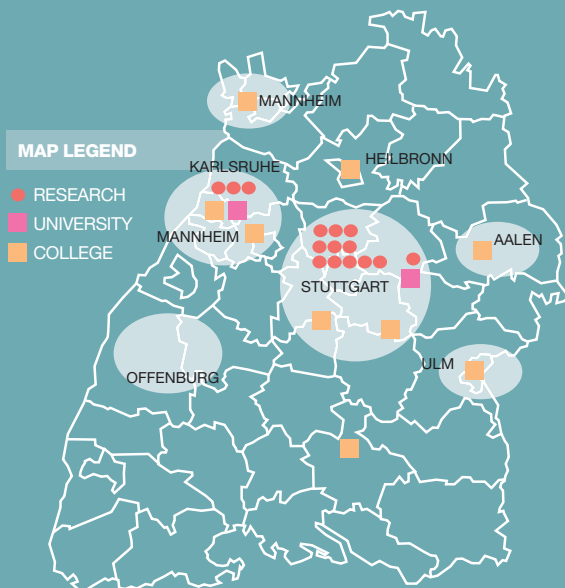
Source: CSM Worldwide

More than ten competence centres bind businesses, research institutes and training centres into each other and promote research on fuel cells, mechatronics, logistics and virtual reality.



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AUTOMOTIVE CLUSTER BADEN-WÜRTTEMBERG RESEARCH INSTITUTES, UNIVERSITIES AND COLLEGES



SOURCE: LOCAL GLOBAL, BADEN-WÜRTTEMBERG WIRTSCHAFTSMINISTERIUM

and Pforzheim offer the study courses Vehicle Interior Design and Transport Design respectively, to future designers of the industry.

Strong Research Institutions

An example for the many research institutes involved in automotive projects is the Institute for Vehicle Concepts in Stuttgart. At present brand new hybrid concepts for fuel cell engines are being developed in its fuel cell test facilities. Lightweight construction and hybrid building methods are other research fields which connect with construction and simulation technology and may lead to the manufacture, testing and vehicle integration of demonstration models. More than ten competence centres complement these research institutes on the themes fuel cells, mechatronics, logistics, virtual reality, by binding businesses, research institutes and training centres into each other and so make an important contribution to the transfer of research results. The automotive cluster is rounded off by a number of associations and business organisations which drive communication between and the networking of players inside the cluster.

Due to this unique concentration of cluster actors the focus on the cluster's further development/enhancement in the areas transparency, dialogue and networking. An important instrument to increase transparency is the information portal www.autoland-bw.de. Events, news, cooperation requests and offers as well as members of the automotive cluster are listed on the website. autoland-bw.de does not offer much original content, but instead links to the substantial content and databases of the cluster members. Thus autoland-bw.de offers the most comprehensive overview of the automotive cluster Baden-Württemberg.

Of course, Baden-Württemberg will once again have a strong presence at the world's largest motor show, the

IAA in Frankfurt/Main. More than 110 automotive suppliers and OEMs from the state will present the newest developments and provide solutions to meet the challenges of the future - one focus being on environment-friendly technologies such as hybrid drives and emissions control technologies.

Enhancing Dialogue

The basis for the further enhancement of dialogue and networking within the cluster are the many events in different regions offered in different formats. The central event is the "Zuliefertag Automobil" (Automotive Suppliers Day), which takes place once a year.

9th Automotive Suppliers Day

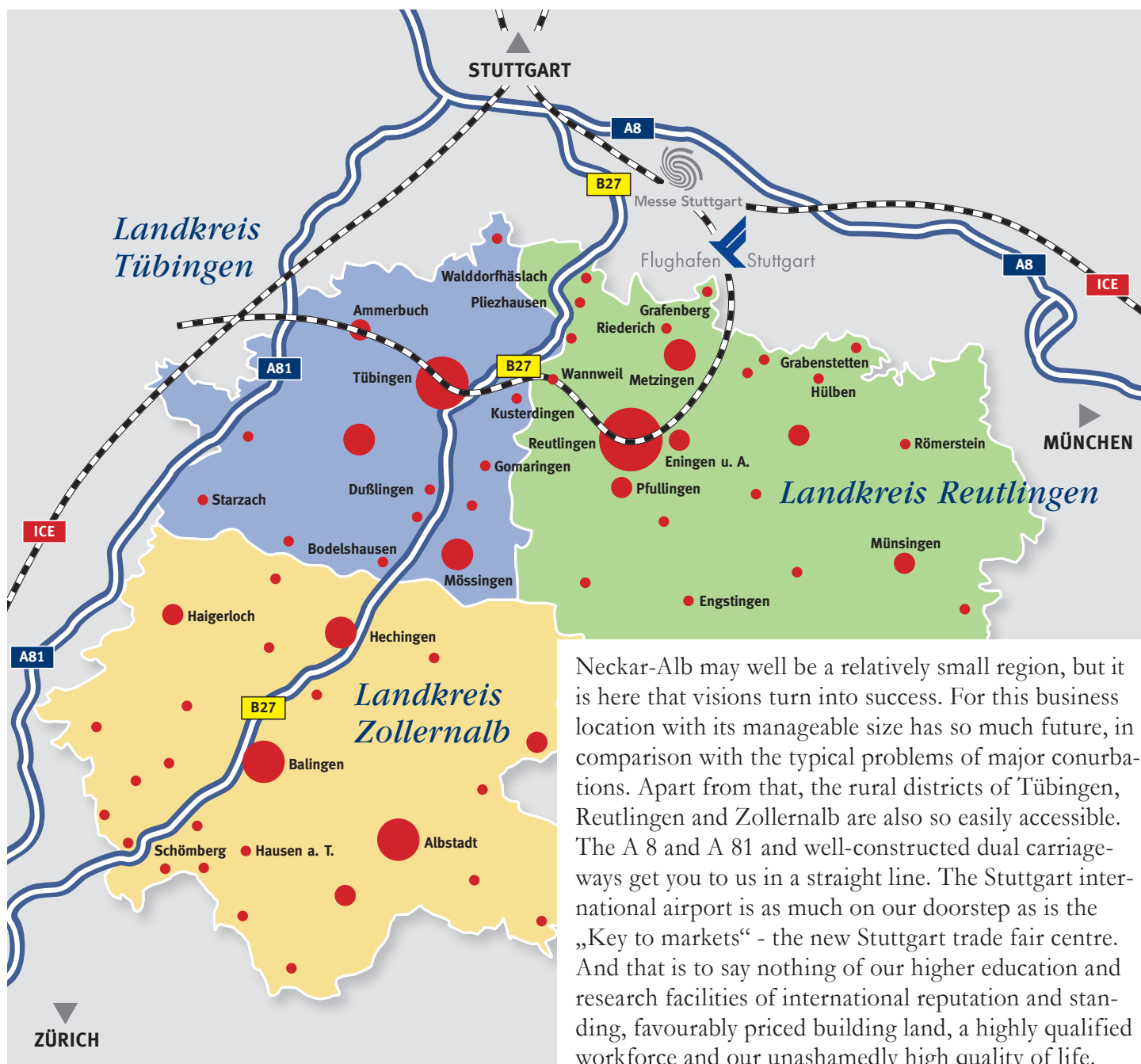
This year 9th Automotive Suppliers Day takes place on 21 November 2007 in the ICS International Congress Center Stuttgart at Stuttgart's New Trade Fair Centre. Top speakers from the automotive industry will report on current trends. Attendees will have the opportunity to exchange information in specialist workshops. The Deutsche Gesellschaft für Galvano- und Oberflächentechnik (German Association for Galvano and Coating Technology) will present current trends in the automotive coating sector on 20 November 2007. In addition, an international matchmaking event and a trade exhibition will also take place during the 9th Automotive Suppliers Day.

Numerous Opportunities for Face-to-Face-Contact

In addition, an international matchmaking event, regional supplier exhibitions, tours of car manufacturers and supplier factories, supplier workgroups and R&D projects involving business and science as well-established for a, in which cluster members get to know each other, exchange ideas and often agree to work jointly on future projects. ■

www.autoland-bw.de

What's the future worth if you don't invest in it?



Neckar-Alb may well be a relatively small region, but it is here that visions turn into success. For this business location with its manageable size has so much future, in comparison with the typical problems of major conurbations. Apart from that, the rural districts of Tübingen, Reutlingen and Zollernalb are also so easily accessible. The A 8 and A 81 and well-constructed dual carriageways get you to us in a straight line. The Stuttgart international airport is as much on our doorstep as is the „Key to markets“ - the new Stuttgart trade fair centre. And that is to say nothing of our higher education and research facilities of international reputation and standing, favourably priced building land, a highly qualified workforce and our unashamedly high quality of life.

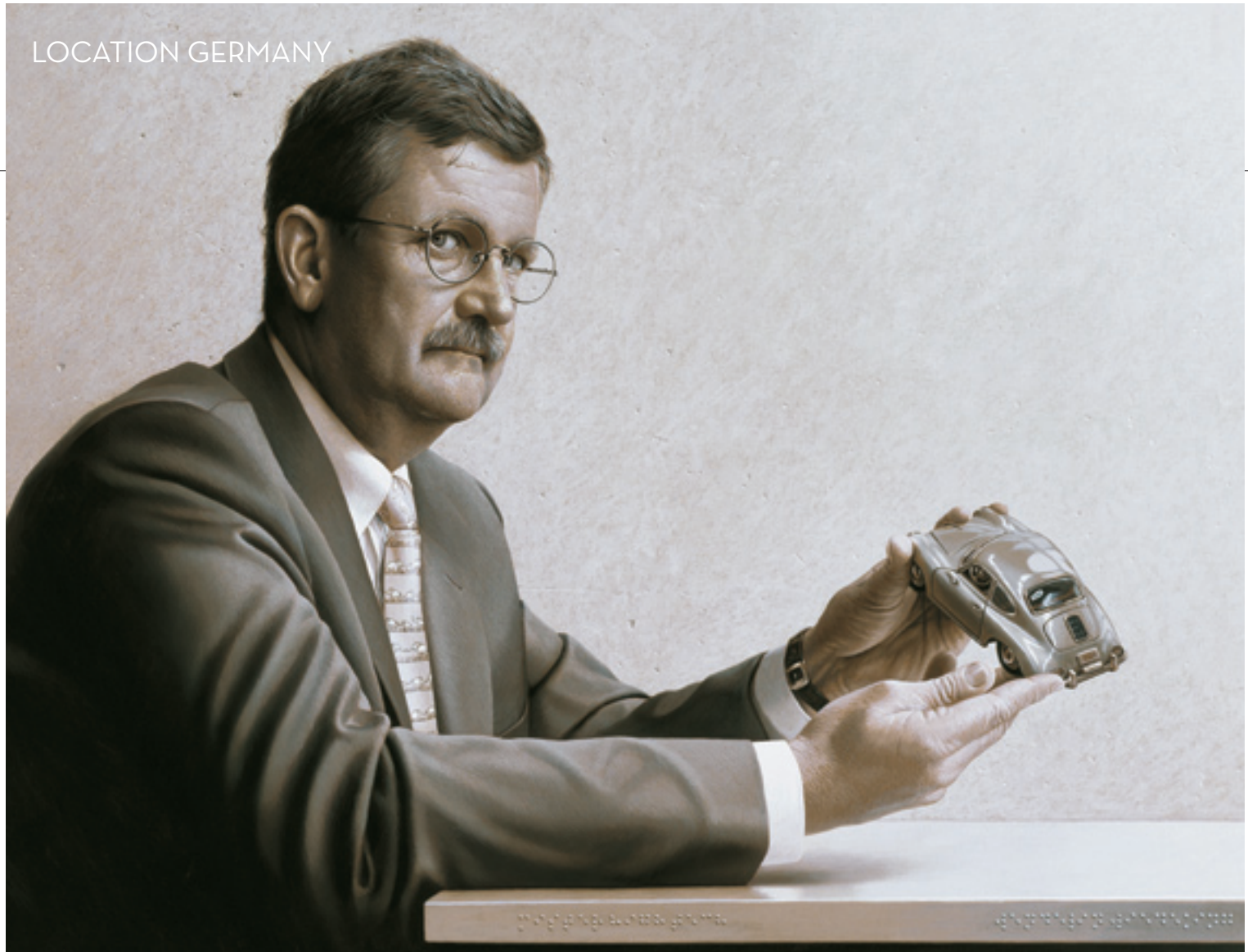
You can learn all about this and much more about the innovative region here: www.neckaralb.de or at www.tourismus-schwaebische-alb.de.

Neckar-Alb – an interesting location for you too.

Tübingen
Reutlingen
Zollernalb | Region NeckarAlb



Going forward? – We're already well on our way!



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“Our Home is in Baden-Württemberg”

More than 120 years ago two engineers invented the automobile in Baden-Württemberg.
[Dr. Wendelin Wiedeking](#), CEO of Porsche, discusses the evolution of the automotive location
Baden-Württemberg and how Porsche reacts to the challenges in an age of globalisation.

INTERVIEW: HANS GÄNG • AUTO.WORLD 02.2007

“Although we are international on the sales front, we are and will remain a Swabian company through and through. It makes no sense to uproot the entire development process, in many ways the heart of Porsche, and relocate to a distant location.”

auto.world: What distinguishes Baden-Württemberg so sharply from other locations in the automotive industry?

Dr. Wiedeking: The automobile was discovered in Swabia some 120 years ago. Since then, Baden-Württemberg has evolved into an automotive-industry location of international renown; one which is now home not only to the two world-famous manufacturers Daimler and Porsche, but also to a multitude of highly innovative, very well performing supply companies. Plus it has prominent universities and research institutes that on the one hand undertake cutting-edge scientific research in the field of vehicle technology and on the other train highly qualified engineers. One would be hard put to find another location anywhere in the world where as much cumulative knowledge and as many years of experience in the development and production of automobiles is so concentrated as in Baden-Württemberg. Being constantly able to fall back on this outstanding infrastructure is another fundamentally important factor in the competitiveness of our companies.

Can Baden-Württemberg's reserves of engineers and technical specialists keep pace with the global rise in manufacturer and supplier numbers?

Recently, not to the extent that it should, unfortunately. Successful, local businesses are finding it ever harder to meet their rising demands for qualified personnel. There is a lack of newly qualified blood, especially in the technical professions. Engineers are avidly sought after everywhere nowadays. In this respect, Porsche

is still in a comparatively favourable position: surveys show us that, among engineering students, we are one of the most popular employers in Germany, and even in Europe. This means that we can usually fill open positions immediately. For medium-sized supply companies, however, the shortage of engineers is increasingly becoming a real problem, and one that limits their competitiveness on the global market. This trend concerns me greatly. We at Porsche rely on strong, innovative supply partners.

Could you imagine Weissach moving to Shanghai or Pune?

No. Although we are international on the sales front, we are and will remain a Swabian company through and through. It makes no sense to uproot the entire development process, in many ways the heart of Porsche, and take it from its traditional surroundings to some far-and-relocate to a distant location. With its lean, flexible structures, flat hierarchies and highly efficient processes, our company is reliant upon short decision-making processes. This is why our development dovetails so closely with production, sales, and administration. The network of relationships between our staff in different departments and divisions is also important. We could not sustain this mature, tried-and-tested company culture if our developers were to work overseas. “Engineered by Porsche” will thus always mean “developed in Weissach”.

How does your company itself get involved in the knowledge-based landscape of Baden-Württemberg?

We start with the schools. Each year, for example, together with Baden-Württemberg's Ministry of Culture, we award the Ferry-Porsche Prize to the highest-achieving high-school graduates specialising in math and science. Our aim in doing so is to better the profile of scientific subjects in schools. We also work closely with the universities' technical faculties, for example by commissioning research projects or supporting students on their theses.

How do you promote networks and knowledge transfer with your regional suppliers?

As a comparatively small vehicle manufacturer with limited production depth and innovative products, Porsche naturally has to be able to rely on a well-functioning supplier network. So, in this respect, we leave nothing to chance. Even in the development phase of a new vehicle, our engineers sit down with our most important systems suppliers to put forward our aims and jointly plan the relevant projects. We also help our partners optimise their internal processes. This simultaneously saves considerable amounts of money and boosts quality and productivity. We help them to rise to the challenges of global competition, thereby also helping to maintain jobs in Baden-Württemberg and secure them for the long term.

What challenges do the desired, or at least potential, production alliances with Volkswagen pose for the suppliers?

Volkswagen has been supplying the bodies for our Cayennes, which are assembled in Leipzig, since 2002. The bodies for our fourth series, the Gran Turismo Panamera, which will also be produced in Leipzig ready for a 2009 market launch, will originate in the VW plant in Hanover. In both cases, Volkswagen is nothing more and nothing less than a key supply partner that takes charge of the

bodyshell and paint work on behalf of Porsche, enabling it to make better use of its production capacities. There are no further joint manufacturing ventures in the pipeline, so absolutely nothing is set to change for our systems suppliers in the foreseeable future.

Is your stake in Volkswagen a platform for more powerful, national synergies in the research arena? If so, in which areas?

Porsche has been working successfully with the Volkswagen Group for years, not least in the field of research and development. For example, our third series, the Cayenne, which was launched at the end of 2002, is the upshot of a joint development project headed by Porsche, which in turn laid the foundations for the VW Touareg. Our engineers are currently working with their VW counterparts on an innovative hybrid drive that will enter series production before the decade is out. So you see, our move to become a larger shareholder in Volkswagen AG also served, in no small part, to place a long-standing, tried-and-tested partnership on a solid foundation, from which it can be nurtured further. In the future we will collaborate even more closely, for example, on the development of electronics platforms, enabling us to achieve marked synergies in terms of innovation and cost-effectiveness.

“As a comparatively small manufacturer with limited production depth and innovative products, Porsche has to be able to rely on a well-functioning supplier network.”

Champions on the World Market



The **German auto industry** can look back on an extremely successful 2006. Unit car production rose nearly one per cent from a high level to 5.4 million vehicles – a new record figure for the second year running. This positive performance was driven by demand from both the domestic and foreign markets.

TEXT: ERIC HEYMANN • SENIOR ECONOMIST, DEUTSCHE BANK RESEARCH • AUTOWORLD 2.2007

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► Car exports climbed to a new high for the fourth year in a row despite the general weakness of the US auto market and the continuing appreciation of the Euro. This impressively underlines the international competitiveness of the German automotive industry. The vehicles built by German car makers have been very popular with foreign customers for years already on account of their quality, safety, range of models, design and comfort.

Environmentally, German brands can also hold their own against their rivals; for example, German car makers are the world leaders in modern diesel technology. In cost terms the moderate wage settlements of recent years have now paid off. Germany has made up a spectacular amount of ground on other Western European locations where unit labour costs have recently risen constantly. In addition, the constant improvements in the

production processes, outsourcing and the integration of production facilities of German and international automotive supply industry abroad have generated economies of scale and cost advantages and reaped the benefits of globalisation.

Stiff Competition

The domestic market was also satisfyingly buoyant last year. New-car registrations increased nearly four per

cent in 2006. For the first time since 1999 more than 3.4 m cars were sold in Germany. These very positive figures – at first glance – are however largely due to buyers bringing forward their purchases into the last two months of 2006 in order to evade the three percentage point increase in VAT at the beginning of 2007; the number of such brought-forward purchases totalled nearly 100,000 cars. This final spurt averted a much worse result in 2006.

In the fast lane: The output of the entire automobile industry in Germany – as measured by the production index – has risen more than 95 percent since 1993, while unit car production has grown since then by “just” 43 per cent.

Furthermore, the domestic market was subdued due to the ongoing high rebates. They indicate how stiff competition is in the car sector – and not only in Germany. In the meantime customers have got used to significant discounts. In very few cases are list prices the same as actual selling prices. This rebate war of course squeezes the margins of auto makers and car dealers.

Impressive Growth

According to the production index of the Federal Statistical Office, which also covers the production of recently booming commercial vehicle makers and the automotive supply industry as well as qualitative growth, output of the entire automobile industry in Germany grew by a price-adjusted 2.4 per cent in 2006. This enabled an all-time-high to be celebrated for the tenth time in succession! Qualitative growth far exceeds the purely quantitative/volume growth that tends to receive more attention within the sector. Output of the entire automobile industry in Germany – as measured by the production index – has risen more than 95 per cent since 1993, the last year of recession for the sector, while unit car production has grown since then by “just” 43 per cent.

Suppliers Benefit

The reasons for this discrepancy are the trend towards better equipped cars in all vehicle classes, the rising share of more expensive diesel-engined vehicles and the growing importance of niche vehicles. Focusing solely on unit statistics allows little meaningful analysis of the automobile industry and ignores the whole of the automotive supply industry.

The automotive supply industry has constantly contributed to the expansion of the auto industry as a whole over recent years. Although in 2006 the autoparts segment managed a real increase in output of only a good two per cent – i.e. somewhat lower than the overall auto industry – it has in the past generally achieved much stronger production growth than the auto industry as a whole. Its output in Germany has increased 143 per cent in real terms since 1993, making automotive suppliers one of the most dynamic industrial sectors in Germany. The automotive supply industry has benefited and will continue to benefit from the reshaping of the automotive value chain. Both car and truck makers are reducing their level of in-house production and outsourcing increasingly complicated tasks to autoparts suppliers; these suppliers already account for over 60 per cent of value added. In the process, outsourcing is increasingly acquiring a different quality.

The demand is for technical solutions that ensure that the car, which is becoming increasingly complex, remains a cutting-edge, world-class product. This means that outsourcing is not focused primarily on production departments, but also on their research and development teams. Vehicle electronics are acquiring a key function in this regard. The automotive industry also faces major environmental challenges. Stringent CO2 emissions limits for new vehicles are on the political agenda. Suppliers will have a pivotal role in meeting these challenges. They will contribute their expertise to the development of more efficient powertrain concepts, lighter materials or other technologies to improve vehicle efficiency. This will



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LIGHT VEHICLES: TOP SALES MARKETS FOR GERMAN OEMS (IN UNITS)

Country	2004	2006	2009	2011	2013
United States	846.944	881.708	938.818	1.056.695	1.156.523
United Kingdom	872.321	876.988	853.852	886.316	917.237
China	697.799	768.152	698.506	717.087	758.983
Italy	510.470	559.728	646.091	677.700	663.866
Spain	405.239	459.970	502.131	548.916	608.878
France	399.958	431.235	499.606	550.920	543.944
Brazil	353.798	426.449	450.447	463.593	453.556
South Africa	145.791	217.447	196.215	202.186	226.396
Belgium	180.216	200.217	187.325	211.052	217.612
Japan	152.354	171.042	151.955	164.194	165.449

Source: CSM Worldwide

generate additional growth momentum for the sector, which should also be reflected in positive labour market developments. The process of technological refinement of motor vehicles is still far from over.

Domestic Market: Blot on the Landscape

The German automotive industry made a very vigorous start to 2007.

Both car production and exports are on course to reach record levels again. In H1 2007 they were seven per cent and twelve per cent higher than their respective pre-year levels. This means that new records are virtually assured for 2007 as a whole. We expect output growth of four per cent and export growth of eight per cent for the year 2007 despite their high levels in 2006. The production index ➤

► in the auto industry continues to point upwards. In the first five months of 2007 it was up some seven per cent in real terms on the previous year. The booming truck segment will continue to make a major contribution. For 2007 as a whole we forecast growth of five per cent and for 2008 – due among other things to less buoyant foreign markets – an increase of three per cent. A key contribution will again be made by automotive suppliers, which should achieve price-adjusted growth of three per cent in both 2007 and 2008.

Sales Bounce Back

However unit car sales in Germany have so far been worryingly low (H1 2007: down nine per cent yoy) due to purchases brought forward to the end of 2006, high fuel prices and the discussion about additional environmental burdens, for example. What

is particularly striking is that private car buyers are being very reticent (sales down 27 per cent year-on-year in the first five months of 2007). Their share of new-car registrations so far this year has fallen to only 37 per cent (2006: 47 per cent). This declining share of new-car registrations by private buyers, which has been apparent for years, may also be due to the fact that despite the launches of a number of new models the supply of attractive vehicles costing around EUR 10,000 remains very limited. True, sizeable rebates and favourable financing offers for new cars have played a large role in Germany for years, and list prices and actual sales prices are rarely identical. However, as a result of their pricing of new models and volume models, car producers seem to have lost touch with part of their traditional client base, which in some cases is trickling into the market for

“EU plans to introduce binding CO₂ limits for newly registered cars should drive up spending on R&D. The suppliers will benefit from this via supplementary contracts.”

used cars. So the main victims of the sales slump are the car dealers since the export option is not open to them. Moreover, stiff competition and rebate offers are squeezing car dealer margins considerably. All in all, however, domestic car sales as well are likely to bounce back in the next few months. This is suggested by, among other things, the improvement in the German employment situation.

Pent-up Demand

Furthermore, Germany has strong pent-up demand as the average age of cars on German roads is more than eight years old. This applies despite the fact that the average lifespan of cars has continued to rise for years as a result of the improvement in quality and the lower mileage per vehicle. On the supply side, the Frankfurt International Motor Show (IAA) held in September will give the market a boost with many new models which, however, should not be fully reflected in demand until 2008. All in all, new-car registrations are likely to fall at least six per cent in 2007. A discernible recovery is likely in 2008; we expect an increase of five per cent to more than 3.4 m cars sold in Germany.

Environmental Challenges

The automotive industry is the subject of particularly close political attention with regard to climate policy. Since CO₂ emissions from road vehicles have risen constantly in recent years and the progress in cutting specific fuel consumption has slowed considerably of late, the EU plans to introduce binding CO₂ limits for newly registered cars from 2012 at an average of 120 grams per kilometre (compared

with the current average of around 160 grams for new vehicles). In Germany discussions are taking place about changing over to CO₂ emission levels as the basis for assessing vehicle tax. Restrictions on company car regulations are also under discussion. These government measures should drive up the sector's spending on research and development. Manufacturers will work even more feverishly on newer and potential powertrain technologies of the future (electric cars for urban driving/commuters, hybrids, fuel cells, hydrogen technology), on new materials and reducing rolling resistance and aerodynamic drag. The automotive supply industry will benefit from this via supplementary contracts.

Great Potential

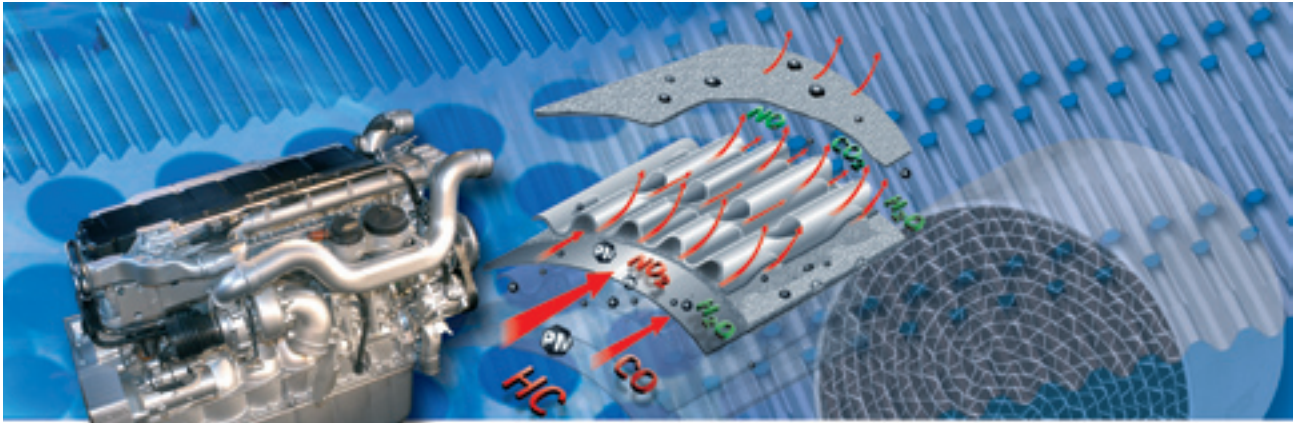
Boosting the efficiency of traditional drivetrains, for example by equipping petrol and diesel engines with direct fuel injection or automatic start/stop systems, offers the greatest potential for success in the short term. Preparations for a rising share of biofuels are underway. With the capital expenditure costs that will be incurred over the next few years comes the opportunity for domestic and international success offered by energy-efficient vehicles. A car's fuel consumption will in future become a more important decision-making criterion – especially for private buyers. Ultimately the key for the German automotive industry in particular will be to avoid being forced onto the defensive in the environmental policy debate. It should go on the offensive regarding this topic and demonstrate its innovative capacity in this area as well. ■
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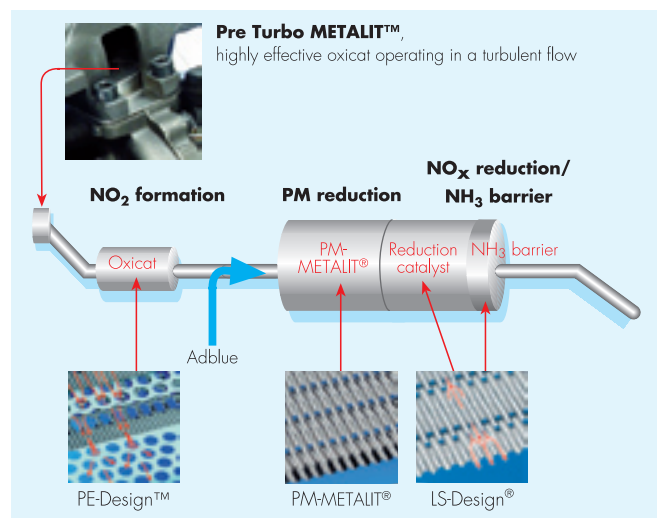
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Speed may soon be less decisive: A car's fuel consumption will become a more important decision-making criteria for buyers.

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Pole Position with Innovations

Spiralling oil prices, the halving of CO₂ emissions, particulate pollution and congestion charges – these are just some of the key issues currently facing the world's automobile industry. What often goes unnoticed is that **suppliers** have already come up with trumps in delivering a number of pioneering innovations and solid technological expertise within this field.

TEXT: DR. STEFAN WOLF • CHAIRMAN OF THE MANAGEMENT BOARD OF ELRINGKLINGER AG • AUTOWORLD 2.2007

► The key issues for discussion within the global car industry and the focal points of this year's IAA motor show in Frankfurt/Germany are centered around the reduction of fuel consumption, the lowering of emission levels and the development of alternative fuels and propulsion concepts.

Reduction of Emissions and Consumption

The significance of these topics is reflected in the official motto chosen for this year's IAA – „Sustainable Mobility“. Public debate also revolves around the socio-political implications

of climate change for the automobile industry. Within this context, one of the central questions is to what extent and with the help of which technologies automotive suppliers will be able to contribute towards consumption- and emission-reducing solutions. Beyond the current debate centred around the potential reduction of CO₂, the industry is also having to square up to the challenge of lowering the level of nitrogen oxide, hydrocarbons and particulates.

As a supplier and development partner to vehicle manufacturers, ElringKlinger has many years of

experience in addressing these key issues, focusing its R&D activities on product solutions that are tailored to the requirements of the automobile industry. Alongside the production of high-temperature specialty gaskets and thermal shielding solutions for the components of the exhaust system, the company is currently developing a pioneering concept for diesel particulate filters as well as fuel cell components.

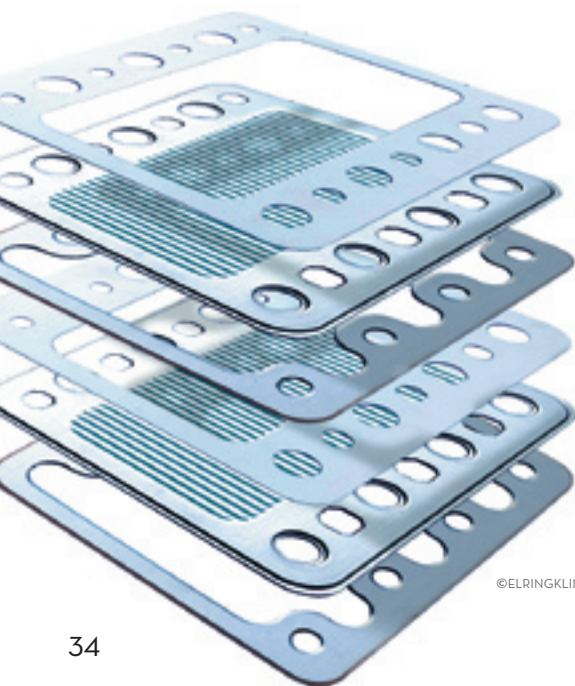
Alternative Fuels

Prompted by the sharp increase in oil prices, the market for alternative fuels has been undergoing rapid expansion. One of the key benefits of using bio-fuel and synthetically derived fuels on the basis of regenerative raw materials such as rapeseed, corn, soy beans or beet is the reduction of CO₂ emissions. A non-fossil fuel derived from crops, bio-ethanol has good anti-knocking properties and is proving increasingly popular as an additive to standard gasoline. Drawing on its expertise in cylinder-head and specialty gaskets, ElringKlinger has established itself as a premier supplier of components used in diesel engines, an application that places great demands on sealing solutions in terms of technology and product design. Beyond this, the company's R&D work also focuses on gasket technology for bio-etha-

nol/flex-fuel engines. In Brazil, for instance, two-thirds of the vehicles in use are powered by bio-ethanol derived from sugar cane. What is more, a number of new production plants will commence operation in the US as early as 2008. In Europe, too, bio-ethanol is added to the so-called E5 to E85 blends. However, bio-ethanol is relatively aggressive when it comes to its chemical properties, which poses a challenge for sealing technology.

Lightweight Construction: Use of Alternative Materials

As an alternative to metal, the use of light-weight materials in the development and production of automotive components can make a significant contribution to the lowering of fuel consumption. At ElringKlinger, development engineers are responsible for assessing the potential deployment for lighter, more cost-effective plastics for components used in vehicle manufacturers' engines and gearboxes. Cylinder head covers formerly made of metal are increasingly being produced from high-performance light-weight plastics. Similarly, the trend in commercial vehicle design is towards plastic valve covers. Oil pans, gearbox covers and housing modules also offer plenty of potential when it comes to reducing the overall weight of vehicle components.



ElringKlinger develops high-precision bipolar plates for fuel cell stacks.

©ELRINGKLINGER



“Suppliers are likely to play a prominent role when it comes to developing concepts aimed at emissions reduction.”

Dr. Stefan Wolf,
Chairman of the Management
Board of ElringKlinger AG

© ELRINGKLINGER

Lower weight translates into better performance: by incorporating lighter components, CO₂ emissions can be scaled back by approx. ten per cent.

Propulsion Technologies

Modern vehicle propulsion systems range from standard petrol engines and clean diesel through LPG and hybrid technology to fuel cell solutions. From today's perspective, the internal combustion engine still offers a great deal of potential for improvement, for example by developing new fuel injection methods and more homogeneous combustion processes. It is likely to remain the dominant propulsion system used by the world's major automobile companies for the foreseeable future. Having said that, spiralling energy prices have generated fresh impetus within

the market for alternative propulsion technologies, as well as creating new challenges for suppliers when it comes to developing specialist expertise and embracing innovation. With a view to establishing a strong position within the area of high-potential propulsion systems, such as fuel cell technology, ElringKlinger has been drawing on its core competency in sealing technology to develop high-precision components such as high-precision bipolar plates and sealing frames. Additionally, the company combines the individual cells to produce the actual fuel cell stack.

Rising Demands on Automotive Suppliers

There can be little doubt that the demands on automotive suppliers have grown substantially in recent years. In particular, suppliers have to

demonstrate greater technological expertise. Increasingly, the supply side has become responsible for research and development, as well as contributing directly to production processes. This calls for structures that are financially sound and sustainable well into the future, i.e. supplier companies that are capable of financing the necessary investments.

Good Prospects in the International Arena

The fast-paced emerging markets, in particular, have opened up new opportunities for automotive suppliers accustomed to stringent European emission standards. For instance, countries such as China, Korea, Thailand and India are introducing strict emission limits based on the Euro 3 and Euro 4 standards implemented in Europe.

Suppliers are likely to play an increasingly prominent role when it comes to developing concepts aimed at emissions reduction. This applies not only to their contribution to technological development but also to their share in the value creation process. One of the prime objectives will be to raise awareness among customers that future-oriented mobility cannot be achieved without some form of financial sacrifice. Here, the emphasis is on educating the public and establishing a socio-political framework. Suppliers with a strong position in emissions technology, engine management, alternative propulsion and next-generation fuels, coupled with the ability to provide targeted support for OEMs in the field of technical innovation, are likely to be presented with numerous exciting opportunities for growth over the coming years. ■

www.elringklinger.de

Reducing Exhaust Gases

BERU, specialist for ignition technology, diesel cold-start technology, electronics and sensor technology, recently celebrated the official opening of its expanded R&D Center (RDC) at its head office in Ludwigsburg.

TEXT: HANS GÄNG • AUTO.WORLD 2.2007S

► Dr. Rainer Podeswa, BERU managing director for research and development and sales of original equipment, welcomed the numerous representatives from business, politics and the automotive industry and declared: "The extension is a visible sign of a long-term corporate policy and permanent investment in the future. Only in this way, BERU can guarantee technological leadership in diesel cold-start technology and secure its position as a specialist for ignition technology."

In his remarks Dr. Podeswa emphasised the following: "With the extension of the RDC, the company consistently conforms to the increased requirements of our global customers for a required qualitative expansion of the testing of new, innovative products and systems with a simultaneous reduction in development times. Against this background BERU set up the shop for electromagnetic compatibility in the RDC several years ago. There we have the opportunity to test electronic products for their electromagnetic compatibility in the vehicle environment." As the leading specialist for diesel cold-start systems and ignition Technology for petrol engines, BERU is also prominent in the advancement of engine technology with the aim of improving consumption and reducing exhaust gases.

The heart of the new extension, which cost about five million euros, is the new 4-wheel roller test bench in a cold chamber. The RDC now also includes the new BERU competence

centre for ceramics as well as numerous laboratories and test areas for the BERU product inspection and quality control. The RDC which was built in 1998 required the approximately 1,000 square metre extension on account of the ever growing spectrum of tasks for the development departments which also provide more and more research and development services for BERU customers, and on account of the associated ever increasing demands on the quality control of the supplier company.

The most important technical data:

- > wheelbase: 2.1 - 4.2 metres
- > gage (outside - outside): maximum 2.7 metres
- > weight: maximum 3.5 tons
- > output: maximum 200 kW per axle
- > speed: maximum 250 km/h

Shorter Development Times, Quicker on the Market

Under the chic exterior of the new RDC is pure hi-tech. In the centre of the extension there is a 4-wheel roller test bench in a two-storey cold chamber used for running tests and developing components for cars. Temperatures from -40° C to +30° C can be generated in the cold chamber. BERU spark plugs, glow plugs, Diesel Instant Start Systems (ISS) and Tire Safety Systems (TSS) as well as sensor and electronic components are tested and applied at the new heart of the RDC. "With the extension of the RDC, BERU now has a two-axle cold roller. Unlike the existing engine test

benches and cold cells, we are able to test and validate products and systems in vehicles under driving conditions", explained BERU member of the board Dr. Podeswa. "As a result, we can reduce development times. Our products come on the market even more quickly." As BERU customers frequently have capacity bottlenecks on their own test benches, BERU will offer the customer (if requested) the external use of its new 4-wheel roller equipment and the engine test benches. Customer information with all important technical data is in preparation.

With the extension of the RDC, the existing engine and special engine test benches featuring measurement and

test engineering for fully automatic endurance tests, cold start tests as well as for the thermal, electrical and mechanical measurement of components can be operated even more quickly and flexibly. Roller test bench, engine test benches and their equipment are situated on one level. Advantage for all those involved in the process: short routes, optimum communication.

In Germany BERU currently has 224 employees in development; 148 at the head office in Ludwigsburg and 76 at the electronics site in Bretten. In the financial year 2006 BERU invested 33.5 million EUR in research and development. ■

www.beru.com



The EMC center is an important component of the BERU RDC. This is where BERU products are tested for their electromagnetic compatibility.

© BERU



Financial Rating

Financial Rating is a business rating based on quantitative rating criteria. The data required are obtained from the profit and loss account, balance sheet and notes from up to three years' annual accounts. The rating calculated from these data covers the likelihood of default and therefore is a measure of the financial strength or creditworthiness of the business.

This type of rating evaluation is both cost-effective and quick to perform and is gaining increased popularity as **part of the risk management** for external value-added chains. For supplier management, this is particularly relevant for key suppliers, single source suppliers, foreign suppliers and potential new suppliers. Applied to customers, the financial rating enables substantiated creditworthiness assessments and is of particular relevance for foreign or new customers.

A **Financial Rating** generally includes the following range of activities:

- Obtaining data
- Classifying and entering data from the annual accounts into the R-Cockpit™ rating programme
- Evaluation of data and calculation of the rating score
- Production of a rating report, including graphical representation of risk characteristics and comments on the key indicators
- Provision of a summary, with comments on the rating score and indication of particular points to note and details of any additional observations included.

Our financial ratings are usually based on **one or three years' data**. Ratings based on three years' data are significantly better quality, since the identification of trends is then possible.

Our **customers** include both large, internationally active concerns and medium-sized companies with international business connections. Our company covers all regions of the world, and has developed particular expertise in the rapidly developing economic regions of Eastern Europe and Asia.

The professionalism of our analysts is in demand, particularly for **international business relationships**, where the difficult conditions due to international reporting standards, foreign languages and foreign currencies can be overcome through their technical competence.

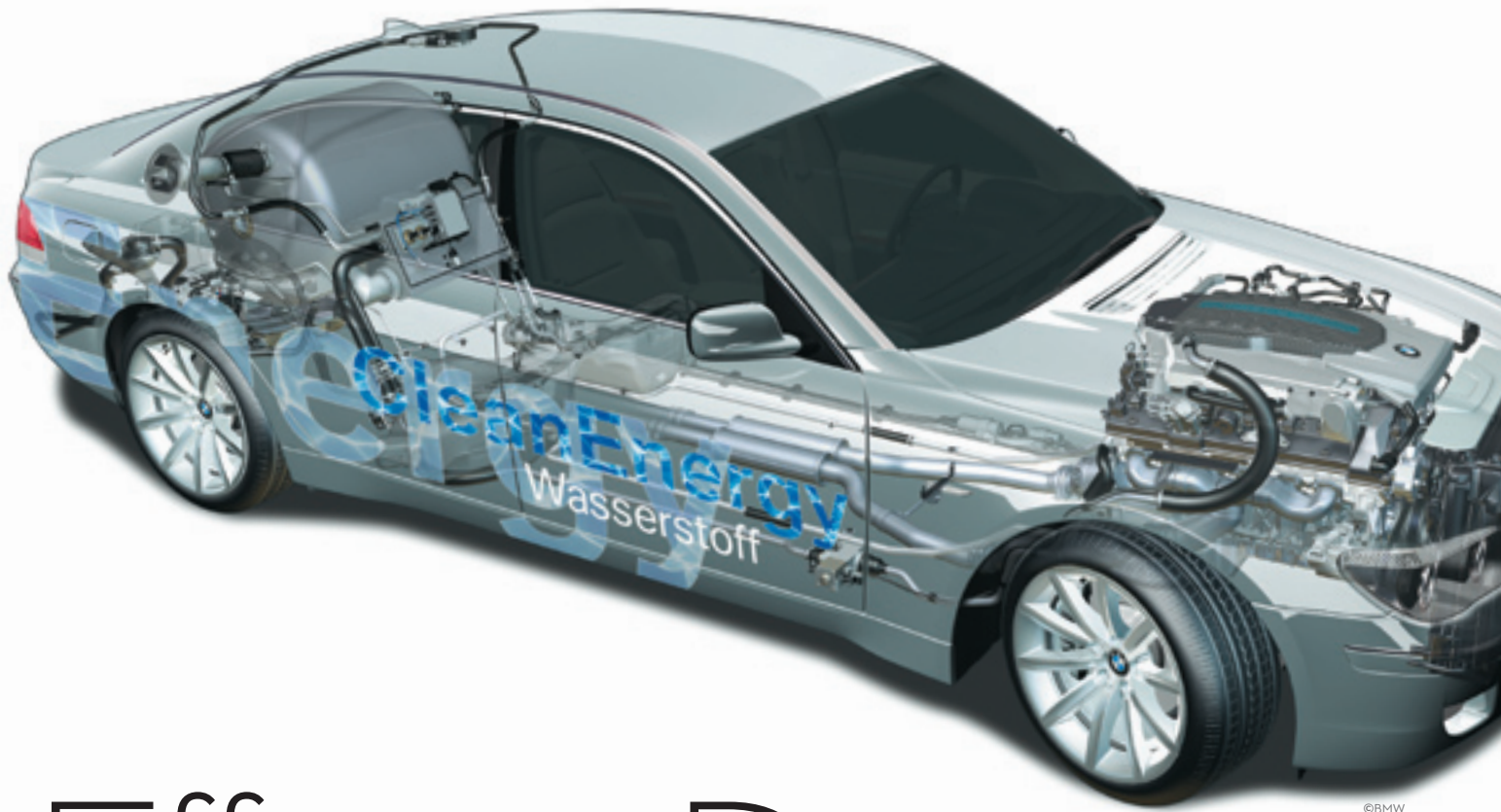
Financial Rating is also suitable for an organisation wishing to know its **own rating profile**.



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Efficient Dynamics

The **BMW Group** has been working intensively for years to reduce its fleet's fuel consumption. The concept is called "EfficientDynamics" and includes highly efficient engine generations, active aerodynamics, the use of innovative lightweight materials and intelligent energy management. auto.world talks with Dr. Hans Rathgeber, Senior Vice President for Vehicle Architecture and Integration, about its green strategy.

INTERVIEW: INKA ZIEGENHAGEN • AUTOWORLD 2.2007

auto.world: This spring the debate on the reduction of CO₂ emissions gained steam. Many Original Equipment Manufacturers (OEMs) complained then that without a technological revolution or massive price increases the reduction targets could not be met. What has BMW done since then?

Dr. Rathgeber: The BMW Group for a long time has been pursuing a number of measures for Innovative Drive Trains. Under the communicative umbrella EfficientDynamics the BMW Group accumulated all activities for the reduction of both emissions and fuel consumption. The modular elements

of EfficientDynamics allow the BMW Group to solve the conflict between efficiency and dynamic performance.

What stands behind the "EfficientDynamics" concept?

The program EfficientDynamics contains three major elements which

can be categorised in three different phases - to make the launch times of each measure clear:

The category short term refers to technologies available now in the width of our model line-up to reduce emissions and fuel consumption - in particular engine optimisation mea-

energy saving and emission reducing technologies. What are your plans for the 3 Series, BMW's most popular model in Europe?

The 3 Series will receive all BMW EfficientDynamics technologies by September 2007. By then around 40 per cent of all BMW Group European new car sales will come with maximum CO₂ emissions of 140g /km. Aside from the 3 Series also 6 Series, X3 and X5 will get BMW EfficientDynamics measures in the fall of 2007.

How much further will you be able to reduce emissions and fuel consumption? How much driving pleasure and performance is necessary for the US and European market so that your vehicles continue to sell?

Future success of the BMW Group in all markets will depend on our ability to continuously reduce emissions and fuel consumption, while at the same time maintaining the BMW advantage on agility and dynamics. The BMW EfficientDynamics strategy had been set up for exactly this purpose. It pays off very well. There is nothing comparable in competition.

In the mid-term the BMW Group sees a great potential in the hybridisation of our line up. We understand hybridisation as the intelligent management of energy flow in the vehicle. Implementation of hybridisation must fulfil characteristic BMW properties such as dynamic performance in conjunction with efficient use of fuel, be suitable for all conditions of use and be available for broad use across the model range. The potential is an increase of efficiency of up to 20 per cent while preserving the Pleasure of Driving for our customers.

In the long run, BMW CleanEnergy is a key element within BMW EfficientDynamics and represents the long-term vision of emission-free motoring based on hydrogen technology. With BMW EfficientDynamics, the BMW Group proposes increases in efficiency due to integrated energy management, to be used in the short and

medium term in conventional vehicles and in the long-term also in hydrogen vehicles. However, the basis is still the most efficient engine technology of the combustion engine (whether petrol, diesel or hydrogen combustion engine).

Other OEMs are also riding the green wave such as Volkswagen with its Blue Motion Campaign. And Daimler has also announced that it will present 18 efficient models at the IAA. What competitive advantages does BMW enjoy over its competitors?

BMW is not just announcing models for the future - they are already on the road. First BMW Models with BMW EfficientDynamics and 15-20 per cent reduced fuel consumption came to the market in March 07. There is no "eco-option" or "special model" with reduced fuel consumption at BMW. Instead all measures always come standard. Step by step we will introduce them in the whole model line. Reduced fuel consumption at BMW does not mean compromises when it comes to agility and dynamics. We rather enhance BMW typical sportiness, while at the same time we reduce fuel consumption substantially.

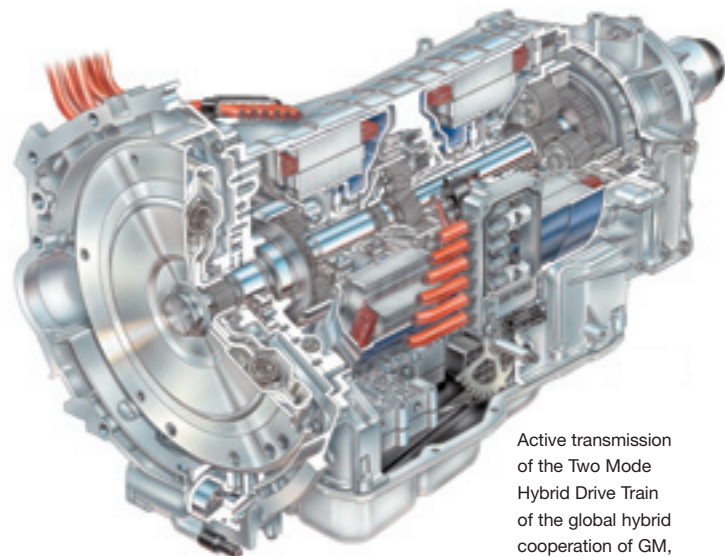


DR. HANS RATHGEBER

Dr. Hans Rathgeber (57) studied mathematics and computer science at the Technical University Stuttgart. In 1979 he began his career at BMW AG as an engineer in vehicle development. After several leading positions in engineering, he currently holds the post as Senior Vice President for Vehicle Architecture and Integration.

What changes does the EfficientDynamics campaign entail for your suppliers?

We do not see major changes for suppliers. The BMW EfficientDynamics strategy is built upon innovative technology developed in close cooperation with our partners. They are an integral part of the development and production process.



Active transmission of the Two Mode Hybrid Drive Train of the global hybrid cooperation of GM, DaimlerChrysler and BMW Group.

measures and measures of "Intelligent Energy Management" (Auto Start Stop Function and Brake Energy Regeneration). In the medium term category, the hybridisation of vehicles has a key role to play for BMW, too, in increasing efficiency.

In the long term, BMW will continue to develop its leading role in the field of hydrogen power to realise emission-free motoring based on the combustion engine. As a result, none of the measures mentioned are in competition with each other but in fact complement each other perfectly.

Until now especially the 1 Series and 5 Series have been equipped with

Porsche Hybrid View

In recent months the debate on climate change and the future CO₂ emission limits of motor vehicles has intensified. **Porsche's new hybrid technology** leads both to a reduction of fuel consumption and to significant improvement in acceleration and engine flexibility.

TEXT: DR. MICHAEL LEITERS • GENERAL MANAGER HYBRID, PORSCHE • AUTO.WORLD 2.2007

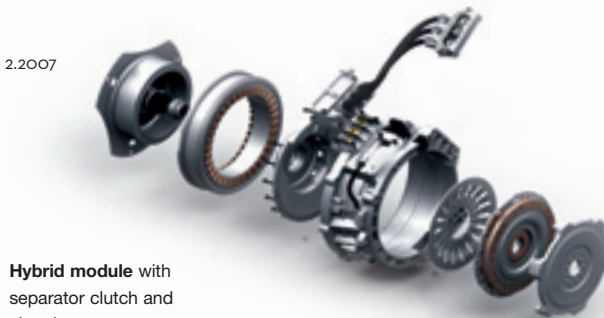
► Hybrid technology offers significant benefits particularly in urban stop-and-go traffic, with a decrease in fuel consumption under real-life driving conditions of up to 25 per cent. Porsche has opted for a parallel full hybrid and not for a hybrid drivetrain branching output along various lines and in various directions. There are a number of reasons which support this unique concept nobody has dared to pursue so far: First, this ensures a high level of compatibility of hybrid components with the existing platform of the Cayenne, thus minimising the risk of having to make restrictions, involving, for example, smaller luggage compartment capacity or all-wheel-drive technology. Secondly, more fuel can be saved than with other hybrid concepts also when driving overland and on the Autobahn: the Cayenne is able to "sail" along entirely without the combustion engine at a speed of up to 120 km/h. Thirdly, this concept means yet a further improvement of both acceleration and engine flexibility.

With the interaction of the three main components – the combustion engine, the electric motor, and the battery – being extremely complex, the processes involved are coordinated and masterminded by the so-called "Hybrid Manager".

The Hybrid Manager

It receives all information relevant to driving requirements and the energy balance, controlling both the electric motor and the combustion engine for optimum fuel economy under all conditions. The battery is never discharged below a certain level nor is it charged and subsequently discharged too often in an exaggerated cycle. All this is not an easy task for the computer, with some 20,000 data parameters having to be defined for the Hybrid Manager. By comparison, conventional engine management requires "only" 6,000 data parameters.

While the Hybrid Manager is the "heart" of the hybrid system, it is far from being the only challenge in this



Hybrid module with separator clutch and electric motor

©PORSCHE

project. Another significant challenge is the battery. Developing output of 38 kW, the battery saves the energy generated while driving by the recuperative brake system and the load point on the combustion engine shifted to an appropriate position for optimum fuel economy. The energy obtained in this way can then be used to drive entirely on electric power without the combustion engine, or to support the combustion engine for greater power and performance on the road.

The Power of 288 Volts

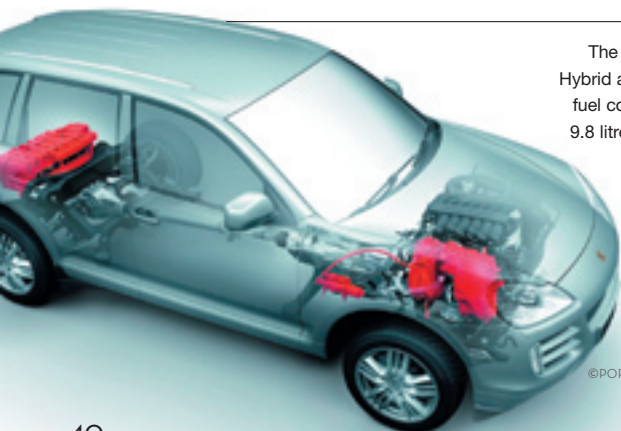
The battery is made up of 240 cells generating the power required of 288 volts. In the process of charging and discharging, the battery generates heat on account of its internal resistance, which has to be dissipated to avoid destroying the chemical make-up of the cells, with a temperature of more than 50° C potentially shortening the lifecycle of the battery. This is why cool air from the rear part of the passenger compartment is drawn through the battery to provide a cooling effect. In a conventional vehicle the servo power assistance and the brake power servo operate only when the combustion engine is running. For the purposes of hybrid drive, the

steering and the underpressure pump for the brake servo have both been electrified, and the air conditioning also operates on electric power. Further technical components such as the oil pump in the automatic transmission again driven only by mechanical power on the "regular" production vehicle have been replaced by electrically powered units, as this is the only way to set off under electric power with maximum efficiency. All this shows, that hybrid technology as such is not witchcraft, but rather a high-tech system fully integrated into the car in a sophisticated and elaborate process and allowing intelligent use in practice.

Hybrid Target: 8.9 Litres/100 Kilometres

Thanks to its hybrid technology, Porsche already achieves average fuel consumption in the New European Driving Cycle of 9.8 litres/100 kilometres in the Cayenne Hybrid, and 28 miles per gallon in the US FTP cycle. Ultimately Porsche will be able to reach the target of 8.9 litres/100 kilometres. This is a figure hardly possible with conventional technologies in a sports utility vehicle of this size. ■

www.porsche.com



The Porsche Cayenne Hybrid already achieves a fuel consumption of just 9.8 litres/100 kilometres.

©PORSCHE

Drive Train Solutions

CO₂ emissions have become a dominant issue in the entire automotive sector. **Schaeffler Group Automotive** is working continuously on products which increase the efficiency in the drive train.

TEXT: DR. PETER GUTZMER, EXECUTIVE VICE PRESIDENT, SCHAEFFLER GROUP

► Greater efficiency in the drive train is a key factor in reducing fuel consumption and emissions. Schaeffler Group Automotive has almost unrivalled expertise in optimising the entire drive train – from the valve train and transmission components to wheel bearings. This includes the development and production of advanced bearing solutions and also variable valve control systems and components for alternative types of drives and transmissions such as dual clutch transmissions and hybrid drives.



DR. PETER GUTZMER

was promoted to Executive Vice President of Schaeffler Group Automotive. In parallel he is still in charge of Technical product development of Schaeffler KG.

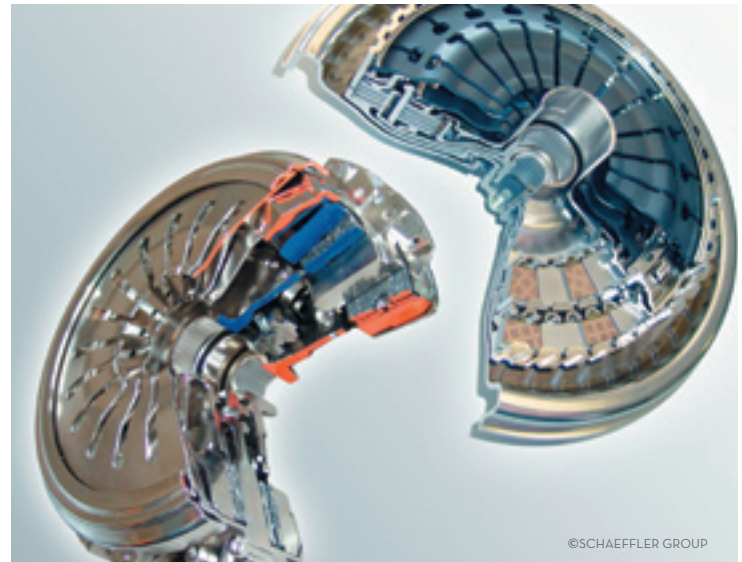
LuK, INA and FAG are globally represented by around 30 R&D centers and a close-knit network of more than 180 sales offices and manufacturing plants, and provide their worldwide customers with system expertise and comprehensive engineering support.

INA Engine Know How

Variable valve train systems – using switchable tappets, switchable lash adjusters or roller finger followers for example – permit a variety of valve lift curves and optimise the torque characteristics and the maximum power output of an engine while reducing fuel consumption and exhaust emissions. Hydraulic and future electric camshaft phasing systems also contribute significantly to reducing fuel consumption and emissions. They vary the valve timing events across a wide range of engine loads and speeds without impairing the driving dynamics and enjoyment. Fully variable valve trains offer even more flexibility in valve events and will show up more and more in next further optimised generations of gasoline engines.

Reduced Resistances

In addition to systems that control engine power depending on the driv-



LuK offers wet or dry twin clutches for future-orientated dual clutch transmissions. They offer best driving comfort and reduce fuel consumption in comparison with conventional automatic transmission significantly.

ing situation, reducing friction also contributes to saving fuel. INA roller finger followers and rocker arms are already being used successfully in a wide range of serial applications. Roller actuation reduces the power required to drive the camshaft due to the reduced friction compared with sliding actuation. But also TRION-DUR®-coated tappets generate up to 20 percent less friction compared with those being only nitrided. Innovative solutions for rolling bearing supports for crankshafts, camshafts and balancer shafts offer further potential for reducing power losses in the engine.

Reducing Friction in other Parts

Innovative bearing solutions from the Schaeffler Group also offer potential for reducing friction in other parts of the drive train. Conventional tapered roller bearings are being replaced by double row tandem angular contact ball bearings that are designed to support the pinion and differential in the final drives of passenger vehicles while reducing friction by almost 50 percent. Chassis applications are also producing similarly impressive results. FAG has developed a four-row twin tandem angular contact ball

bearing for wheel bearing supports in vans, SUVs and light trucks that also replaces conventional tapered roller bearings while achieving a fuel saving of up to 1.5 per cent.

Transmissions also offer numerous approaches for optimising consumption. LuK's dry dual clutch is particularly suitable for automatic and hybrid transmissions in the lower and medium torque range. It combines the comfort of an automatic planetary transmission with the efficiency of a manual transmission without interrupting the tractive force, and therefore contributes significantly to saving fuel. LuK offers an advanced product portfolio for transmissions including efficient components for CVT transmissions for torques up to 400 Nm and fuel-efficient torque converters for automatic transmissions or dampers, which permit the most economical operating point of the engine to be used without impairing comfort. ■

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Driveline Dynamics

It has been predicted that the future belongs to hybrid drive systems. At present ZF is already capable of offering volume-production stage concepts for cars based on parallel hybrids – from individual components to entire systems. The central part is the newly developed automatic 8-speed transmission, which can be fully hybridised.

Moreover, ZF offers major savings potentials with its hybrid concepts for light commercial vehicles.

TEXT: DR. BERND VAHLENSIECK • MANAGER ADVANCED ENGINEERING HYBRID DRIVE • AUTO.WORLD 2.2007

► There is still more public interest than buying interest. While the topic of “alternative passenger car drives” in general and “hybrid vehicles” in particular was widely discussed in the German media in the past year, only a scant 40,000 vehicles were sold in all of Europe in 2006 with a “dual heart” consisting of a gas engine and an electric motor. In Japan, however, this number was almost doubled with about 75,000 newly registered hybrid vehicles. There are signs that, one day, the United States might become an interesting market for manufacturers and suppliers in the business of alternative drivelines, as 270,000 hybrid models were sold. There is no shortage in forecasts regarding this

trend. A study by Mercer Management Consulting (now Oliver Wyman) calculates that there will be 1.1 million hybrid vehicles worldwide in 2011. J.D. Power predicts 3.7 million hybrid vehicles for 2013, and according to Morgan Stanley, there will be between seven and ten million vehicles worldwide equipped with a combination of an electric motor and a gas engine in the year 2015.

Focus on the Parallel Hybrid

Whether vehicles with hybrid drives will catch on and at what rate will depend on whether volume production solutions will be available in the immediate future, which can be integrated into the existing driveline

efficiently and economically. Besides, there are macroeconomic influencing factors like buying incentives due to the rising price of oil, which also play a role. At present, three concepts with different market relevance need to be looked at: The power-split hybrid, the series hybrid, and the parallel hybrid, which is of greatest importance to ZF Friedrichshafen AG and its passenger car activities. Most common in the market today are power-split hybrid drives. Here the power of the combustion engine is split into a mechanical and electrical path.

It is precisely this technology which the alliance among GM, DaimlerChrysler, and BMW – besides the pioneers Toyota/Lexus – is placing its stakes on. The series hybrid drive has no mechanical link between the motor and the wheels. The combustion engine serves in connection with a generator solely as a power generator, while the second electric motor takes care of the propulsion.

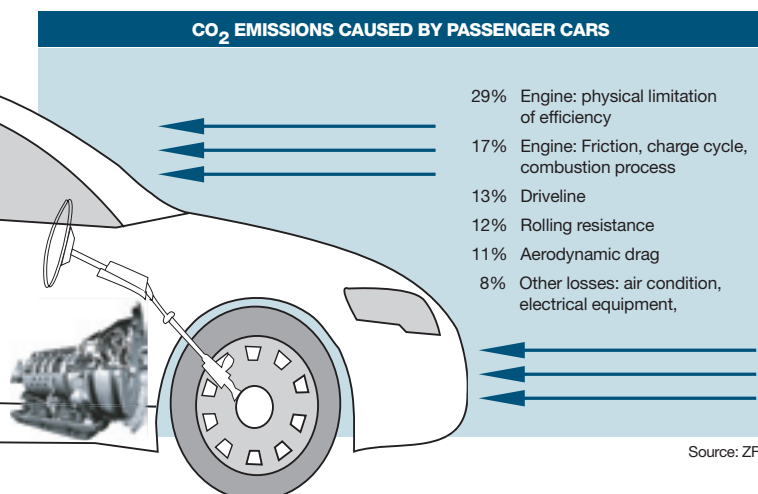
Cost-Efficient Solution

In the case of the parallel hybrid drive the power of the combustion engine, as well as of the electric motor, is transferred via the transmission to the wheels. Since only one electric motor is needed, the parallel hybrid is more cost-effective, yet it still offers the

same savings potential as the other concepts. The existing transmission with its dynamic operating benefits can still be utilised. ZF is in favour of this concept for passenger cars.

Adaptation of Individual Components

In addition to total energy management, the mode of operation of individual components in the hybrid driveline must be closely adapted to each other in all concepts in order to arrive at marketable hybrid applications. The transmission plays an intricate role in this. Depending on design and size of the parallel hybrid system, it provides essential functions which are critical for reduced consumption. Accordingly, the start-stop function of a micro hybrid system depends on an adaptation of the automatic transmission. With a micro hybrid alone, a passenger car can save up to eight percent of its fuel, particularly in inner city traffic. However, in its hybrid activities for passenger cars, ZF focuses more on the mild and full hybrids where the electric drive is integrated into the driveline as opposed to micro hybrids. Due to the higher performance of the electric motor and more storage capacity of the battery, a mild hybrid can make significantly better use of braking energy and actively





The cornerstone of ZF's full hybrid concept for passenger cars is the hybrid version of the **newly developed automatic 8-speed transmission**.

© ZF

achieve a shift in the engine's operation in order to operate it more often at its optimal operating point. Besides, when using this system, the combustion engine kicks in with the electric motor, for instance during acceleration (boosting). Such a system may generate consumption savings of ten to twenty per cent.

Further increased motor performance and storage capacity make possible in

a full hybrid, in a rather large operating range, to favourably distribute power between the combustion engine and the electric motor, resulting in efficient energy management. Moreover, it is possible to run the vehicle temporarily without the combustion engine, i.e. purely electrically. That way, consumption advantages of up to 30 per cent can be achieved in inner city traffic.

Transmission as Full Hybrid

The cornerstone of ZF's full hybrid concept for passenger cars is the hybrid version of the newly developed automatic 8-speed transmission. It features a modular design which can be combined with various input and output drives without deviating from the basic transmission concept. His fuel saving transmission can achieve even more fuel savings in combination with hybrid modules or systems. Thanks to improved installation space, the electric motor, clutch, torsional damper, dual-mass flywheel, and hydraulics can be space-saving and efficiently fitted into the transmission in the case of a full hybrid concept.

At the same time, ZF is developing the operational functions for the hybrid transmission with the above-mentioned units. Functional networking results in efficient hybrid management of the entire system.

The transmission's characteristics in terms of driving dynamics, such as direct engine integration and agility, precise shifting quality, and comfortable handling are increased to an even greater extent through hybridisation. ZF has the know-how to integrate its economic hybrid solutions into almost any driveline or vehicle environment. Major advantages, i.e. fuel savings and preservation of components prone to wear, are utilised by the hybrid concept, in particular in light commercial vehicles which are used in inner city traffic. This commercial vehicle category is characterised by numerous setting off and stopping processes, and here, the start-stop operation and recuperation help saving fuel – at a very favourable cost-benefit ratio. Moreover, compared with today's vehicles, the driver does not need to cut back on driving performance (mileage) and driving comfort.

Hybrid Drives for Light Commercial Vehicles

ZF provides a ready-to-install hybrid concept for the Sprinter model of Mercedes-Benz, consisting of an electric motor with a clutch and actuator technology to be installed by the manufacturer between engine and transmission. This electric drive is so powerful that the same performance

can be achieved whether driving with the combustion engine or with the electric motor.

The concept of a hybrid driveline for light commercial vehicles takes it up another notch. In this case, the hybrid elements, consisting of electric motor, separating clutch, and the associated actuator technology, complement an automatic eTronic transmission. ZF also developed the operational functions of the system like controlling the clutches and the electric motor.

ZF develops the strategic functions of the driveline, i.e. the interaction of the components within the entire system based on the particular specifications of the manufacturer. The only step left is the installation of the hybrid system into the customer's vehicle.

With its volume-production stage concepts – from passenger car to commercial vehicle and from micro or mild hybrid to a full hybrid system that can be completely integrated – ZF is geared up for the increasing demand for hybrid drives. ■

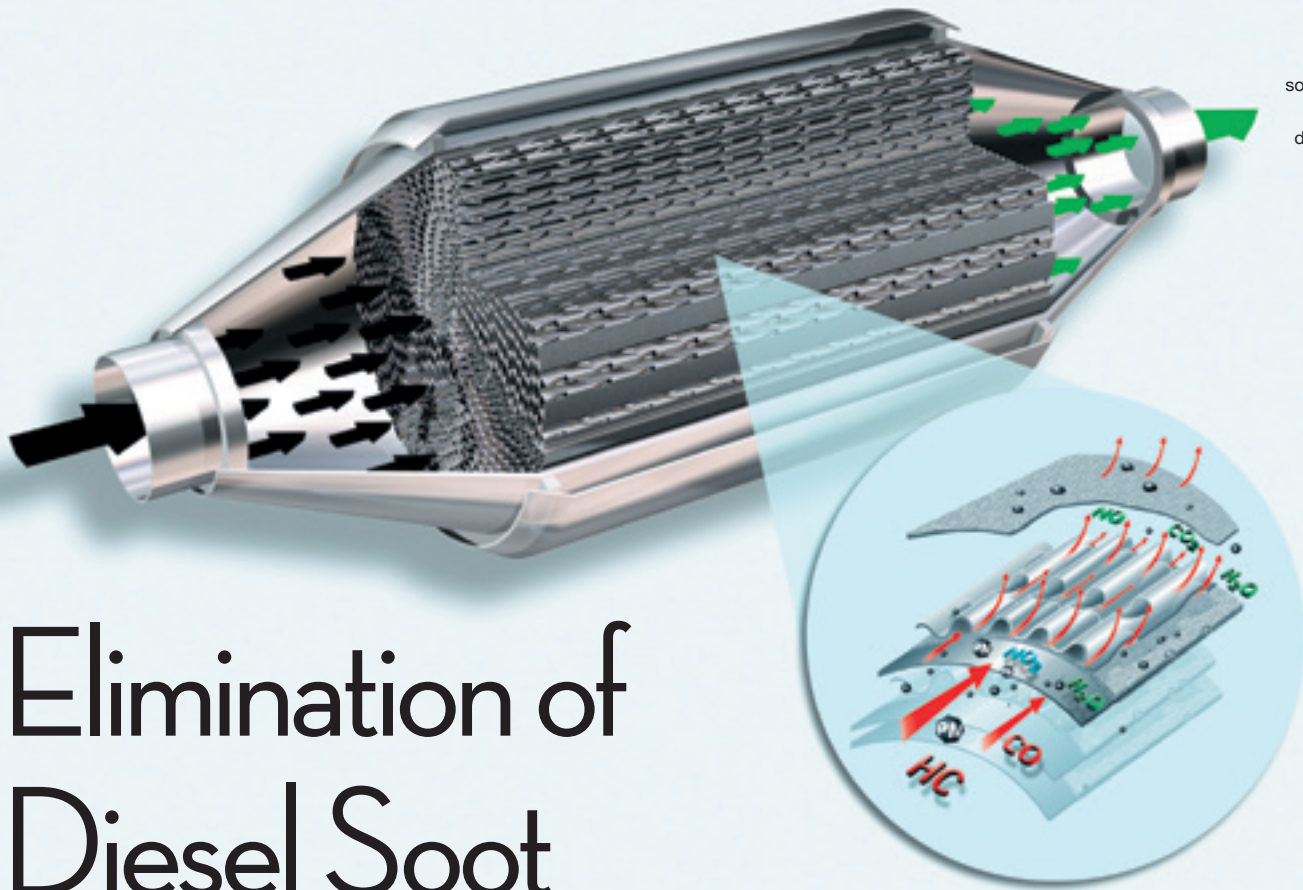


DR. BERND VAHLENSIECK

received his doctorate degree in mechanical engineering at the TU Munich. He joined ZF Passau in 1999 for the development of CVT drives for tractors. Since 2002, he works for ZF Friedrichshafen in the corporate R&D department. Since 2005 he is responsible for the advanced engineering activities in hybrid drives.

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The PM-Metalit® can be used as original equipment or as a retrofit solution and enables our customers to dramatically reduce diesel soot emissions from their vehicles.

Elimination of Diesel Soot

© EMITEC

Diesel engines have proven to be both economical and powerful. In addition, their low fuel consumption helps to reduce global CO₂ emissions. But diesel soot used to be a major problem. In particular, the EU directive on reducing particulate matter has brought a new urgency to reducing these emissions.

PM-Metalit® of Emitec reduces diesel soot without any drawbacks

TEXT: RAINER SCHÄFERDIEK • MANAGER PUBLIC RELATIONS, EMITEC • AUTOWORLD 2.2007

◆ Diesel engines have proven to be both economical and powerful, which has rightly also made them a popular choice for cars. In addition, their low fuel consumption helps to reduce global CO₂ emissions. EMITEC Gesellschaft für Emissionstechnologie mbH in Lohmar, the market leader in metal catalysts, started looking into the reduction of all types of diesel exhaust gas emissions, including soot particles and nitrogen oxides

(NO_x), at a very early stage. With a PM-Metalit® partial-flow deep-bed filter the separated particulates can be reduced and so eliminated based on a chemical principle of continuous reaction with NO₂ from the upstream oxidation catalyst. Nanoparticles (diameter between 20 and 100 nanometres; PM 10 (10 µm = 10,000 nm)), which are considered to be particularly harmful to health, are eliminated by up to 90 per cent depending on the

area of application. Total particulate mass can be reduced by 30 to 80 per cent. This greatly exceeds the separation efficiency required by law.

Trouble-free Engine Operation

Since the PM-Metalit® works on a wall-flow/partial-flow principle it has none of the well known disadvantages of conventional wall-flow diesel particulate filters. The PM-Metalit® guarantees trouble-free engine operation

under any operating condition even in the absence of regeneration. Depending on engine size and adjustment a catalytic coating may not always be required. EMITEC therefore also supplies a PM separator that significantly reduces particulate levels alone. The new PM-Metalit® consists of bladed corrugated metal foils that are separated by porous sinter metal fleece layers. The bladed corrugated layers divert part of the exhaust gas main

flow into the adjacent channels. The particulates are temporarily deposited on the sinter metal fleece and continuously burnt off at temperatures from approximately 180 °C. The second effect is based on the exhaust gas flowing through the filter material in a longitudinal direction resulting primarily in the separation of nanoparticles.

Continuous Operation

The PM-Metalit® partial-flow deep-bed filter is a continuously operating partial-flow system, which unlike conventional particulate filter systems does not require active regeneration after a driving cycle of approximately 400 to 1,000 kilometres. The regeneration cycle in particular requires extensive intervention in the vehicle's existing engine management systems. This makes the retrofitting of conventional diesel particulate filters that

are intended as original equipment extremely complex so that, in fact, it is never done in practice.

Increased Reliance

The constant reduction of diesel soot particles during driving cycles makes the PM-Metalit® much more reliable. In case of a malfunction, e.g. excess deposits of diesel particulates on the sinter metal fleece layers, the exhaust gas partial flow is diverted through the normal longitudinal channels. This prevents any sudden increase in exhaust gas backpressure and potentially resulting damage to the engine. The system's impact on fuel consumption is considerably smaller and compared to other systems the PM-Metalit® is much more compact. It is also maintenance-free for the lifetime of the vehicle. The PM-Metalit® is suitable for all new vehicles (cars and trucks)

and also as a simple retrofit solution for cars and light-duty and heavy-duty commercial vehicles. BMW, MAN and Mitsubishi are using the PM-Metalit® as original equipment in their vehicles. BMW AG, for example, is equipping a number of different models with the system (1 and 3 Series diesel engines). MAN has been fitting PM filter catalysts as standard to its commercial vehicles, started in the end of 2004 with their new D20 engines and subsequently including their D08, D26 and other types of engine. Other commercial vehicle manufacturer, including DAF, followed suit.

Proven Track Record

As demonstrated by one of Emitec's biggest customers, Twin-Tec in Königs-winter, a large number of cars can easily be retrofitted with a PM-Metalit®. 300,000 pieces of these particulate

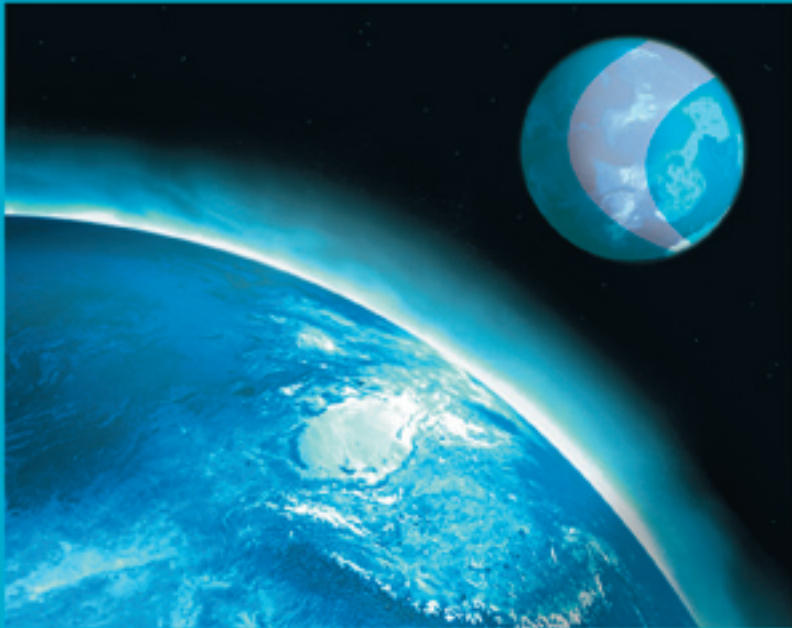
filters have given trouble-free service over many million kilometres.

Emitec and the Japanese Tokudaiji Institute of Automotive Culture in Tokyo jointly developed the PM-Metalit® and brought it to the production stage back in 2003. Soot particles are effectively and significantly reduced even during critical slow speeds in urban cycles. The PM-Metalit® can be fitted to new vehicles and, above all, retrofitted to used cars and light-duty vehicles. The Japanese DEPRO Corporation has been marketing the PM-Metalit® in Asia since 2004. ■

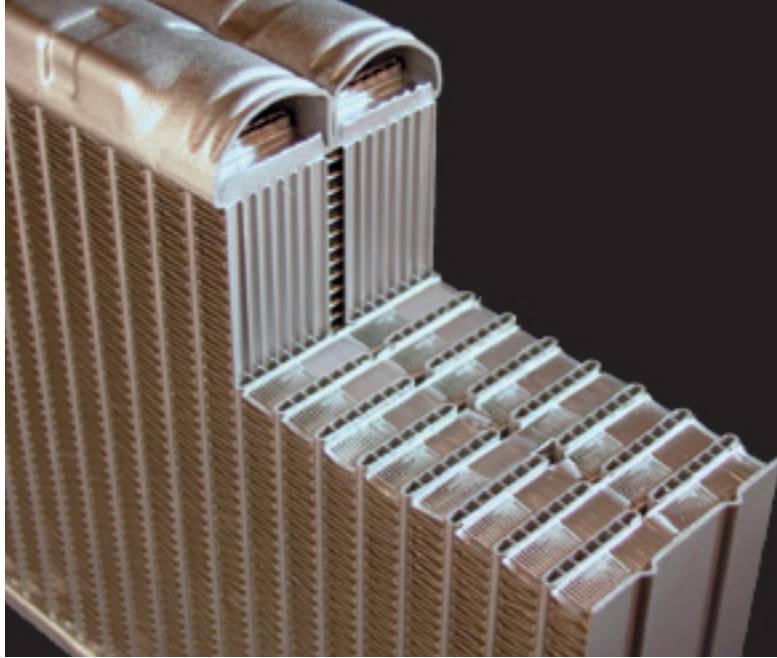
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Metallstrukturen und Module.



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Ecologically Coating Technology

Since July 1, 2007, it is no longer permissible to use chrome (VI) in vehicles. Two years ago, Behr developed a new, completely chrome-free process for coating the evaporators of HVAC modules.

TEXT: DR. SNJEZANA BOGER • ADVANCED ENGINEERING AIR CONDITIONING, BEHR • AUTO.WORLD 2.2007

► Not only does this eco-friendly Behr Oxal® process satisfy the EU End-of-Life Vehicle Directive that came into force on July 1, 2007, but it also simplifies process management, improves the ecobalance of the coating process and the corrosion protection of the evaporator, contributes to industrial safety and inhibits the buildup of odors.

The BehrOxal® Process

In contrast to the yellow chromate coating process, the BehrOxal® process consists of only three process steps. In the first step, the evaporator is intensely heated and then sprayed with dilute aqueous BehrOxal® solution. The solution evaporates and spreads over the entire surface of the evaporator. A closed, homogeneous passivation layer is thus created on the surface. In the yellow chromate

coating process, microfissures form that create contact surfaces for water, and, for example, de-icing salt, and are thus a starting point for corrosion. In contrast, there are no such fissures in the BehrOxal® layer. In addition, the residual flux from the brazing process is not laboriously removed prior to this step, but instead is directly integrated into the BehrOxal® layer. This eliminates time-consuming pre- and post-treatments of the components. The BehrOxal® process cycle times can thus be matched precisely to the rhythm of the production line, allowing the operation to be fully incorporated into the production process.

Enhancing Worker Safety

Unlike other alternatives to the yellow chromate coating process, BehrOxal® requires no poisonous or carcinogen-

ic chemicals such as hydrofluoric or chromic acids – a plus for the environment and the health of employees. The BehrOxal® process does not require any heavy metals or corrosives. This eliminates the need for the disposal of fluoride-containing wastes and sludge contaminated with heavy metals, thus considerably enhancing worker safety.

Studies show that, compared with the yellow chromate coating process

and with other alternative coating processes, the BehrOxal® process sustainably protects the environment in all its process steps. There is no disposal of sludge containing chrome (VI) or fluoride from the production process. The addition of heavy metals can be completely avoided by no longer using chromic acid as a chromate coating agent. The ecological sustainability of the BehrOxal® process is evident even when compared with

“Consumers worldwide have become more concerned about the environmental impact of automobiles. By developing BehrOxal®, we have made automobiles better for society.”

Frank Mueller, President and CEO, Behr America

other available alternative chrome (VI)-free coating processes. This is due primarily to the smaller amounts of water and chemicals used which, moreover, have no aggressive and environmentally damaging properties. In addition to the benefits offered by the process, including improved worker safety and ecological sustainability, BehrOxal® also provides enhanced corrosion protection. This was demonstrated using the SWAAT corrosion testing method.

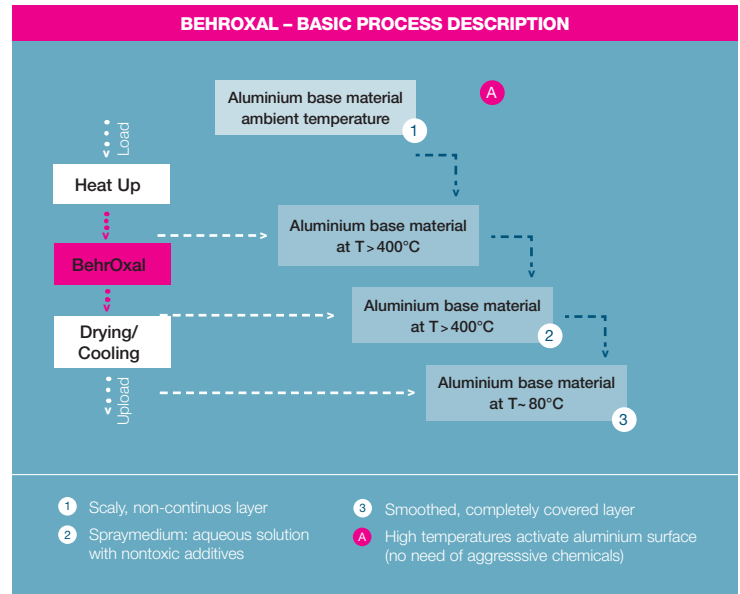
Better Odor Characteristics

Unlike a yellow-chromate-coated evaporator, which emits a perceptible or almost perceptible cement-like odor, an evaporator with a BehrOxal® coating emits no or a almost imperceptible individual odor. In odor tests based on the VDA 270 recommendation of the VDA (German Association of the Automotive Industry), a plate-and-fin evaporator with BehrOxal® coating was given a rating of between 1 and 2, while a yellow-chromate-coated evaporator only managed a score of between 2 and 3. During operation of an air conditioning unit, water condenses on the surface of the evaporator. Depending on the evaporator, up to 200 g of water can accumulate. When the air condition-

ing unit is turned off and the vehicle is stationary, it can be a while before the evaporator dries out completely, depending on the weather conditions and location. Contaminants in the air such as dirt, pollen, etc. can be deposited on the wet evaporator surface during operation, and can thus form, together with the condensation, a growth medium for microorganisms. It is therefore important to improve the water run-off in the evaporator. This is realised on the one hand thanks to an appropriate evaporator geometry, and on the other through the use of a hydrophilic evaporator surface. Water forms large droplets on a hydrophobic surface that block the narrow gaps between the evaporator fins. This restricts airflow, thus impairing cooling performance. In addition, droplets can be swept along by the airflow and can reach the passenger cabin. When the air conditioning unit is in reheat operating mode, the windows can suddenly become misted with condensation.

Efficiency Not Affected

On the hydrophilic BehrOxal® layer, flat droplets are first formed that then join up to create a thin film that readily runs off from the surface and does not hinder the airflow. The efficiency of the evaporator is not affected, and, thanks



Source: Behr

to the self-cleaning effect, contaminants on the evaporator surface are washed away. Additionally, the evaporator can also be configured as a more compact and thus lighter unit. The trade journal Automotive News honored BehrOxal® with the coveted 2007 PACE (Premier Automotive Suppliers' Contribution to Excellence) Award. The winners were recognised for their innovation and technological developments in addition to their entrepreneurial achievements. For its BehrOxal® technology, Behr was

chosen from 23 finalists and won the competition in the category Manufacturing Processes and Production Means. This is an independent award for innovative and eco-friendly coating technology. ■

BEHR GMBH

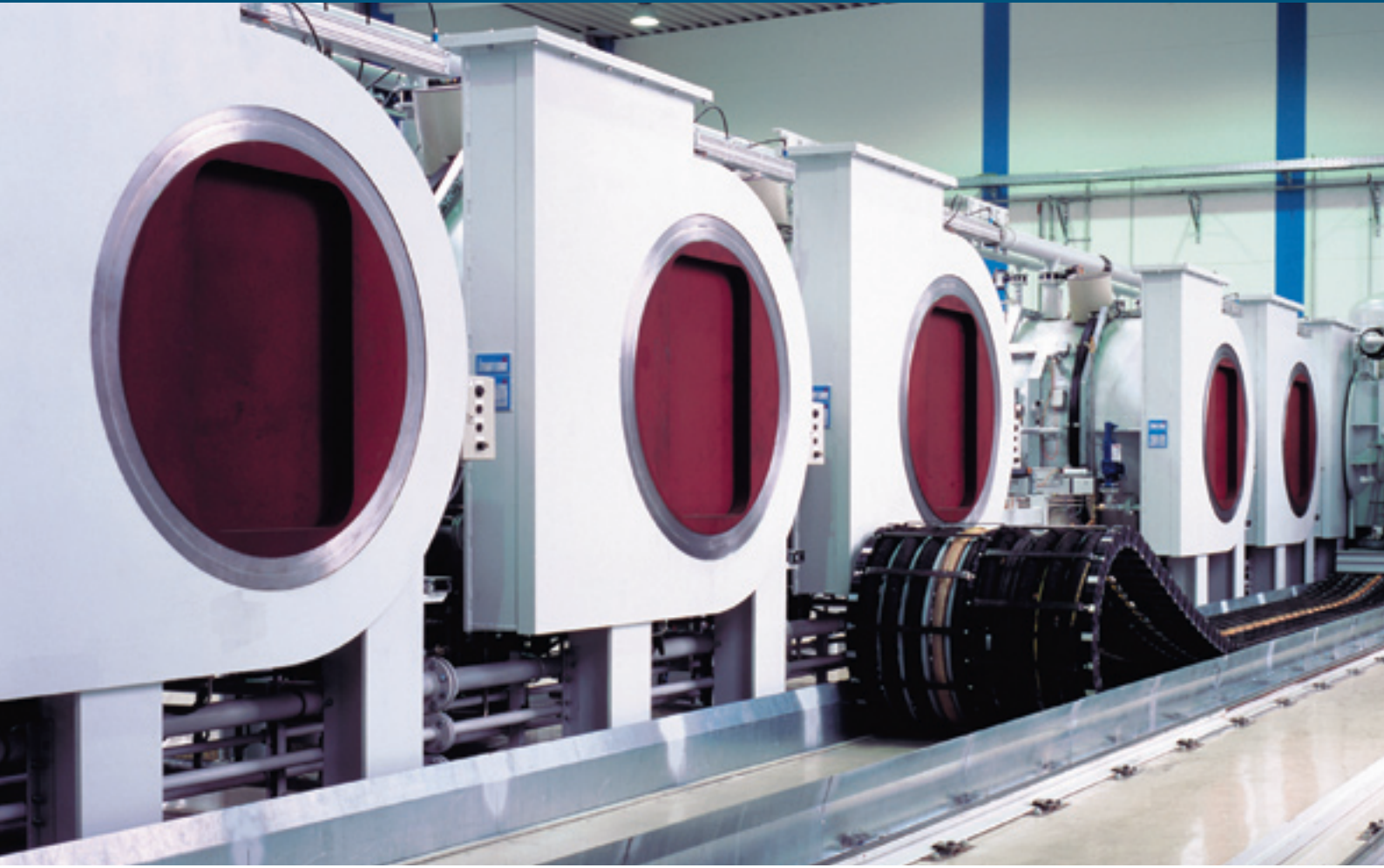
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Dometic Automotive Cooling



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Dometic



Heat Treating Technologies

Vacuum carburising with subsequent high pressure gas quenching represents an innovative heat treatment technology for casehardening in the automotive industry. **ALD Vacuum Technologies GmbH** started the graduated market launch of systems for vacuum carburisation with high-pressure gas quenching around ten years ago.



© ALD

- Case hardening is widely used as a heat treatment procedure for parts requiring a hard, wear-resisting surface and a sufficiently ductile core. Casehardening using vacuum carburising with subsequent high pressure gas quenching represents an innova-

tive heat treatment technology in the automotive industry. Vacuum carburising is distinguished by an extremely high carbon transfer, which leads to a clear reduction of process time as compared to atmospheric gas carburising. The use of oxygen-free hydrocarbons prevents surface oxidation on the parts' surface. High carburising temperatures in the range of 1,000° Celsius and more lead to additional productivity. For that purpose, new process technologies in steel manufacturing were developed to produce sufficiently grain growth-resistant steel qualities.

High Pressure Gas Quenching as Preferred Quenching Method

To achieve the required material properties, carburising is followed by a quenching process usually performed in liquid quenching media e.g. oil. However in combination with vacuum carburising, high pressure gas quenching with helium or nitrogen has become the preferred quenching method. Gas quenching is a dry quenching method and has many important eco-logical and economical advantages compared to liquid quenching. The quenching gases used such as nitrogen and helium are inert and leave no residue on the parts, without additional investment in washing machines or fire monitoring

“Vacuum heat treatment is the foundation for path-breaking processes for the automotive industry.”

Dr. Klaus Löser, ALD Vacuum Technologies GmbH

devices. Through the steady increase of the quenching pressure and the gas velocity, as well as the development of suitable gas quenching chambers, so-called “cold chambers”, even low-alloyed case hardening steels and tempering steels can be successfully hardened. The most significant advantage of gas quenching compared to liquid quenching is the fact that there are no phase transfers in the quenching medium. Therefore a more uniform thermal transfer takes place, keeping distortion during quenching to a minimum thereby reducing hard machining costs. In order to reach sufficient hardness on the parts, new steel grades have been developed applicable for high pressure gas quenching.

Development of New Furnaces for Cost Effective Gas Quenching

To carry out vacuum carburising with high pressure gas quenching in a cost effective way, ALD Vacuum Technologies GmbH has introduced a new plant generation into the market, named ModulTherm®. This furnace system comprises of up to 10 different individual heat treatment chambers linked with a transportation shuttle. The transportation shuttle carries a transfer chamber and a high pressure gas quenching chamber. The ModulTherm®-system is very flexible and can grow with increasing production demands by adding additional heat treatment chambers thereby reducing the investment risk and initial capital commitment. Such an expansion is performed with a minimum operation interrupt and takes only a few days. The ModulTherm®-system is fully automatic and is environmentally



© ALD

Typical Gear Parts after Vacuum Carburising with high-pressure gas quenching.

friendly due to minimum exhaust and thermal emissions and can be integrated into the production flow without any problems. Each heat treatment chamber can be maintained by its rear door without interfering with the remaining plant's operation securing low maintenance costs and a high productivity of the total furnace system. Meanwhile, a large number of ModulTherm®-systems have been delivered to customers worldwide working to complete satisfaction especially in the serial production of highly stressed transmission parts and diesel injection components. The market for this new heat treatment technology will continue to grow in the future especially in case of advanced transmission technologies like 6-speed automatic or dual clutch gearboxes. ■

ALD VACUUM TECHNOLOGIES GMBH

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www.ald-vt.de



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Fuel Injection System

Flexible metal elements
by Witzemann for various functions
in modern vehicle technology.



© WITZENMANN

From Pioneer to Market Leader

The Witzemann Group is one of the world's leading manufacturers of metal hoses, expansion joints, metal bellows and automotive parts. With 24 companies, **Witzemann** is present in all the major markets worldwide. In 2006, its 2,800 employees generated a turnover of around 410 million USD.

► “Managing flexibility” expresses the Witzemann code of expertise, and is the mission, which connects every department in the Witzemann Group. More than 120 years have passed since the industry pioneer and company founder, Heinrich Witzemann, invented the flexible metal hose – which marks the foundation for a new industry that today employs and supports thousands of people. Today Witzemann develops and manufactures products for the automobile and aerospace industries,

industrial facilities, technical building equipment and many other industries. With production sites in the USA, Brazil, Spain, the Czech Republic, China and Korea, Witzemann is everywhere where the international automotive industry requires the most modern technology for tomorrow's markets.

Technology Leadership

In the Centre of Excellence at the Group Headquarters in Germany a pool of highly qualified engineers, working in close cooperation with customers, develops individualised product solutions and technological innovations. In product development and testing the Witzemann Group has obtained a globally leading position with multi-axis testing benches, ultrasonic and x-ray or thermal testing benches and an equipment that can generate pulsating pressures of up to 250 bar. Witzemann has the whole testing field for efficient high-tech in the automotive industry. Mobile measuring equipment for tests in vehicles

complete the testing equipment, which means competitive advantages in all business divisions.

Solutions for Every Challenge

Today many leading OEMs of commercial vehicles, construction machines and exhaust systems rely on Witzemann products. Witzemann develops and manufactures numerous products for use in a wide range of areas:

- > **Exhaust decoupling elements** reduce the transmission of engine motion and vibration. Short, supporting elements are used primarily in areas near the engine. To realise an almost completely vibration-free environment, highly flexible elements in various configurations are used. All components are technically pressure resistant and gas-tight.
- > **Expandable exhaust components** compensate for heat expansion in the manifold area, and also before and after a turbo charger, as well as in areas affected by the high

WITZENMANN GMBH

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www.witzemann.com

temperatures in the front exhaust pipe area.

- > **Exhaust gas and oil return pipes** that reduce pollutants emitted by engines and safeguard the supply of oil to engines and turbo chargers compensate for heat expansion, assembly tolerances, vibrations and aggregate motion.
- > **Flexible piping systems** are realised as combination of fixed and flexible components for use as pressure resistant systems in closed gas or liquid loops. They combine the advantages of simple assembly with a reliable balance of assembly tolerances and aggregate motion for the highest possible security demands. ■



© WITZENMANN

Example of exhaust gas or oil return pipes by Witzemann.



© EMITEC

Emitec's product range consists of metal catalyst substrates and diesel particulate filters for engine exhaust gas aftertreatment.

© EMITEC

Metal for Innovations

In 1986 **Emitec Gesellschaft für Emissionstechnologie mbH** was founded with just three employees. Today, the company is a world leader on the metal substrate market for vehicle exhaust gas catalysts.

EMITEC AT A GLANCE

Management: Wolfgang Maus (Chairman), Andreas Aumüller
Employees 2007: Approx. 800
Revenue 2007 (planned): 220 million EUR
Percentage of sales: Automotive industry: 99 per cent
Export volume: 48 per cent
Sites and products:
 > Lohmar, Germany: Prototypes and series catalyst substrates, head offices, research and development
 > Eisenach, Germany: Series catalyst substrates, test centre
 > Fountain Inn, SC, USA: Series catalyst substrates
 > Pune, Mumbai District, India: Motorcycle catalyst substrates
Major costumers:
 All major costumers worldwide

► Emitec was founded in 1986 as a subsidiary of Siemens and GKN. Profiting from the rapid development of the young company and the growing environmental awareness worldwide, the company grew rapidly due to the decision of the automotive industry to use catalysts to reduce emissions. From the beginning, Emitec used metal for its innovations and to enhance existing products. Previously, only ceramic catalytic converters were available on the market, even though the advantages of using metal foil to construct converters were realised by many early on. However, Emitec's products were the first to ensure the required elasticity while at the same time surviving extreme temperature differences.

The Company

Since its foundation, Emitec has sold over 91 million metal substrates of the highest quality with no field failures. The company employs around 800 people in Lohmar and Eisenach, at the Fountain Inn plant in South Carolina, USA, and at the new plant

in Pune, India. Development centres are based in Lohmar and Eisenach. Emitec's most important markets are in Europe, North America and Asia. The company has subsidiaries in China, India, Japan, Vietnam and Korea. The company's customers include every major car and motorcycle manufacturer and numerous manufacturers of commercial vehicles from across the world. Emitec owns over 1,700 patents worldwide, a fact that reflects the company's innovative strength.

Product Range

Emitec's product range consists of metal catalyst substrates and diesel particulate filters for engine exhaust gas aftertreatment. These include: METALIT® metal substrates, metal substrates with structured foils (LS-Design®, PE-Design™, MX-Design®, TS-Design®), conical catalyst substrates (ConiCat®), lambda sensor catalysts (Lambdasondenkat™), electrically heated catalysts (EMICAT®), PM-Metalit®, preturbocharger cata-

EMITEC GESELLSCHAFT FÜR EMISSIONSTECHNOLOGIE MBH

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lysts (Pre Turbo Metalit™), Hybridkat™, Emitec CompactCat®, Emitec TwinCat®.

The company continues to be a leading innovator. For instance, the metal catalysts with integrated sensors offer customers a highly efficient and compact catalyst system. Where previously two catalysts were required – one with a lambda sensor in the inlet area and another containing a lambda sensor in the catalyst outlet – now a single catalyst substrate with integrated lambda sensors is sufficient to perform the same task. At the same time, the integrated lambda sensor reaches its operating function quicker because it is protected from the "water splash" effect. ■

The **Neckar-Alb Region** provides an excellent infrastructure, highly qualified personnel and is close to some of the world's leading OEMs.



© COLLAGE

Centre of the Car Industry

The **Neckar-Alb Region** begins south of Stuttgart and is Europe's most important automotive region. From Tübingen / Reutlingen, the airport Stuttgart is reached in just 20 minutes and Stuttgart's city centre in 30 minutes. Ideal conditions for automotive suppliers.

INDUSTRIE- UND HANDELS- KAMMER REUTLINGEN

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► Many automotive suppliers have located in the Neckar-Alb Region. Here, they find perfect conditions to grow their business. More than 190 automotive companies with 27,000 employees call the Neckar-Alb Region their home.

Prime Location: In the Heart of the Market

The region provides an excellent infrastructure, highly qualified personnel and is close to some of the world's leading OEMs. For this reason, many top suppliers call the region their home, among them: Automotive Lighting Reutlingen GmbH, manufacturer of exterior automotive lighting; Blickle Räder und Rollen GmbH & Co. KG,

one of the world's leading wheel and castors manufacturers; Robert Bosch GmbH, global supplier of automotive technology and services; Eissmann Group Automotive, manufacturer of vehicle interiors; ElringKlinger AG, manufacturer of cylinder-head and speciality gaskets; Joma-Polytec GmbH, producer of high-quality plastic parts; Mattes & Amman KG, producer of textile surfaces; Reiff Group, manufacturer of sealing elements, profiles, gaskets and hydraulic seals as well as damper parts; Rösch rökona Textilwerk GmbH, supplier of textiles for the vehicle interior.

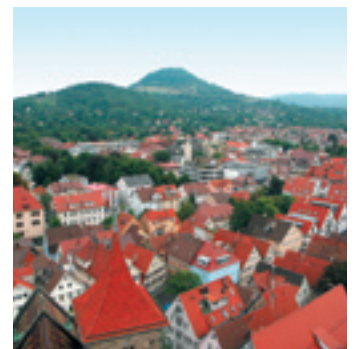
In 2007, the Chamber of Industry and Commerce founded the IHK-Netzwerk Automotive (Network Automotive) in order to address the challenges of the future together with its member companies. While suppliers have strong relationships with OEMs, one weakness that has been identified is the lack of cooperation among regional suppliers. The goal of

the IHK-Netzwerk Automotive is to facilitate contacts between suppliers, OEMs and regional cooperation partners in order to win customers, exchange information, discuss trends in the industry and identify opportunities for cooperation. A key step in this direction will be the organisation of matchmaking events for regional suppliers. Another area of key concern is to ensure that the Neckar-Alb Region continues to attract and train highly qualified personnel.

Countless Opportunities

The heterogeneous structure of the supply industry in the Neckar-Alb Region offers countless opportunities. Almost the entire automotive value chain is present in the region – from plastics to software. Only in Baden-Württemberg does one find three OEMs – Audi, DaimlerChrysler and Porsche – in such close proximity to their highly-specialised suppliers. As suppliers become ever more tightly

integrated into the development process and take on ever more responsibilities – including the supply of entire components – proximity counts. Relying on foreign suppliers does not allow for the quick adjustments often necessary in an era of increasing competition. With its activities, the IHK-Netzwerk Automotive strengthens local suppliers and assists them in keeping ahead of the competition. ■



© JÖRG LAUNER

Reutlingen offers more than nice views: It is home to some well-known suppliers.



© HOERBIGER

HOERBIGER Drive Technology is the leading independent supplier of synchronizer systems world-wide. Furthermore HOERBIGER collaborates with its customers to develop and produce innovative solutions and optimize comfort, performance and cost for tomorrow's drive train.

Setting Standards for Comfort

At the IAA 2007, **HOERBIGER** presents new components and systems for the intelligent drive train, consisting of synchronizer systems, double clutches, actuators and controls. This year, HOERBIGER will have a new location in Hall 6.1, Booth B 25.

HOERBIGER ANTRIEBSTECHNIK GMBH

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- ▶ **HOERBIGER** Drive Technology is recognized as a global and trusted partner in the automotive industry and acknowledged as an expert in the field of "friction and comfort" within the drive train segment. HOERBIGER supplies components and systems for drive trains in passenger cars, trucks and off-road vehicles. The efficient and flexible combination of production technologies of fine-stamping, metal-forming, machining, heat treatment as well as friction lining production guarantees the best solution in any application. Apart from complex components, HOERBIGER offers ready-to-assemble modules and systems.

Moreover the unique portfolio of friction linings (organic, sinter, carbon, graphite, cellulose and molybdenum) provides optimized friction characteristics and limited noise emission over the complete life cycle. Most important, the whole process starting from development, design and engineering to production of components and systems is all performed by HOERBIGER in-house which results in optimum customer support.

Synchronizer Systems From One Source

Unique and dynamic – HOERBIGER has become the leading independent supplier of single-cone and multi-cone synchronizer systems for Manual, Automated-Manual and double clutch transmissions in passenger cars world-wide. HOERBIGER focuses on innovative system solutions in order to help its customers optimizing performance and cost. With the unique and state-of-the-art friction linings

HOERBIGER can cope with all the demands towards modern transmission set-up, in the automotive, the commercial vehicle as well as off-road market segments.

More Than "One" Wet Clutch

Reliable and economic – the optimized calibration of Automatic and Double Clutch Transmissions drives HOERBIGER and its customers to top efficiency. HOERBIGER delivers "torque on demand" not only through components like steel or friction discs for automatic transmissions, limited slip differentials or AWD clutch systems but also via complete double clutches, torque converter clutches for automatic transmissions and launch clutches.

Fast and strong – HOERBIGER systems and actuators deliver supreme driving comfort. On the search of a compromise between comfort, fuel efficiency and agility the focus in the drive train development lies on Doub-

le Clutch Transmissions. HOERBIGER supplies its customers with the perfect system solution - mechanical components, pressure regulators, magnetic valves as well as electrical and hydraulic control units from in-house development. Dedicated shift rods and shift levers cope even with the extreme conditions in Double Clutch Transmissions. People who still "have fun with manual shifting" can experience the newly developed electromechanical shift servo which proportionally boosts the shifting force of the driver. Reduced shift time and perfect acceleration create an ideal combination between driving fun and comfort. HOERBIGER Drive Technology is a business unit of HOERBIGER Holding AG, Zug / Switzerland. The HOERBIGER group is an innovation and technology leader in the business segments compressor technology, automation technology and drive technology.

For the target markets indicated in darker sand colour, **made-in-germany.com AG** offers export oriented companies a comprehensive portfolio of services.



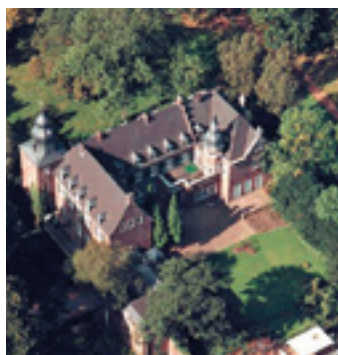
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International Cooperation

The **made-in-germany.com AG** helps automotive industry suppliers in Germany and abroad make international business contacts with its comprehensive range of services.

MADE-IN-GERMANY.COM AG

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Elbroich Castle in Düsseldorf: head office of made-in-germany.com AG

- ◆ The increased globalisation of the car manufacturing industry means that companies involved in the supply sector also have to act. Reliance

on traditionally occupied markets and long-established supply relationships ceased to be enough to secure a company's future success a long time ago. With OEMs establishing and expanding assembly capacities in other locations in Europe, Asia, Central and South America, South Africa, Turkey and Mexico, all automotive industry suppliers must meet the challenge of ensuring their companies are able to perform internationally. The ways in which this can be achieved are as numerous as the risks and opportunities associated with entering new target markets.

Services for more than 50 Target Markets

The made-in-germany.com AG in Düsseldorf offers German companies a comprehensive portfolio of services, providing support in making balanced decisions regarding new commitments abroad and paving the way for successful entry into new markets. Support services for export-oriented

companies are now offered for more than 50 target markets. According to made-in-germany.com AG Chairman Arno Wied, "the company is now represented by more than 400 advisers on all five continents, making us the best-positioned network to establish international business contacts for German companies". The services on offer range from the gathering of pertinent information on the market situation and competition, to developing initial business contacts, providing tangible support during the market entry phase and setting up subsidiaries and production sites.

Developing the German Market

The made-in-germany.com AG is also a reliable partner for companies based in other countries that wish to open up the German market to their products and services. "With more than 80 million consumers and over three million companies, Germany is still a very attractive market for foreign

AUTOMOTIVE EVENTS

The made-in-germany.com AG regularly organises events for the automotive industry. In the past year, it led a business delegation to AUTO AFRICA in Johannesburg, South Africa and organised a joint stand at the OTOMOTIV trade fair in Istanbul, Turkey.

companies and investors", remarks Arno Wied. made-in-germany.com AG smoothes the way for companies to enter the German market, initiates contact with potential business partners or end customers, develops distribution networks or finds partnership solutions, provides information on interesting locations and possible subsidies, and helps create appropriate marketing strategies. "In addition, our company and product database at www.made-in-germany.com is a cost-effective means of presenting our customers' companies in the international arena." ■

Important for power-driven tailgates and sliding doors: **obstacle detection systems** that help to avoid injuries.

© METZELER

High-Tech Profiles

Intelligent high-tech sealing systems with integrated obstacle detection sensors by **Metzeler** guarantee a safe closing process.

METZELER AUTOMOTIVE PROFILE SYSTEMS GMBH

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Fax +49 (0) 8382 707 336
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www.metzeler-profiles.com

► Metzeler Automotive Profile Systems Germany is a European leader in the development and production of automotive sealing systems for doors, windows, boots and hoods. More than 2.000 employees at 3 production sites in 2 countries guarantee optimal manufacturing efficiency and comprehensive customer focus. An additional production site is currently in the planning phase. In its modern Technology Centre in Lindau / Germany, Metzeler is today developing and testing the sealing systems of tomorrow: the Centre provides state-of-the-art testing and development facilities, a CAD Pool for product design as well as a team of FEA experts that virtually investigate

the behaviour of each sealing system prior to production.

Metzeler delivers the complete range of solutions for car body sealing systems – from basic applications to complex convertible sealing systems. Metzeler is a system partner that provides innovative and flexible solutions for the OEM. Thus, besides their basic function of sealing against dirt, noise and water, Metzeler sealing systems also provide a range of additional benefits with regard to safety, aesthetics and acoustics.

Tactile Obstacle Detection Sensor (T-ODS)

Motor-actuated car parts, i. e. sliding doors or tailgates, are becoming increasingly common. However, intelligent functions require intelligent safety systems. The Metzeler T-ODS is a so-called "direct system" in which anti-trap protection sensors are either integrated in a sealing system or designed as a separate element to be mounted on a retainer. If the

sensors are pinched during a closing movement they respond immediately. "Intelligent" sealings of this type are already in production at Metzeler and are, for example, integrated in the tailgate of the new Volvo V70. Furthermore, Metzeler has received orders for three additional projects.

Proximity Obstacle Detection Sensor (P-ODS)

The next generation of anti-trap protection is called P-ODS. Two thin pieces of metal wire are integrated in this type of sealing. With a special electronics design, an electromagnetic field is created around the sealing. If this field is disturbed, for example, by a finger

sticking out of the window, the sensor reacts even before the obstacle gets in contact with the sealing. In order to enhance reliability, Metzeler has combined proximity and tactile obstacle detection systems – the sensor assembly is designed to enable a parallel function of both systems. The Metzeler sensors work directly at the point of trapping, swiftly sending a signal to the ECU. Furthermore, the Metzeler systems – in particular the integrated version – are highly cost-efficient and fail-safe. With its innovative obstacle detection systems, Metzeler has again proven that it is an active full system supplier that provides technical innovations and quality for the OEM. ■



Comprehensive competence: **sensor and retainer development** by Metzeler.

© METZELER

Directory of the Automotive Industry

This database list is a research tool on VDA member companies, their locations and their product range.

www.vda-herstellernachweis.de/index_en

3M DEUTSCHLAND GMBH

type of process and pre-products; plastics and raw materials; body- and functional elements; engines, engine components and powertrain; instruments and electric; traffic systems
www.3m-automotive.com

A

A.U.E. LINDENBERG GMBH & CO. KG

interior components and operating elements

ABT SPORTSLINE GMBH

body- and functional elements; engines, engine components and powertrain; drive train; instruments and electric; cars and traffic systems
www.abt-sportslines.de

ACKERMANN FAHRZEUGBAU GMBH

cars and traffic systems
www.ackermann-net.com

ACTS GMBH & CO. KG

engineering services; interior components and operating elements
www.acts.de

AFT ATLAS FAHRZEUGTECHNIK GMBH

engineering services

AGRODUR GROSALSKI GMBH & CO.

engineering services; type of process and pre-products; plastics and raw materials; engines, engine components and powertrain
www.agrodur.de

AKKUMULATORENFABRIK MOLL

GMBH & CO. KG
instruments and electric
www.moll-batterien.de

ALFMEIER PRÄZISION AG

engineering services; engines, engine components and powertrain; interior components and operating elements
www.alfmeier.de

ALLEVARD FEDERN GMBH

drive train
www.allevard-rejna.com

ALLIGATOR VENTILFABRIK

body- and functional elements; drive train
www.alligator-ventilfabrik.com

ALTENLOH BRINCK & CO.

www.altenloh.com

ANTON RUTHMANN GMBH & CO. KG

www.ruthmann.de

APPARATEBAU KIRCHHEIM-TECK

drive train; instruments and electric
www.ak-teck.de

ARVINMERITOR EMISSIONS

TECHNOLOGIES GMBH

body- and functional elements; engines, engine components and powertrain
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ATERA GMBH

body- and functional elements
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instruments and electric
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B

B&T EXACT GMBH

drive train
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BEHR GMBH & CO. KG

engines, engine components and powertrain
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BENSELER HOLDING

type of process and pre-products
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BERTRANDT AG

engineering services; drive train; instruments and electric; productionsites and shops (equipment and services)
www.bertrandt.com

BERU AKTIENGESellschaft

engines, engine components and powertrain; drive train; instruments and electric
www.beru.com

BING POWER SYSTEMS GMBH

type of process and pre-products; body- and functional elements; engines, engine components and powertrain
www.bing.de

BINZ GMBH & CO.

productionsites and shops (equipment and services)
www.binz.com

BJ AUTOMOTIVE GMBH

interior components and operating elements

BLECHFORMWERKE BERNSBACH AG

body- and functional elements; engines, engine components and powertrain
www.bfw-blechformwerke.de

BORGWARNER TURBO SYSTEMS GMBH

engines, engine components and powertrain
www.turbos.bwauto.com

BOS GMBH & CO. KG

interior components and operating elements
www.bos.de

BOURNS SENSORS GMBH

instruments and electric, geometrical sensors
www.bourns.com

BPW BERGISCHE ACHSEN KG

drive train; cars and traffic systems
www.bpw.de

BRITAX RÖMER

KINDERSICHERHEIT GMBH

cars and traffic systems
www.britax-roemer.de

BROSE FAHRZEUGTEILE GMBH & CO. KG

body- and functional elements; instruments and electric; interior components and operating elements
www.brose.de

BÜHLER MOTOR GMBH

body- and functional elements; engines, engine components and powertrain; drive train; instruments and electric; interior components and operating elements; productionsites and shops (equipment and services); cars and traffic systems
www.buehlermotor.de

BURGMANN AUTOMOTIVE GMBH

engines, engine components and powertrain
www.burgmann.de

C

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$$V = s / t$$

V = velocity or value

S = the distance between problem and solution

T = time

*There's a zero-sum game there, inside "T", beyond the appearances.
The game between Productive Time (T1) and Preparative Time (T2)
 $T = T1 + T2$*

**Focus. One "S" only.
Mash T2.**



Time by time we spend some moment to decide on buying a car, a power tool, a forklift, a lawnmower... how much of this time we spend thinking of a component, a gear? Zero? How much thinking about the intrinsic value of the investment? All of it?

That's why we in miniGears chose the value creation as our mission, the focus as our strategy & difference. All these goals translated into a superior performance by people who take every step to add value.

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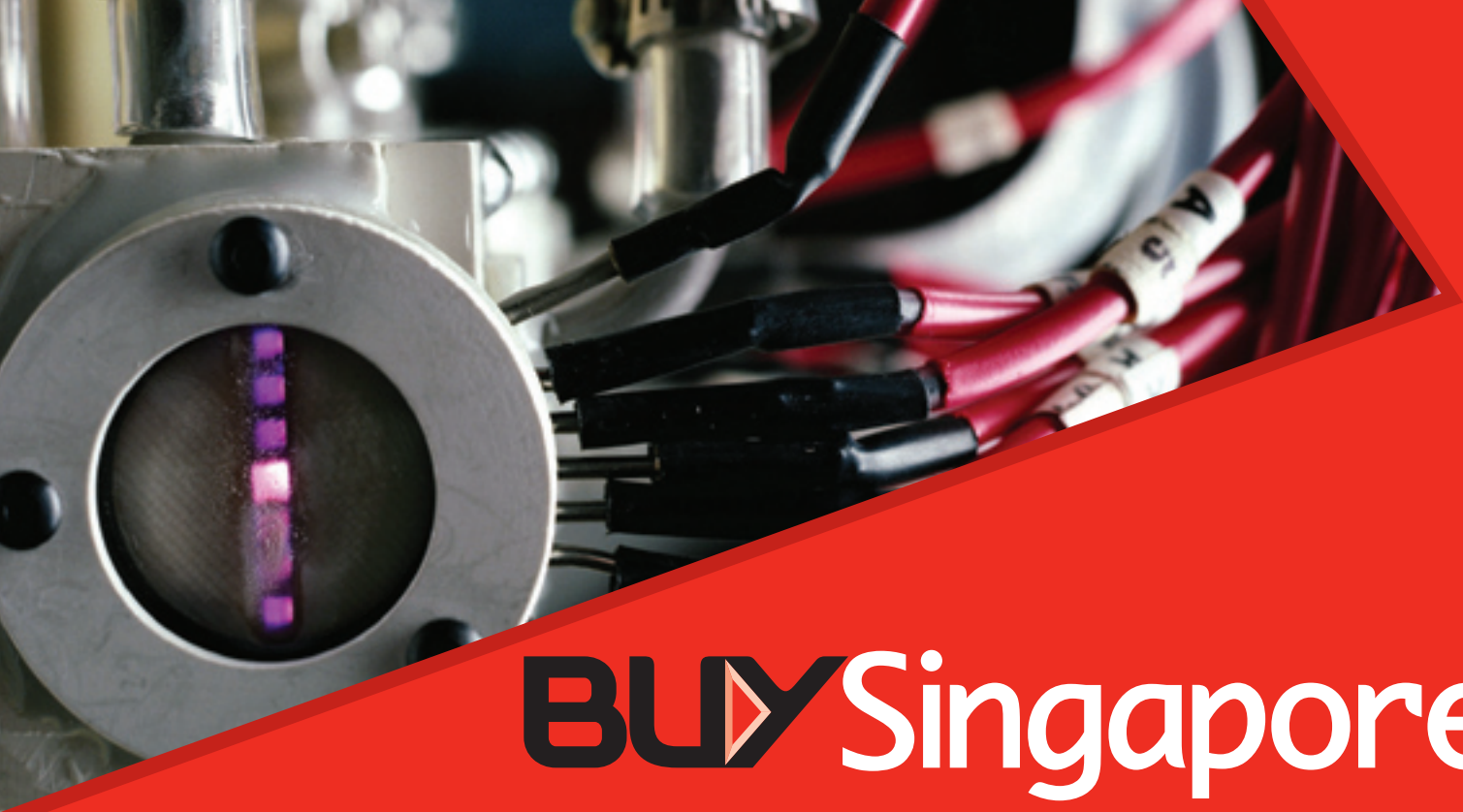
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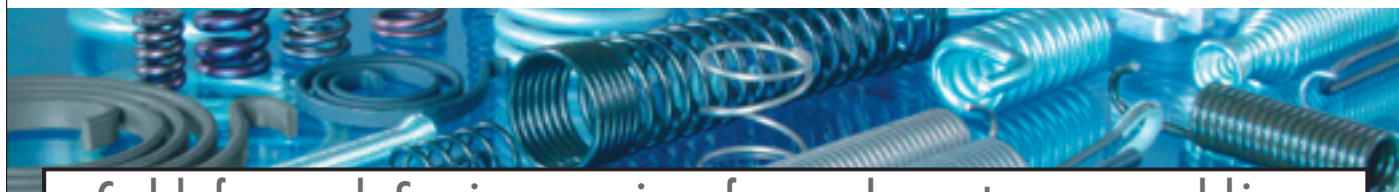
The database of the Association of the German Trade Fair Industry (AUMA) contains more than 5,000 profiles of international exhibitions. It supports exhibitors and visitors from Germany. Find detailed information at www.auma.de



Datum	Ort	Land	Titel
11.09.-13.09.2007	Singapore	Singapore	Tyrexpo Asia
12.09.-16.09.2007	Joensuu	Sweden	ELMIA HUSVAGN & HUSBIL - Scandinavian Caravan Show
13.09.-16.09.2007	Hochiminh City	Viet Nam	AUTOWORLD Vietnam - Vietnam International Exhibition on Auto & Autoparts
13.09.-23.09.2007	Frankfurt/Main	Germany	IAA - International Motor Show Passenger Cars
17.09.-20.09.2007	Goyang/Seoul	Korea (Republic)	KOAAShow - Korean Autoparts & Accessories Show
22.09.-28.09.2007	Chengdu	China (PR)	CDMS - Chengdu Motor Show
26.09.-28.09.2007	Toronto	Canada	Automechanika Canada
27.09.-03.10.2007	Nitra	Slovakia	AUTOSALON NITRA - International Exhibition for Passenger and Commercial Vehicles and Accessories
28.09.-03.10.2007	Kishniev	Moldova	AUTOMARKET - Autosalon
29.09.-07.10.2007	Barcelona	Spain	CARAVANING - International Caravaning Show
29.09.-07.10.2007	Paris	France	Mondial Du Deux Roues - International Two-Wheeled Show
29.09.-07.10.2007	Paris	France	Salon des Véhicules de Loisirs - Leisure Vehicles Exhibition
02.10.-05.10.2007	Kiev	Ukraine	AUTOTECHSERVICE AUTUMN
02.10.-05.10.2007	Moscow	Russia	SPETZTRANSPORT Part of Sklad.Transport.Logistika - International Exhibition of Special Purpose Transport Facilities
02.10.-05.10.2007	Kiev	Ukraine	TIR Truck International Review - International Show of Trucks and Commercial Vehicles
03.10.-05.10.2007	Moscow	Russia	AUTOCOMPLEX - Filling Stations and Equipment, Car Equipment and Maintenance, Garage and Parking
04.10.-10.10.2007	Milan	Italy	TRANSPOTEC & LOGITEC - Industrial Vehicles, Intermodal and Combined Services, Road Transport and Logistics



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International Motor Show (IAA) in Frankfurt/Main

In recent months, environment-friendly technology and the contribution of the car to global warming have become major issues in public debate. As is to be expected from a motor-show that has been setting the trends for the future of the automobile, this year's International Motor Show (IAA) does not shy away from confronting its critics. "See what's driving the future" is the motto of this year's event.

"Sustainable mobility" will be a key theme of the world's largest motor show, organised by the German Association of the Automotive Industry (VDA). "With the key theme of 'sustainable mobility' we have set ourselves the ambitious task of making a fresh visual interpretation of the central terms 'Innovation - Emotion - Environment'", explains VDA President Matthias Wissmann. Opening in Frankfurt am Main on 13 September 2007 industry leaders will present innovative technological solutions and debate the future of the industry. For the first time the VDA will set up an event platform at the IAA offering a forum for discussion on climate change and energy efficiency at differ-

ent stands on a number of days. The IAA will also be offering "Eco-training" during which trainers will be available to teach visitors how to drive in the most economical way.

"The IAA will show everyone the progress made by the German automotive industry in fuel-efficient vehicles," says Wissmann. Suppliers and vehicle manufacturers will present technological innovations such as advancements in hybrid-drive technology and more efficient catalytic converters. In addition to environmental-friendly technology other major topics will be innovations in vehicle safety and accident research.

Numerous world premieres of cars will also grab the public's attention. "We have not set ourselves an easy task. The IAA is not only about environmental protection, but also at least as much about fascinating vehicle premieres and enjoying vehicles," says Wissmann. Even before the opening of the 62nd IAA it seems certain that the ten-day event will once again shape the public debate on the future of the automotive sector. ■

www.iaa.com

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German-Mexican Cooperation Day

The German and Mexican automotive industry are on the path towards tighter cooperation. At this year's IAA in Frankfurt/Main, the German-Mexican Cooperation Day will take place on 19 September. The event, organised by the Business Association

for Latin America in cooperation with the VDA will discuss current trends in the Mexican automotive industry as well as opportunities for enhanced cooperation for OEMs and suppliers. ■

www.iaa.com

Tokyo Motor Show 2007

The Japan Automobile Manufacturers Association (JAMA) will hold the 40th Tokyo Motor Show 2007 at Makuhari Messe in Chiba City for 17 days from 26 October 26 (Friday) through 11 November (Sunday) this year. The theme for this year's show is "Catch the News, Touch the Future." At the automotive show, upgraded special events that involve audience participation and experiences will be offered to generate excitement about vehicles, such as five

types of test ride programmes where visitors can actually come in contact with cars. The entertainment aspect will be heightened so that a wide range of visitors including women and youth, as well as families, can enjoy a full day at the show. Services for visitors have also been enhanced by introducing an official travel agency and making the online ticket system "E-tix." available. ■

www.tokyo-motorshow.com

Turkey: Market for German Suppliers

The Turkish automotive industry is one of the pillars of the country's economic miracle: it has turned into the most important export sector, contributing to the rapid increase in foreign trade, reports the Cologne Chamber of Industry and Commerce (IHK). Nearly all major manufacturers as well as the main suppliers of systems and components are represented in Turkey, says the IHK. These are supported by an increasingly dense network of local supplier companies.

Links are particularly strong with the country's neighbour Bulgaria. Bulgaria's imports of automotive parts have increased by two digits. An annual growth rate of twelve per cent is expected until

2012. On 5 September 2007 the Turkish-German Chamber of Industry and Commerce, the IHK Cologne as well as the Chamber of the Middle Lower Rhine region will jointly hold an event to provide information on current trends and possibilities for cooperation in Turkey and Bulgaria. Together with exTim GmbH, the organisers will arrange a trip to Turkey from 19 to 24 November 2007. The programme features visits of local companies as well as a visit of the new automotive and suppliers' fair Commercial Vehicle Istanbul which will be organized by the sector's federation TAYSAD. The schedule also includes a trip to Bulgaria. ■

www.td-ihk.de

Baden-Württemberg Supplier's Day

High expectations as to their innovative potential and performance, growing pressure to reduce costs and an increasingly international supply chain - German automotive suppliers are facing serious challenges. The Baden-Württemberg Ministry of Economic Affairs has therefore initiated support for the region's medium-sized automotive suppliers. Its core element is the "Day of the Baden-Württem-

berg Automotive Suppliers", an event which will be organised by the regional RKW on behalf of the Ministry for the eighth time now. Experts with practical experience, scientists and politicians will acquaint participants with recent developments and trends. The event takes place on 21 November 2007 at ICS, Neue Messe Stuttgart, Airport. ■

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NEXT ISSUE SPRING 2008



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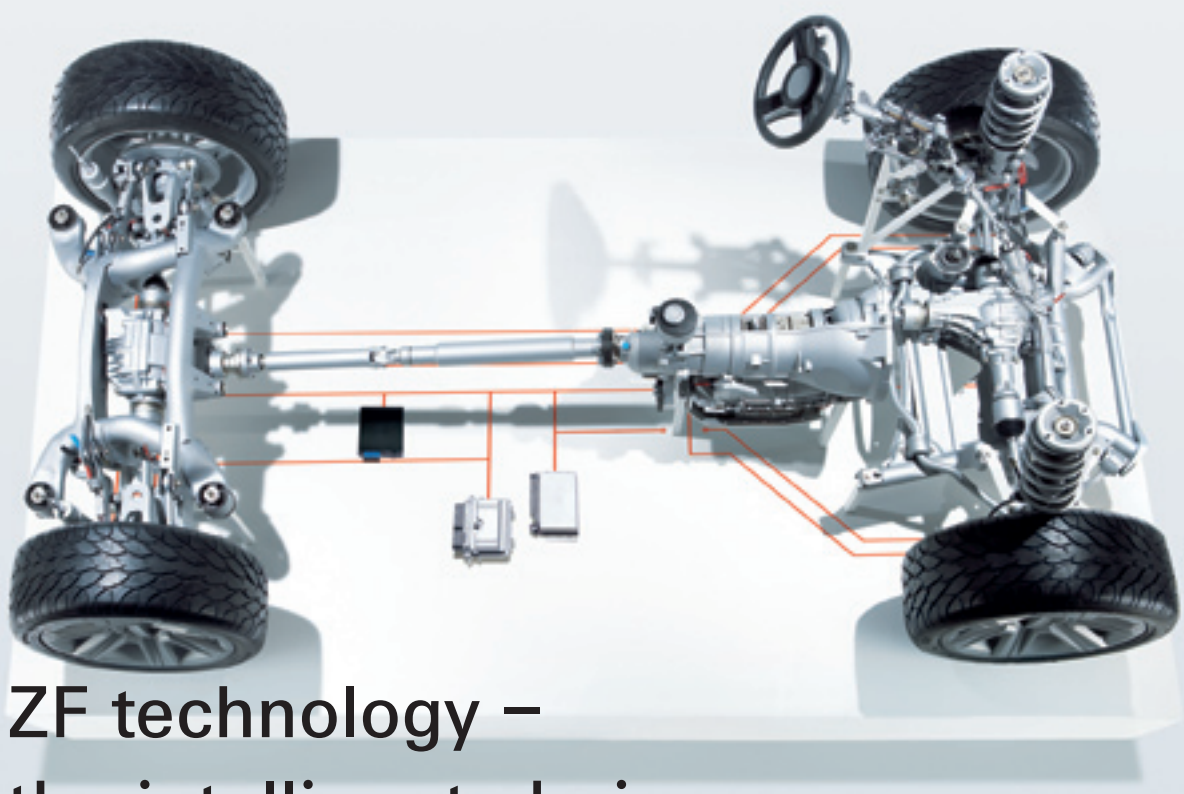
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