

# edwin

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NEW SLIDING DOOR MECHANISM

## Hiding sliding door

IAA 2003

Edscha inside



Fresh ideas for vehicles.



As a supplier of movable systems, we've got a feel for what's essential for vehicles. Together with our ability to design complete vehicles, and with fresh ideas, our path into the future invariably looks good. And hence some matching extras can come along too. Like extras that smell nice. But leave that to others to supply. [www.edscha.com](http://www.edscha.com)

# Open up!

**A** central feature of corporate culture at Edscha is openness. Honest and timely communication is something we care about deeply, both in-house and towards the general public and of course our customers. That's one of the reasons why we have *edwin*, now appearing the second time.

Coincidence or not – many of our products also center on 'openness'. Hinge and convertible roof systems from Edscha have for decades now been providing dependable access to cars. In that time, the demands made on cars have risen dramatically in every respect. Nowadays, it's comfort above all that's the clincher for the buyer. We haven't shut our eyes to that fact either – instead we set ourselves the task of opening up new prospects in our niches for our customers.

In this edition of *edwin* we're presenting a few of our ideas for discussion. For example ideas for more convenient opening systems:

ranging from the next-generation door hinge, the Notch Stop (pages 11 and 22), and an electrically-powered rear lid developed by us (page 14), to the alternative sliding door mechanism that adorns the title page (page 18).

We've developed new approaches elsewhere too: specialists from IVM Automotive helped, for example, to develop the existing Junkers opposed-piston engine into an unusually efficient, lightweight, inexpensive and clean two-cylinder design for a wide range of applications (page 16); and they pondered how our customers could exert a favorable effect on the production costs and weight during the development process itself (page 12).

More details of all this can be found in this issue – or can be heard at the Edscha Group's 4th Symposium in November. Its motto? "OpenMinded", what else!

**On that note, enjoy reading it!** ■



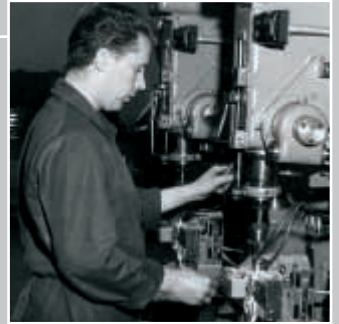
## IMPRINT

Publisher:  
Edscha AG,  
Hohenagener Str. 26–28,  
42855 Remscheid  
Coordinator: Christiane Nadol  
Publishing House: corps Corporate Publishing Services GmbH,  
Schanzenstraße 56,  
40549 Düsseldorf  
Editors: Wilfried Lülldorf,  
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Art-Direction: Guido Koch, Köln  
Cover Photography: John M. John  
Photos: Adam Opel AG, Audi AG, Manfred Bernhard, DaimlerChrysler Nutzfahrzeuge, Dorint AG, Edscha AG, John M. John, Lars Langemeier, M. Dannemann, Meilenwerk, Smart GmbH, Ssangyong Motor, Volvo Car Corporation  
Lithography: F+S GmbH  
Printing: Druckerei Tannhäuser  
Publication dates: twice a year

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# Tacking against the wind

**FINANCIAL STATEMENTS 2002|2003** Weak markets and other adversities could do little to hold up the Edscha Group this past financial year.

**D**espite contrary winds in the sales markets and a rough climate in the motor vehicle industry in general, the Edscha Group attained its sales targets in fiscal 2002|2003 (through 30 June) and extended its market positions. Between July 2002 and June 2003 the Group sales were € 948 million; this is an increase of 22 percent over the previous year (€ 777 million), and almost exactly the level envisaged since the beginning of the year. The new division, Vehicle Design, established by the acquisition of IVM Automotive in July 2002, contributed € 108 million to total sales.

The Hinge Systems business remained stable at € 553 million (previous year € 555 million); the dramatic decline of the Brazilian real prevented reporting higher sales. The launch of pro-

duction of the BMW Z4 and the Smart Roadster tops caused sales of convertible roof systems to shoot up 30 percent to € 189 million (€ 145 million). Thanks to numerous production launches, the Driver Controls division sharply boosted sales by half to € 68 million (€ 45 million). With € 30 million, the smallest division, Sliding Roofs for Trucks, was also the only division reporting a slight dip in sales over the previous year (€ 32 million) – but given a very weak market it still turned in a satisfactory performance.

In the face of these efforts, the Edscha Group with little fanfare simultaneously prepared to meet coming challenges – with a new capital structure (edwin 01|2003 reported), the reorganization of IVM Automotive (page 9), the building of a factory in Mexico and new



A strong wind at the headquarters in Remscheid doesn't bother Edscha much

joint ventures in Japan and China (page 6), and many new products (pages 10, 14, 18), orders and ideas. The future can come now – with any weather.

## INTERNET

### New in the web

Going online in the next few days – the new Internet site of IVM Automotive. Based on the vehicle designer's new Corporate Design (since the company was acquired by the Edscha Group in the summer of 2002), the pages will have an entirely new appearance, a new navigation and, of course, completely revised or new contents. The purpose of the effort, as of the entire reorganization of IVM Automotive (page 9): higher quality of service from more efficient structures.

**i** [www.ivm-automotive.com](http://www.ivm-automotive.com)



## DIN ISO EN 9001: 2000 AND VDA 6.2

### IVM Automotive certified

Increasingly complex technology, the rising quality awareness of car owners, and sharp competition require that automotive component suppliers and service providers ensure highest quality across all processes. IVM Automotive takes this seriously. After one year of preparations, in spring 2003 all locations and business fields of the vehicle designer were certified to comply both with the amended version of DIN ISO 9001 from the year 2000 as well as with the standard VDA 6.2 for service providers. IVM Automotive is thus the first company in its area of business to have its processes certified as being entirely in conformity with the new standards.

## NEW JOINT VENTURE IN CHINA

# Edscha goes East

Anhui Edscha Automotive Parts Co. Ltd. (AEA) is the Hinge Systems division's response to the booming Chinese automotive market.

Since mid-June, Edscha AG has been running a second joint production ven-



Chinese employees at AEA familiarize themselves with Edscha products

ture (50:50) with AEA in Hefei in Anhui province. Shanghai Edscha Machinery Co. Ltd. (SEM), the first joint venture of the Group in China, has grown so fast since it was founded in 1994 that it will soon reach the limits of its capacity. At present, SEM produces easily six million hinges and door checks annually, thus serving around 30 percent of the Chinese market for passenger car hinge systems. With the new joint venture this market share passes the 50 percent mark.

AEA is located around 450 kilometers west of Shanghai in the vicinity of major automobile plants. Under the name Jiang Nan, the factory previously was one of the principal competitors in the regional market for door hinges and was not privatized until early 2003. The technological strength and worldwide presence of the Edscha Group persuaded the new owners to serve the Chi-

nese market jointly with Edscha in future. AEA currently supplies almost five million hinges and door checks annually, mainly to Volkswagen and General Motors.

Processes and product quality will soon reach Edscha standard, and output and sales will thereafter grow by at least 20 percent annually. AEA will then also supply other Asian markets, including the Japanese joint development and sales venture Edscha-Ohi Co., Ltd., in Yokohama, launched in January 2003. In the medium term, AEA will additionally manufacture pedal boxes and parking brakes for the Driver Controls division.

The Edscha Hinge Systems business division, producer of some 250 million hinges annually, with 19 production facilities in 13 countries, is the world's leading supplier of hinges to the automobile industry.

## MECHATRONICS CENTER

# Live wires

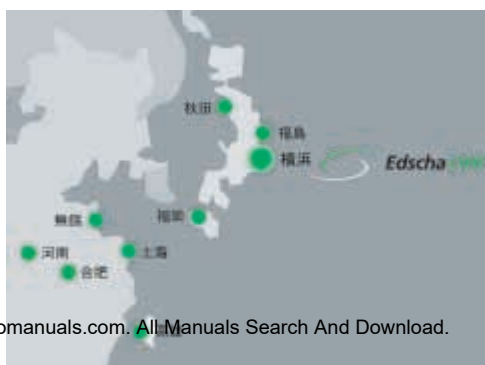
Electric drives and electronic controls for mechanical components are the basis of most automotive innovations – including rear lids, parking brakes and convertible roof systems. In Remscheid, Edscha is therefore about to set up a Mechatronics Center in the still-young business year 2003|2004. The Center is to serve as interface between the Hinge Systems, Convertible Roof Systems and Driver Controls divisions, to the electrics and electronics experts at IVM Automotive, and not least to suppliers and customers. Its tasks are to test motors, gears or electronic components and to qualify them for Edscha applications, to integrate them with mechanical components into fully functional units, to initiate and support cooperation with specialists, and to monitor customer projects. To accomplish these tasks, the Mechatronics Center will have full access to the Edscha Group's testing stations for entire vehicles, special measuring equipment, and test benches for components.

## JAPAN

# Edscha-Ohi growing

The joint venture of the Edscha Group established in January 2003 in the Japanese city of Yokohama is developing at a rapid pace. Though initially the joint venture with the local hinge manufacturer Ohi Seisakusho Co., Ltd., only targeted the development and sale of hinge systems, as of 1 July, Edscha-Ohi Co., Ltd., has appreciably widened its scope of business: now it also looks after the interests of the Convertible Roof Systems and Driver Controls divisions in Japan – this is the first step by these divisions into the world's third largest car manufacturing country. The workforce of the joint venture is growing to keep pace with the tasks: Edscha-Ohi currently

employs eight people; in the business year 2003|2004 which has just commenced it is planned to take on another three employees in Sales, Design and Quality Assurance.



# Open for Edscha?

**4TH EDSCHA SYMPOSIUM** For many years Edscha has been dependably opening vehicle doors, lids, hoods and roofs. In November for the fourth time we invite our customers to open up too – to our latest ideas relating to vehicle bodywork.

November is mostly a dreary month. The world outside is grey, car sales sag, and most automobile designers and procurement managers retire to the four walls of their offices.

Taking as our motto “OpenMinded”, on this day we intend to make our product and development skills tangible in the field of doors, hoods, lids, roofs and complete vehicles – they have been greatly expanded since the purchase of IVM Automotive in July 2002. We will present our freshest ideas and put them to discussion. In-depth contributions by outside speakers and a panel discussion will complement the program. The symposium will be chaired by Franz W. Rother, editor-in-chief of the leading German automotive industry journal “Automobilwoche”. Following the day program, Edscha invites the participants to attend a joint evening event – but we’re keeping it a surprise!

Personal invitations will be sent out in the course of September. Overnight accommodation has been reserved at Dorint An der Messe (at the trade fair), Cologne for both the evening before, Tuesday, November 18, and for Wednesday, November 19. If you do not receive an invitation and wish to attend, please contact us at [info@edwin.de](mailto:info@edwin.de) or phone +49. 2191.363-363. We’d be happy to see what we can do for you.

But not this year! For the fourth time since 1995, 1998 and 2000, Edscha AG is inviting selected customers from the ranks of car manufacturers and automotive component suppliers to attend a technical symposium, which will be held on November 19, 2003 (conference day), in the Dorint An der Messe (at the trade fair), Cologne.



Franz W. Rother,  
editor-in-chief  
“Automobil-  
woche”

Edscha

OpenMinded  
4th Edscha Symposium  
Cologne, 18 – 20 November 2003



## EVENTS

11–21 September 2003 (9/10 press days)

**IAA INTERNATIONAL MOTOR SHOW PASSENGER CARS** • Frankfurt/Main

9 October 2003 **PRESS CONFERENCE**

**ON FINANCIAL YEAR 2002|2003**

• Steigenberger Parkhotel, Düsseldorf

16 October 2003

**MEET@ FH WIESBADEN** • Campus Career Contact Fair, FH Rüsselsheim

23 October 2003

**CONNECTA** • Campus Career Contact Fair, FH Regensburg

29 October 2003

**W & I TAG** • 6th Siegen Economics and Engineering Day, Uni Siegen

5 November 2003

**HOKO** • Campus Career Contact Fair, FH München

17 or 18 November 2003

**BONDING KARLSRUHE** • Campus Career Contact Fair, Uni Karlsruhe

18–20 November 2003

**4TH EDSCHA SYMPOSIUM** • Dorint-Hotel An der Messe, Cologne

8 or 9 December 2003

**BONDING AACHEN** • Campus Career Contact Fair, RWTH Aachen

10–19 January 2004

**N.A.I.A.S.** • North American International Auto Show (Detroit Motor Show), Detroit, USA

21 or 22 January 2004

**BONDING KAISERSLAUTERN** • Campus Career Contact Fair, Uni Kaiserslautern

27 or 28 January 2004

**BONDING BRAUNSCHWEIG** • Campus Career Contact Fair, TU Braunschweig

January 2004

**COMPANY AND INDUSTRY CONTACT FAIR** • University of Applied Sciences (HAW), Hamburg

February 2004

**HALF-YEARLY REPORT 2003|2004**

4–14 March 2004 (2/3 press days)

**74TH GENEVA MOTOR SHOW** • Geneva, Switzerland

26 or 27 April 2004

**BONDING BOCHUM** • Campus Career Contact Fair, Ruhr-Uni Bochum

■ Edscha ■ IVM Automotive

# When the Machine came to Man



## THEN AND NOW

These days Hengersberg is the headquarters for the Driver Controls and Convertible Roof Systems division. Hinge system production capacity is also significant.



**40 YEARS AT HENGERSBERG** In June 1963, Edscha opened its first branch plant. For the people of the Bavarian Forest this meant jobs – for the Edscha Group the birth of the Company's most important out of today's 24 plants around the globe.

**T**hank Heaven for forty years of Edscha Hengersberg. Church dignitaries such as the Abbot of the nearby Niederalteich Monastery and the Bishop of Passau were among the first to give the start-up their blessing on June 7, 1963: "May the plant bear abundant fruit for all who work here." Fritz Eberle, then mayor of Hengersberg, also rejoiced at the prospect of a rich harvest on the day "the Machine came to Man". And the machine has indeed brought wealth to the region.

## LONG TIME COMING

It was almost a century before the descendants of company founder Eduard Scharwächter dared open a plant so far from their roots in Bergisch Land. The reasons lay somewhat closer to home: a lack of space and manpower prevented the Company from expanding in Remscheid, while the border region in the East offered plenty of both. As a result, the fifties had seen many thousands of people migrate to the industrial regions. Even the 25 jobs (later 70) initially offered in hinge production (3,600 m<sup>2</sup> of operating area) meant a considerable boost to the region.

Four decades and several expansions later, the plant now

employs approx. 1,200 people on a factory site of 47,000 m<sup>2</sup>. During the last business year, plant revenues came to about € 225 million, equivalent to almost a quarter of the Group's entire sales – and a no less important factory in the region's economy today than in the sixties. By the time the plant celebrated its silver jubilee in 1988, it was already – according to Franz Josef Strauss, then prime minister of Bavaria – "one of the most successful industrial developments in the Bavarian Forest".

## LEAPS AND BOUNDS

Since 1986, the plant owes much of its success to the addition of a new business division: Convertible Roof Systems. At the request of BMW, Edscha – as a specialist in moveable connections – assumed responsibility for the production of the roof linkage for the first Series 3 convertible. These days, Hengersberg produces some 65,000 soft and hard tops a year for four different car models – an impressive figure and yet only half the division's entire production. Four more plants have since been set up around the world; a fifth is currently being built in Mexico.

At the Hengersberg division headquarters, 85 design engineers provide for the future: a well filled order book means the Hengersberg convertible roof production is booked out for years to come. No doubt many there glance upwards through the open roof in gratitude.

*Rafael Zelek* ■



# Sharper profile

**IVM AUTOMOTIVE** After the takeover of IVM Automotive by Edscha in the summer of 2002, nine in-house teams worked to raise the profile and structure of the vehicle designer. The results have been implemented since May 2003.

The ability to respond even more quickly and efficiently than before to customer requirements – this was the intention of the Vehicle Design business division (IVM Automotive) and also the reason for its new organizational structure. Their aim: consistent use of specialized know-how and resources throughout all locations.

Since May 2003, IVM Automotive has been subdivided into five business fields: Complete Vehicle Development, Design, Vehicle Body and Interior, Samples and Prototype Manufacturing, and System Development and Integration, with the latter comprising the segments Calculation and Simulation, Electrics and Electronics, Engine/Drivetrain/Chassis, and Testing.

## MATRIX RELOADED

IVM Automotive will continue to focus in the future too on developing complex modules and complete vehicles including project control and coordination. The new feature: every location will have access to the know-how and services of all the business fields on the spot; the skills available in every single business field will however be concentrated at a central location and coordinated from there.

The business field Complete Vehicle Development for example is located at Bad Friedrichshall; Design and Electrics and Electronics are mainly at the Rhine-Main location; Vehicle Body and Interior, Samples and Prototype Manufacturing, and Engine/Drivetrain/Chassis predominantly in Bad Friedrichshall; and Calculation and Simulation plus Testing in Ingolstadt. Sales and Customer Support operate on the basis of key accounts for all locations. The opportunities for IVM Automotive on the French market are current-

ly being analyzed from Edscha's French location, at Les Ulis.

“The new matrix organization forges links between locations that have previously worked largely independently of each other. This will create synergies with which IVM Automotive will continue to expand its market position”, says Managing Director Ulrich Mellinghoff, commenting on the reorganization of the 1,000 or so engineers and technicians in Germany. “As an efficient engineering partner, we will also be offering to a greater extent contents to the OEM as opposed to external capacity reserves. That will make the use of our services easier to plan for our customers – both OEM and system manufacturers – from the cost angle”, says the former BMW manager. The positive responses from the customers confirm that the vehicle designers are on the right track with this new setup. *Christina Kaulhausen* ■



## PRECURSORS

Ulrich Mellinghoff (53, left) has been the spokesman of the management since March 2003 and is in charge of the Sales and Engineering fields. He is assisted by Frank Braun (43), who as managing director has been in charge of the commercial aspects and the locations since April 2003.

## ORGANIZATIONAL STRUCTURE

Locations	Business areas	Key accounts
Wolfsburg	■ Complete Vehicle Development	VW
Rhein-Main		Ford, Opel
Bad Friedrichshall Stuttgart Sindelfingen	■ Design	DaimlerChrysler, Porsche
	■ Vehicle Body and Interior	
	■ Samples and Prototype Manufacturing	Audi, BMW
Ingolstadt Munich	■ System Development and Integration	
Les Ulis (France)		PSA, Renault



# Edscha inside

**IAA 2003** The Edscha Group has chosen not to attend this year's International Motor Show (IAA) for passenger cars in Frankfurt with its own stand. Instead, it can be found in many other stands – with contributions large and small towards concept studies and new production models. Some instances.

## OPEL ASTRA

The doors of the new Opel Astra feature a door check of completely new design – the

**Edscha Corporate Check (ECC1)**. Made almost entirely of plastic, it is maintenance-free, considerably lighter than most other door checks, and also better protected against corrosion and friction noise.

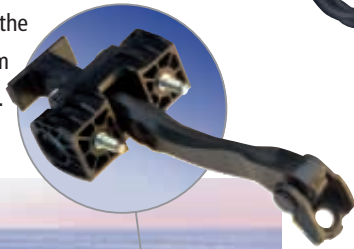
The Edscha-designed handbrake of the new Astra also makes the vehicle quieter: a special comfort package muffles mechanical noise and isolates the lever from vibrations. The door, engine hood and liftgate hinges of the new Opel are also from

Edscha.

pedal box



decklid hinge





hood hinge



hand brake lever



Notch Stop

### SMART FORFOUR

In the new Smart Forfour, the latest generation of hinges from Edscha is opening series-produced doors for the first time (page 22 f.): The Notch Stop is a door hinge with an integrated door check and some very special advantages for the OEM as well as for car users. It takes up less room than two separate systems and is – thanks to its closed-off compartment – proof against paint penetration, easy to fit and maintenance-free. Its modular design makes for a special feature: the integrated door check technology is interchangeable – for example with the Soft-Stop®, a stepless system also developed by Edscha.

Edscha furthermore supplies engine hood and liftgate hinges, plus foot controls and handbrake for the new Smart Forfour.



### MERCEDES-BENZ VIANO

The Viano's **foot-operated parking brake**, specially designed by Edscha, is distinguished by an extremely compact sandwich construction and a strict design-to-cost approach. Even a manufacturer of exclusive Italian sports cars has since evinced interest in this product from Edscha's plant in Santander, Spain.

### EDSCHA PRODUCTS AT THE IAA 2003

Model	DH	DC	HH	LH	FB	HB	PB
Audi A3 Avant	■						
BMW 5er	■	■		■		■	
BMW 6er	■	■	■	■		■	
BMW X3	■	■	■	■		■	
Ford C-Max			■				
Mazda Mazda 3						■	
Mercedes-Benz Viano	■	■		■	■		
Opel Astra	■	■	■	■		■	
Opel Vectra Caravan		■ <sup>1</sup>	■	■			
Peugeot 307 CC	■						
Smart Forfour		□	■	■		■	■
VW Golf	■		■				
VW T5	■		■	■		■	■

DH door hinge; DC door check; HH hood hinge; LH decklid or liftgate hinge  
 FB foot operated parking brake; HB handbrake lever; PB pedal box  
 □ = Notch Stop; <sup>1</sup> rear doors

# Lightweight doesn't have to be expensive

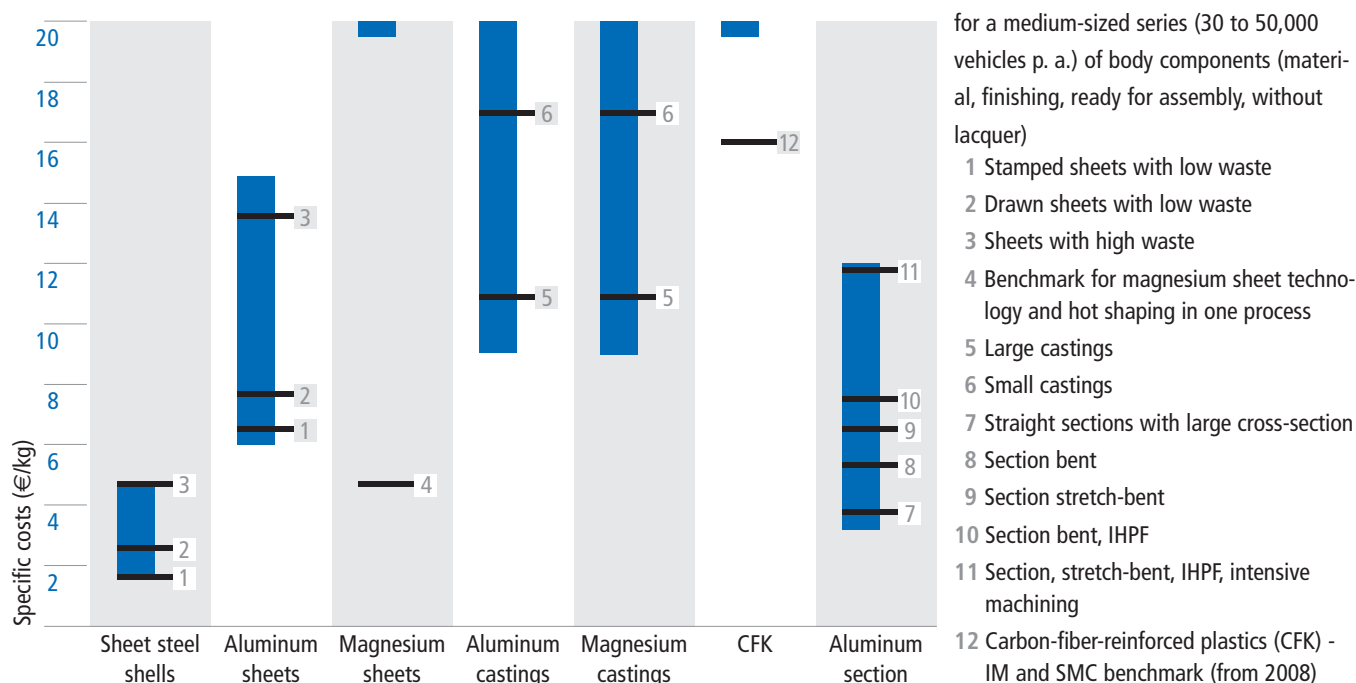
**COST-EFFICIENT LIGHTWEIGHT BODIES** Environmental protection necessitates lower fleet consumption, while tough competition requires strict cost management. Although lightweight construction concepts are central to the former, they still tend to hinder the latter. One effective remedy is the cost/weight optimization method developed by IVM Automotive.

Lightweight construction is an obvious solution in the quest to cut fuel consumption and harmful emissions. These days, a wide range of lightweight options exist: the first generation of aluminum bodies produced during the nineties saw the steel industry respond with a plethora of new steels and processing techniques. Even magnesium can now be obtained in something other than

cast form, and it is almost impossible to number all the different plastics and composites currently in use.

At the moment, however, lightweight construction is having problems establishing itself in series production; strict cost management by OEM facing an unfavorable market environment would appear to leave little scope for innovative production materials and

## COMPARISON OF SPECIFIC COSTS



techniques. The reasons are as varied as the spectrum of alternative materials available: the often biased expertise of concept engineers regarding the potential, maturity and cost of alternative materials, semi-finished products and techniques, the expensive procedures before they are released as suitable for use, and insufficient importance being attributed to the learning curve in cost models. Often dimensional concepts designed for use with steel are used for lightweight materials; when transposed at a ratio of 1:1, they generally result in greatly inadequate weight reductions. In practice, cost-optimized lightweight construction fails not least because of a tendency to ignore the designers' old rule of thumb that design costs should already be fixed during the concept phase.

### STARTING EARLY

Enter CWO (Cost Weight Optimization) – a method developed by IVM Automotive that allows simple calculation of production costs for lightweight concepts very early on and a positive impact on the whole process. CWO enables the marketability of new materials or semi-finished products to be assessed, new techniques to be compared, and aims for their development to be defined. Entire car bodies, not to mention individual modules or components, may be cost-optimized for each size of production run. By the end of the development process you have a vehicle that strikes the right balance between cost, weight and other required properties in production, too.

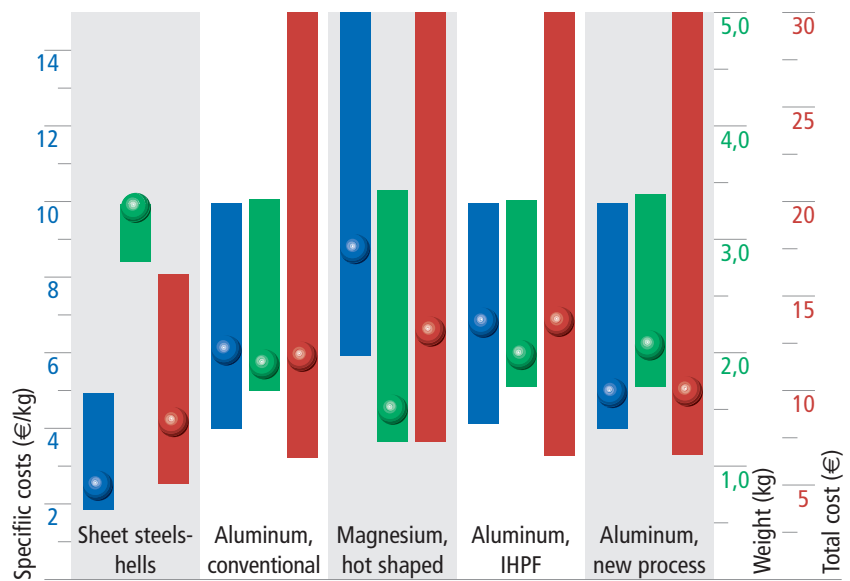
At the heart of the CWO method lies the simple cost equation

$$C = m \cdot C_s$$

Where C is the cost of the component in euros, m its mass in kilos, and C<sub>s</sub> the specific cost in €/kg of the ready-to-fit component: this includes material and production costs, tooling cost depreciation and extra charges.

Specific costs are generally determined by only a handful of cost factors. In a CWO project, the designer receives a table of possible materials matching the project concerned and the scale of production; the contents of the table vary considerably depending on the latter (diagram left).

## COST WEIGHT OPTIMIZATION (CWO) DIAGRAM



### BLUE, GREEN, RED

The blue bars represent the specific costs of the material. The bottom end marks the cost-optimized solution for the material in question. The blue ball represents the targeted concept status. The designer can thus ascertain the cost of a particular design.

The green bars stand for weight. Once again, the ends of the bars should be regarded as positive and negative benchmarks. The green ball represents the target weight. The designer can thus ascertain how lightweight a particular design is.

The absolute costs are shown in red. Multiplying the above values produces the range. The designer can ascertain whether the cost targets have been met.

The aim of the concept phase must be to achieve the weight targets while maintaining sufficient rigidity and meeting the cost targets. In the past, however, the calculation of production costs has frequently been postponed into subsequent project phases. If it is assumed that automobile designers can optimize and control the mass and other properties of a vehicle or component using finite element (FE) methods, CWO represents an opportunity to optimize costs at the earliest possible stage while taking account of other target values (diagram above).

### BIG ENLIGHTENMENT

Having developed it between 1996 and 2001, IVM Automotive has so far applied the CWO method to various customer projects. The results are persuasive: in each individual case, whether involving small or large components, in small or large production runs, the early transparency in production costs for lightweight construction effectively helped optimize costs. In several cases where a maximum weight saving was achieved, the costs even matched those of conventional construction. In one project, for instance, it proved possible to design the production of a light-metal car cross member in such a way that its cost matched that of the reference model while achieving a 50 percent reduction in weight.

Ralf Anderseck ■

# Built-in drive

**ELECTRICALLY DRIVEN REAR LIDS** Trunk lids that open and close at the push of a button – more and more car owners appreciate this kind of comfort. Edscha engineers have developed a particularly economical and comfortable electric solution that will go into production in the autumn of 2003.

**N**ot even hinges are what they used to be. Their task has remained largely the same ever since automobiles were invented and Edscha began equipping them: that task is reliable and flexible connection of car body parts. However, the demands on their service life and safety, their functionality and their comfort have risen enormously.

## ELECTRIFYING OPENING

Consequently, the design engineers of the Edscha Hinge Systems Division have for years been working on new and improved, more comfortable opening systems: from pantographic side doors and sliding doors (pages 18 f.) to multipiece rear lids and extending load compartment floors. They haven't neglected the driver motors either: in September the first electrically powered rear lid system from Edscha – the first of its kind in the market – goes into production.

Design chief Andreas Polz explains the advantages for drivers: "Our system offers distinctly more comfort than the usual electrohydraulic systems, since the trunk lid control is more sensitive and the lid responds reliably even

at ambient temperatures of minus 40 or plus 80 degrees Celsius. Not least, the stalled-condition detection feature developed by us and based on Hall sensors sets new standards in software-controlled sensitivity and variability." The OEM will also notice the advantages: up to 30 percent lower costs, in part thanks to the use of a special Edscha motor, as well as a step towards independence from hydraulic

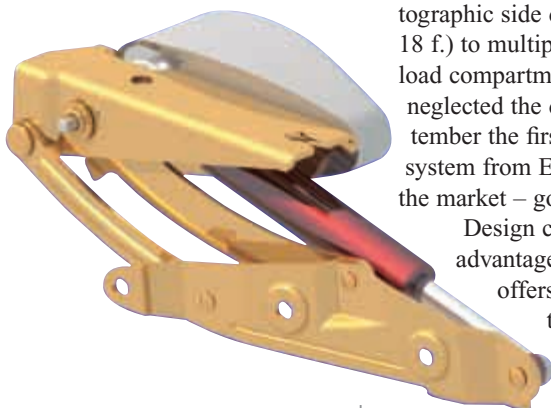
fluids, which have to be disposed of at considerable expense to comply with the end-of-life vehicle regulations.

Even in comparison with other electric-only drives, the Edscha system affords clear advantages: the drive integrated in the pop-up hinge permits stopping and reversing the direction of motion at any time. Motor power is controlled by means of pulse-width modulation (PWM) depending on temperature; and a voltage equalizer ensures practically constant operation irrespective of battery charge level. Although a trouble-prone and cost-raising coupling was dispensed with, opening and closing the trunk lid is nonetheless child's play if ever the vehicle power supply fails.

## INVOLVED

The system was installed in a test car by mid 2002. The first to be convinced by Polz to employ a customized version of the Edscha system was Volvo – in the 'Versatility Concept Car', Volvo's highlight at the 2003 Geneva Motor Show. The Scandinavian designers set particular store by stylish, comfortable cruising in this forward-looking high-class station wagon. Edscha hinges feature not only in the electrically operated rear lid, but also in the hinges to the side doors which open in opposing directions.

However, the Edscha system will first be entering the market in a different make. As of autumn 2003, Korean manufacturer Ssangyong, a former subsidiary of the Daewoo group, will be fitting out its flagship 'Chairman' with it. Several thousand of these luxury cars annually – thanks to Ssangyong's earlier



## POWERFUL

This is it how it looks, the pop-up multilink hinge with integrated electrical drive that provides much greater comfort than conventional systems.



connection with Mercedes-Benz, it's no coincidence that the 'Chairman' resembles the predecessor of the current S-Class – are intended to lavish this great comfort on Asia's growing upper class. Edscha assumes responsibility for the entire system, from development to project coordination, supplying all components with the exception of the existing hinges: from motor to control unit and gas spring, from lock to closing assist. Around 75 percent of the parts come from the companies that supplied Edscha during development.

### BETTER RESULTS FROM JOINT EFFORTS

Polz is convinced that this is just the beginning of the growth of the hinge business on an appreciably broader scale: "The link with IVM Automotive opens up entirely new opportunities for us. Whereas we previously only had the connection points between body and door in mind, we can now design new structures and analyze and optimise them with advanced simulation tools." Innovative body ideas are evolved in cooperation with the IVM Automotive Design Center Rhine-Main (pages 20 f.) and serve as basis for discussions with the design and pre-development departments of the OEM. Physical models can be provided at short

notice by the model and prototype makers at IVM Automotive. And in collaboration with the Mechatronics Center that is about to be established in Remscheid (page 6), the electrics and electronics experts of IVM Automotive design and test new controls, including their software, and integrate them into existing vehicle networks. Polz takes great pride in these comprehensive skills: "This enables Edscha to offer our customers a unique range of services."

*Christiane Nadol* ■

### SHOW OBJECTS

An Edscha system was shown for the first time in public in the Volvo Versatility Concept Car; a different version will soon be seen on Korean roads in the Ssangyong Chairman. Edscha itself demonstrates the development at the converted rear lid of a 7 Series BMW.



# Junkers for Asia

**OPPOSED-PISTON ENGINE** Increasingly lower costs, consumption, exhaust emissions and weight – these are the most important goals of manufacturers as they continue to develop the internal combustion engine. Employing the well-known opposed-piston principle but brand-new technology, IVM Automotive has built a two-cylinder engine which promises big reductions in all the above values.

## CARBON-ALUMI- NUM PISTON

With a 25 percent lower mass and 300 percent higher temperature resistance than conventional pistons, the carbon-aluminum pistons are the ideal partners in the GKM 1200.

**H**ugo Junkers' aircraft engines are to this day the most efficient diesel engines ever built. The creator of the Junkers 52 ("Auntie Ju"), a flying legend, was the first to recognize the potential inherent in the opposed-piston principle – and this was at the end of the nineteenth century. With its pistons at opposite ends of a common crankshaft, the one controlling the inlet of fresh air, the other the exhaust of the combustion gases, it's the only two-stroke cycle that easily outperforms the present-day four-stroke cycle.

And so the specifications of the famed Junkers engines 205 and 207 of the 1930s are sensational even by the standards applied to today's diesel engines. From 16.6 liters swept volume the JUMO 207, for example, generated 2,200 horsepower, i.e. 133 horsepower

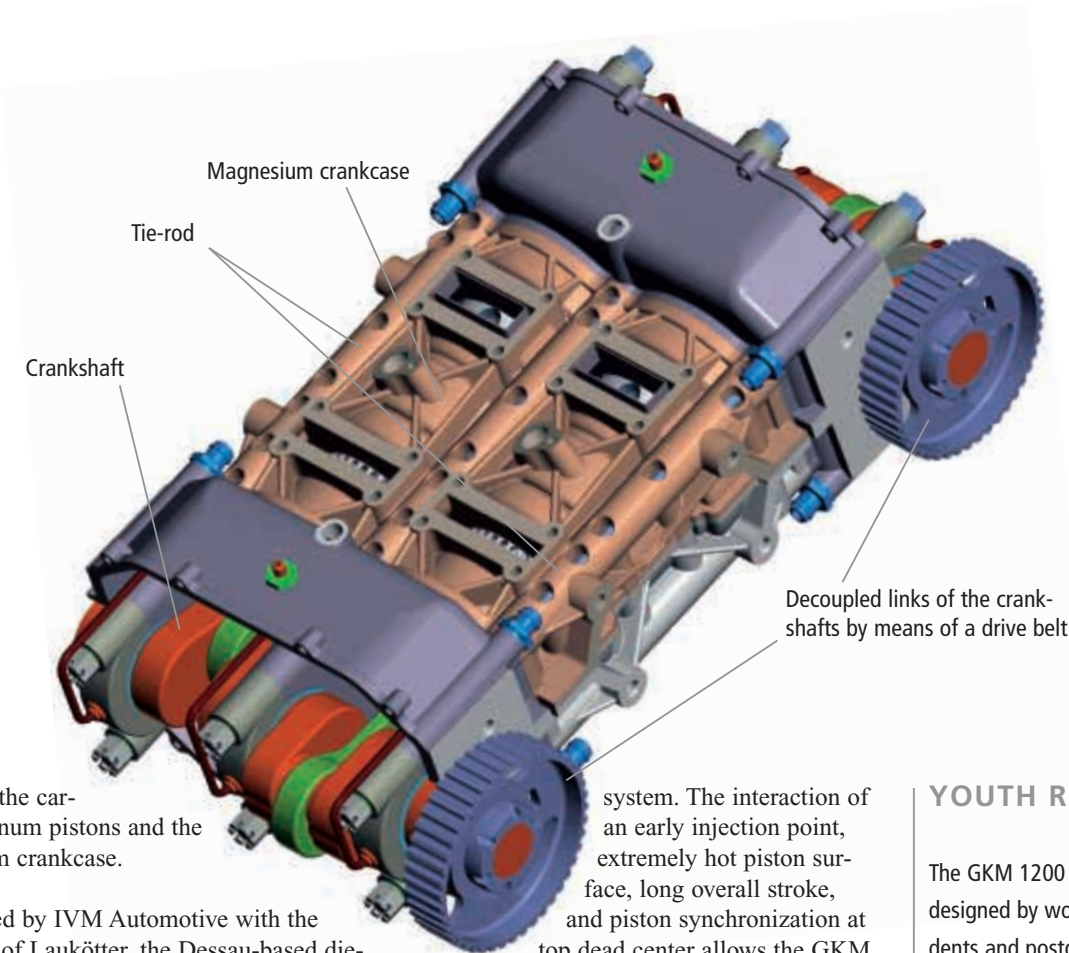
from one liter – at only 3,300 revolutions per minute. Owing to its simple design, consisting of relatively few parts, it also had a unit mass of 309 grams per horsepower and consumed just 155 grams of fuel per horsepower – advantages that still speak in favor of the opposed-piston principle today. However, it had one serious drawback: a high rate of wear of the exhaust-side pistons, which necessitated short replacement intervals in the old aircraft engines and which renders the principle unsuitable for present-day car engines, precisely because of the high demands on their longevity. This is not to even mention the high pollutant emissions.

## JUNKERS REVISITED

Notwithstanding, in the late 1990s, IVM Automotive took up the idea again and improved it using the tools and knowledge of the present, to produce a one-cylinder engine which impressed the engineering world at the 2002 Aachen Colloquium. Together with Diesel-Air, the aircraft engine specialists from Dessau (Junkers' hometown), IVM Automotive succeeded in completely overcoming the weaknesses of the old opposed-piston engine using advanced development, manufacturing and materials technology. In the meantime two two-cylinder working prototypes have been built of the so-called GKM 1200: each displaces about 1,200 cubic centimeters and develops 70 kW output with 250 Newton meters torque (illustration). The distinctive and decisive features of these joint develop-







ments are the carbon-aluminum pistons and the magnesium crankcase.

■ Designed by IVM Automotive with the assistance of Laukötter, the Dessau-based die-casting specialist, and Diesel-Air, the crankcase consists of a magnesium alloy. Its manufacture by a die-casting process, and applying special design guidelines for magnesium, results in extremely low weight and low costs compared with aluminum die-casts. At present, Laukötter is producing the tools required to build the crankcase.

■ The carbon-aluminum piston developed by Diesel-Air also features a very low specific weight. Its biggest advantage, however, is its tremendously long service life even at extreme temperatures of over 1,000 degrees Celsius. Moreover, with the carbon piston the HCCI combustion principle – currently a subject of much discussion in the engineering world – can be implemented in the opposed-piston engine: owing to homogeneous blending and subsequent simultaneous ignition of the air/fuel mixture, it promises even higher overall efficiency. Initial operational tests with the prototypes have corroborated the theoretically computed figures.

■ IVM Automotive and Diesel-Air oppose the injection pressures presently used in diesel engines, which reach 2,000 bar and more, with a low-pressure, 120 to 200 bar injection

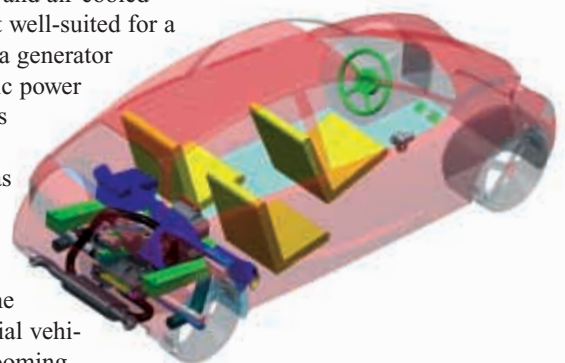
system. The interaction of an early injection point, extremely hot piston surface, long overall stroke, and piston synchronization at top dead center allows the GKM 1200 to achieve high efficiency combined with low pollutant emissions.

### MANY OPTIONS

By now the two-cylinder engine has been almost completely integrated into a virtual lightweight vehicle (LWP) designed by IVM Automotive and Hamburg Technical College (illustration). Still, the development partners are far from satisfied: the engine should also be a multi-fuel unit capable of running on vegetable oils or gasoline, with compressor, oil-free and in water-cooled and air-cooled variants. This would make it well-suited for a great many applications: as a generator set engine to produce electric power and heat (promising contacts with an electricity producer have already been forged), as an aircraft engine for lightweight planes, as an outboard motor for boats, and last but not least as an engine for small cars and commercial vehicles – particularly for the booming Asian market. The first contacts have been established with China. If they result in series production, Junkers will in the end have flown farther than his planes. *Tom Sauerzapf* ■

### YOUTH RESEARCH

The GKM 1200 (above), largely designed by work study students and postgraduates, is with its target weight of 72 kg and a torque of 250 Nm perfectly suited to power a lightweight vehicle such as the one designed by IVM Automotive and Hamburg Technical College (below).



# Hiding sliding door



**NEW KIND OF SLIDING DOOR MECHANISM** Note how unnoticeably the sliding door opens – smoothly, almost noiselessly, giving no indication from the outside of being a sliding door until it opens. A fully functional prototype of the new Edscha system promises new freedoms for car designers and drivers.

A conventional sliding door is really more of a “push door” – it takes strong arms to get it moving; it often can be heard streets away as it slides heavily and slams shut, and its guide rail along the fender is the first thing that draws dirt, rust and design criticisms. For these reasons, the sliding door has gained acceptance to date mainly in commercially used vans and their derivatives aimed at large families.

And yet the sliding door has potentially enormous advantages for the users of purebred cars too, from compacts to luxury limousines: it provides the easiest way of getting into a car – even in the tightest parking spaces. In pursuit of new customer benefits, more and more carmakers are thus seeking solutions to the image problems that the sliding door suffers from. And an entirely new solution is now offered to them by Edscha.

## WENT CLICK

At this point the catch pin has received the passive roller carrier. The door is now securely guided to the end of the opening travel distance.



## PRESENTABLY INVISIBLE

“Our system will open all doors wide to the slide concept.” Klaus Ruigrok van de Werve, Product Manager Sliding Doors in the Hinge Systems Division and co-inventor of the concept, is convinced of that. In spring 2001, Ruigrok (at the time still with invenio, the engineering service providers) and his team began experimenting with telescoping rails, pantographs and swiveling arms: “I just couldn’t see why we shouldn’t succeed in eliminating the drawbacks of the sliding door.” The solution they found is as simple as it is ingenious (see box on right) – and

already patented. As it features a whole range of advantages over conventional systems, there’s only enough space here to name the most important ones:

- With the Edscha system, vehicle design is no longer subject to the limitations resulting from external guide rails. The sole externally visible indication of the door technology is a round button in the fender, about the size of a parking sensor.

- The width of the door opening is no longer limited by overall vehicle length; previously this criterion ruled out the use of sliding doors in vehicles with a short overhang. With the Edscha system, the door now can be opened across its entire width – even beyond the rear end of the vehicle if desired.

- As the guide rail lies entirely within the vehicle, and moreover can be made to run straight, the system is appreciably more resistant to wear, has much closer tolerances and is thus sturdier than conventional sliding doors. A double door seal is now also possible.

- Technical details additionally enhance comfort: a spring assembly, for example, saves the user a great deal of effort opening the door.

- Not least of all, the concept has significant advantages also for production. Although the production sliding door à la Edscha would cost roughly the same as conventional systems, it still means good money to the OEM: as the number of subassemblies declines, bodysell complexity also is appreciably reduced.



## AND HERE'S HOW THE EDSCHA SLIDING DOOR WORKS:

- On the C pillar there is a deflecting support with a spring actuator. On the inside of the door, at the same height, there is a guide rail hidden by a blind. It is connected to the deflecting support via a roller carrier. Behind this roller carrier there is a second roller carrier parked at the end of the door.

- When the door is opened, the deflecting support swings out, the door lifts out and over the support, parallel to the body, and is pushed over the first roller carrier towards the rear.

- The swinging out of the deflecting support has simultaneously caused a control rod to trigger a catch pin; the pin jumps about 60 mm out of the fender and is now ready to receive the passive roller carrier.

- When the door – and with it the parked roller carrier – reaches the catch pin, the roller carrier engages the pin. From half the length of its opening travel, the door is therefore securely guided over the second roller carrier until the entire width of the door opening is exposed.

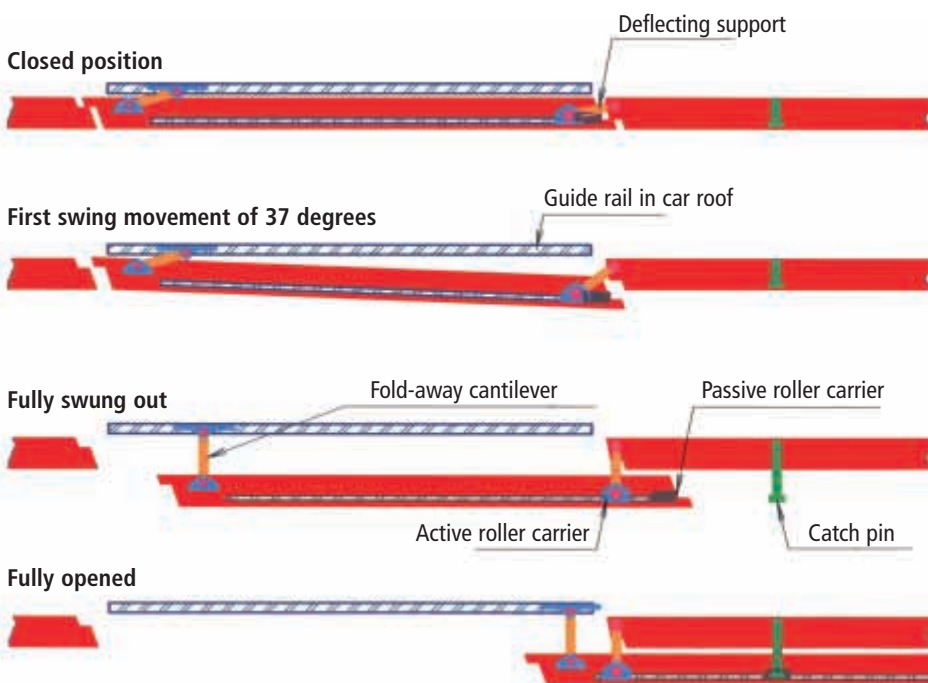
## MORE RAIL TRAFFIC

Around 4,000 hours were invested in engineering and model making to complete the first fully functional prototype based on a Mercedes-Benz Vaneo. Since the beginning of 2003, Ruigrok and his colleagues have been calling on the development departments of the OEM with it – and meeting with keen interest. They are already developing made-to-order concepts on

behalf of customers. Practically as a sideline, hobby sculptor Ruigrok also is tinkering with an electric drive for the system, and with his latest vision: sliding doors for driver and rear passengers that open in opposite directions. With no B pillar, they would open up the entire side of the passenger compartment – the ultimate in accessibility. The first concept sketches are already awaiting his attention.

*Christiane Nadol* ■

## PRINCIPLE DIAGRAM OF SLIDING DOOR\*



\*further developed version with straight guide rail

# Design from Germany

**IVM AUTOMOTIVE DESIGN CENTER** “Made in Germany” stands for precision and reliability, for mechanical engineering and metal machining, but not for innovative automotive design studios. Terry Wolkind and his team at the IVM Automotive Design Center are out to change that.



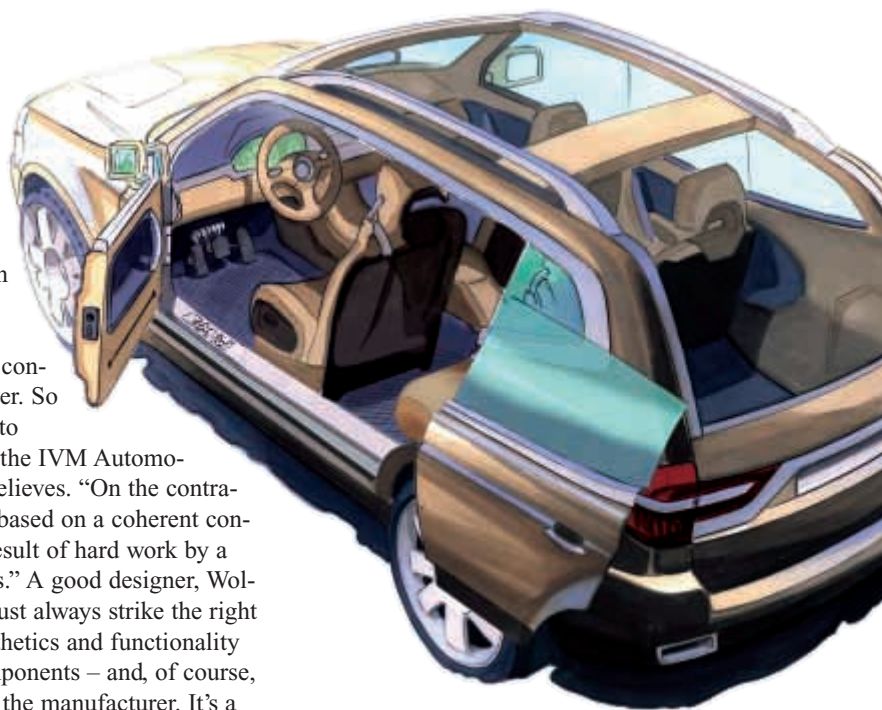
## VITA

### Terry Wolkind (55)

The mobile Briton has always been one to look beyond his own island and his own nose. After studying to become a body design engineer in England, he worked, among others, as a designer at Ford and GM in the USA; for an independent design studio in England; and at Porsche, BMW and Opel in Germany. He has been head of the Design Center at IVM Automotive in Rüsselsheim since 1998.

**T**erry Wolkind doesn't rely on luck in his work. “A vehicle has about ten seconds to convince a potential buyer. So nothing must be left to chance,” the head of the IVM Automotive Design Center believes. “On the contrary: design quality is based on a coherent concept, and that's the result of hard work by a team of professionals.” A good designer, Wolkind is convinced, must always strike the right balance between aesthetics and functionality in cars and their components – and, of course, their profitability for the manufacturer. It's a challenge that still appeals to the 55-year-old Briton's sense of adventure even after almost 40 years in the motor vehicle business. Not only new technologies, but also the zeitgeist always provide him fresh stimuli: “The retro look, for example, would hardly have met with demand in the market a few years ago. But now some manufacturers are enjoying great success with it. That shows they're on the right track.”

Wolkind and his team also have demonstrated their good nose in the past six years. Only set up as a separate unit in Rüsselsheim in 1998, IVM Automotive was soon involved in the development of the design concept of the Opel Speedster – a concept that was very important for the brand. In close cooperation



with Opel, IVM Automotive built first design models that led to show cars presented at the Geneva, Frankfurt and Detroit motor shows. Under Wolkind, designs for a number of concept studies on behalf of other OEM also have been produced; numerous pictures testifying to this activity adorn the walls of the studio.

### FROM SKETCH TO SHOW CAR

The Design Center skills have been steadily enhanced by Wolkind since 1998: “Today, we offer our customers the entire design portfolio – from first concept sketches to drivable show cars.” He has done particularly well with the



latter in the most recent past: besides show cars for Hyundai (incl. Hyundai Clix, Frankfurt International Motor Show 2001) and Mazda (Mazda 6 MPS Concept, Paris Motor Show 2002), his last outstanding effort was the design of the 'Luminus' shown on the Edscha / IVM Automotive stand at the 2003 Geneva Motor Show. Luminus, based on a modified Mercedes-Benz A-Class, demonstrated the comprehensive skills of the designers and engineers of IVM Automotive. They equipped the vehicle with a panorama roof measuring just about 1.5 square meters, thus glazing it almost over its entire length and width; the roof slides along the roof rails. They furnished the Luminus interior with two independently operating roller blinds and high-grade leather appointments; and on a projection screen they presented further (virtual) innovative ideas for roofs, doors and lids. "For the 2003 Frankfurt Motor Show we again have built a show car for a customer, but we can't talk about it as yet. And we're engaged in concrete talks for the 2004 Geneva Motor Show", Wolkind disclosed after persistent inquiry.

A lover of Cuban cigars, he is assisted by a 44-strong team of university-educated designers, clay modellers and Alias modellers, studio engineers and model makers. They demonstrate creativity, professional competence and a feel for shape and configuration

day in, day out – sketching exteriors, interiors and color & trim concepts, making clay models by hand, performing digital design with Alias, and finally producing models from electronic data records with milling cutters. "At the end of the digital process chain, we also offer our customers the possibility of viewing design concepts in a 3D virtual display", Wolkind explained. This enables designers to assess a vehicle in all its dimensions, colors and variants in an early concept phase.

#### DESIGN OF THE FUTURE

Because he is not a man to bank on getting lucky, the chief designer pursues a clear vision: "In future we intend to increasingly realize design studies of our own, which we then present to our international customers." IVM Automotive already possesses the prerequisites to do so, Wolkind is sure – good ideas in particular: "We have creativity in abundance. And that is vital in a market as competitive as ours."

So far, however, most industry observers still associate creativity much rather with the independent design studios in Italy. "We're just as good", says Wolkind: "We just lack the history, which is why, with many customers, we've only been able to make a name for ourselves so far as technical designers. But we're going to change that."

*Christina Kaulhausen* ■

#### A CAR IN FOUR ACTS

Design sketch, clay model, 3D image – this is how first ideas turn into a new car at IVM Automotive. Before it makes its first appearance, for example as a show car, it's not only ideas and machine tools that are buzzing: professional work to tight schedules is essential.





# For the next generation

**NOTCH STOP** In October 2003, Edscha's latest hinge generation will go into production. A highly sensitive steel colossus weighing 150 tons has been especially designed to produce it.

**W**hen the first owners of the new Smart Forfour proudly open the doors to their cars in the spring of 2004, they will hardly guess how much effort was needed to make this possible: three years of development time for the hinge and another 20 months for the equipment on which it is produced.

## INVESTMENT IN THE FUTURE

At Hauzenberg in the Bavarian Forest, a 30 kilometer drive from Passau, Edscha invested in the summer of 2003 about three million

euros in a specially designed production facility for the Notch Stop, the group's latest integrated hinge generation. This hinge not only affords more comfort to drivers, but also distinct advantages to carmakers during assembly (pages 10f.). As of the coming year, the Notch Stop – three million copies of it annually – will also be opening doors and locking them in position in five other vehicles in addition to the Smart Forfour.

To enable each Notch Stop to perform its task perfectly, hinge production must attain both a high level of precision and, if produc-

tion is to pay off for Edscha, a level of flexibility to match. This is why the Remscheid production and process planners, in collaboration with a special-purpose machinery maker, devoted as much love of detail to the development of the new machining equipment as the hinge designers did to the hinge.

### UNTIHING OPERATION

Featuring pallet systems, short tooling times and flexibly usable machining stations, this is the most complex modular CNC machine (out of many others) ever to be ordered by the Edscha Group – and the biggest to boot. Its sheer size – 27 meters long, eight meters wide and four meters high – called for delicate maneuvering when it was delivered in June: with the aid of huge cranes and compressors, the colossus was bedded on an air cushion, about one millimeter thick, in front of the Hauzenberg production hall, and then floated on that cushion with great precision to its destination. Eight employees of the machinery making company then spent about five weeks setting up and testing the highly sensitive equipment.

Large-scale operation of the facility is scheduled to begin in October: in 18 machi-

ning steps and across 28 CNC axes, it will simultaneously machine raw forgings, two for the left, two for the right (provided only with punched screw holes), into Notch Stop pillar or door parts. Every single step on these very latest carbide cutting tools – starting with milling, continuing with drilling, countersinking, reaming, and ending with thread cutting and deburring – takes only eleven seconds, including transport and adjustment; one part therefore takes about three-and-a-half minutes to pass through all stations. Then the finish-machined parts have to be galvanized, paired with their counterparts and assembled on two equally modern and newly acquired assembly lines – four Notch Stop hinges are then complete.

The young generation is growing quickly: in Hauzenberg it will soon be possible to machine eight parts simultaneously. In order to cover the highest capacities for all vehicle series already on order, another identical machine has already been ordered. Properly treated and maintained, both have a life expectancy of over ten years. But the next-but-one hinge generation is sure to be on the horizon by then.

*Rafael Zelek* ■

### COLOSSUS ON CUSHION

Delivery and assembly of the new metal-cutting system required the greatest care to ensure that roads, bridges, buildings and the machine itself were not damaged.



# Safe without roof



**CONVERTIBLE DEVELOPMENT** When its sheet metal roof is removed, a vehicle loses around three-quarters of its stability. Thanks to Technical Calculation, IVM Automotive puts the stiffness back into the convertible and cuts weight and development time at the same time.

**W**hen was the last time you got exasperated by an attempt to stow your collected odds and ends in an open shoe box and carry it around with you? With its lid on it was relatively stiff. But now, without the lid, it gets distorted and misshaped, and it doesn't give your treasures much support.

A similar thing happens when a coupé loses its sheet metal roof. Both the flexural strength and the torsion stiffness of the body drop to around a quarter of the values for the coupé – with drastic consequences for driving dynamics, driving comfort and occupant safety.

No convertible owner fancies being trapped in his vehicle just because one wheel is up on the sidewalk, thus distorting the body and jamming the door – whatever the joys of fresh air. And he'd probably be even less happy if the forces of a frontal impact, instead of being transmitted into the vehicle structure via the roof, caused the A pillar to come alarmingly close to his head.

A major challenge for the bodywork experts at IVM Automotive, who are being commissioned more and more often with the body development of vehicle derivatives like convertibles: they have to compensate for the lack of support from a roof, yet without substantially increasing the weight of the vehicle or the manufacturing costs. This means that a standard target figure of about 20 percent additional stiffness-enhancing mass relative to the closed vehicle is not exceeded; and also that as many parts as possible from the original series-produced vehicle can be used without

modification. The development time too should of course be kept as short as possible.

This is why the bodywork development process at IVM Automotive is now determined by the Technical Calculation department. It's only under their guidance that the heavy demands placed on static and dynamic stiffness and crash safety can be satisfied with a short development time and with safe designs in which problems don't go undetected until the testing stage. The Technical Calculation people first conduct simple potential studies to pinpoint quickly and easily the areas in the original body that need optimization. Then the design team analyses the package and the feasibility of these approaches. In detailed calculations, the precise measures necessary to achieve the target values are then ascertained. An essential condition for this new method: powerful computer hardware.

The designers too benefit from this approach; whereas in the past their concept proposals could not be evaluated until much later on in the process, nowadays this is often possible after just hours on the basis of the computation results. Corrections and optimizations can be incorporated very quickly into the development work. A gain for everyone, and particularly for the OEM: this method gives him a few more months of time-to-market.

And there's another competitive advantage of convertible design by IVM Automotive: cooperation with the Convertible Roof Systems division. The Edscha Group can optimize both the body and the roof system at the same time and at the same place – and in this way offer convertible derivatives as turnkey projects.

*Jürgen Gumpinger, Dr. Gunther Wisinger* ■

## FROM COUPÉ TO CONVERTIBLE

We don't know which team of vehicle developers transformed the Audi TT coupé into a roadster. What we do know, however, is how much know-how and effort it takes to optimize a topless derivative in terms of static and dynamic stiffness and crash safety. At IVM Automotive, this bodywork development process is based on modern simulation techniques.

By the way: at least the soft top of the Audi TT roadster is made by Edscha.





DRIVE-IN MOVIE THEATERS

# A cult for 70 years

It all started with a Kodak projector and a bedsheet hung between trees in a backyard: Richard Holingshead had to experiment for some time before his idea was at last put into practice. The big day was the 6th of June 1933: the first drive-in movie theater opened in New Jersey. The heyday of these open-air cinemas was in the 1950s, and the main factor behind the success of this inexpensive pastime was doubtless the cult of the car prevalent in those years.

Sadly, there are fewer and fewer of these outdoor facilities today. Because even now, watching movies under the stars is a fascinating experience – and not just for the nostalgic. Europe’s first drive-in was, incidentally, built in Germany, and is still operating today. It was opened in 1960 in Gravenbruch near Frankfurt.

**i** For a listing of all open-air cinemas in Germany visit: [www.openairkinos.de](http://www.openairkinos.de)



ELEVATORS

# Reaching for the sky

Long before there were cars, mankind was working continuously to improve its mobility, and ingenious inventors were already familiar with the idea of conveying passengers in the vertical plane. As early as 1743, Louis XV of France enjoyed the luxury of using the first elevator – albeit a muscle-powered one. But the breakthrough for the elevator came exactly 150 years ago: Elisha Graves Otis invented the safety



elevator in America. His engineering feat consisted of a clamp on the elevator that expanded into the guide rail running along the platform in the event of a cable break. This invention is still used today in a similar form. Elevators from the Otis Elevator Corporation are today used in around 1.4 million buildings, including ten of the twenty highest skyscrapers in the world.

# TIPS

**CAUTION: WILD ANIMALS CROSSING**

Automobile engineering is highly developed, and the design departments of both manufacturers and sub-suppliers are working unceasingly to make vehicles even safer. Still, there are some dangerous situations that can never be completely prevented. For example, accidents involving wildlife are particularly frequent between autumn and spring. The sad tally for Germany’s roads: more than 50 people are killed every year in accidents with wild animals, and about 2,500 others are severely injured. 600,000 wild animals are killed. The material damage amounts to around € 350 million, and rising.

**Here’s how you can minimize the accident risk:**

- Slow down when you see a “wild animals crossing” road sign
- Keep away from the right-hand edge of the road
- Caution: an animal is rarely on its own
- Only use your brakes when there’s no risk of being hit by a vehicle coming from behind
- Animals on the road: apply brakes, use horn and dip headlights
- On no account swerve to avoid the animal if there is any risk of hitting a tree, landing in a ditch or endangering oncoming traffic

**If you do have an accident:**

- Immediately make the accident area safe (warning triangle) and notify the police
- On no account touch the animal, as it might harbor diseases (for example rabies) or inflict severe injury

Correct procedures at the accident site are also necessary to claim from the insurance companies. Important: if your vehicle has not hit a wild animal but been damaged after swerving around to avoid it, you can claim the cost of repair against your insurance company with reference to ‘rescue costs’. Incidentally: taking away the injured or dead animal is illegal and is deemed as poaching.

# A journey back in time

**CAR MUSEUMS** Artistically forged steel, gleaming chrome and fascinating forms. Veteran and vintage cars exude a magical charm and also provide exciting history lessons.

## OLDTIMER-TOUR

Just over 15 years ago, the Association of German Car, Motoring and Technical Museums began to draw up a directory of all the vehicle museums in Germany. This work resulted in the "German Museum Route" scheme; all the known museums can be found along it. The plan shows how to get from one classic car museum to the next – subdivided by region and individual segment.

**Contact:** Verband der deutschen Museen für Auto, Motor und Technik e.V.  
branch office at the Automuseum Rosso Bianco:  
Obernauer Strasse 125  
63743 Aschaffenburg, Germany  
Telephone: +49. 6021.21358  
Telefax: +49. 6021.20636  
Internet: [www.deutsche-museumsstrasse.de](http://www.deutsche-museumsstrasse.de)

**A**ffection for them has grown over more than 100 years. Ever since Carl Benz patented his motor carriage back in 1886, and Gottlieb Daimler and Wilhelm Maybach took their first jaunts with a gasoline-driven coach, a unique relationship has evolved between the driver and his vehicle, and in that the car differs from every other technical object. And if the car is the German's first love, classic models are even more special and fascinating. Whether it's nostalgia, admiration for the pioneering spirit of the first carmakers, or simply the aesthetic appeal of the product – there are many reasons why the sight of historic vehicles sets the pulse of most people racing.

## HISTORICAL COLLECTIONS

To preserve these witnesses to our mobile past, more than 150 car museums have been created in Germany. Many are private collections, devotedly put together by their owners. Almost all these collections are worth a visit, and it's not always the biggest that are the best. The "Deutsches Museum" in Munich has only around 50 vehicles, but these were

key influences on the industry – from the Adler Vis-à-Vis from 1901 to the Wanderer "Puppchen" of 1913.

The collections of the major car manufacturers are perhaps somewhat one-sided, but very comprehensive. BMW, Mercedes, Opel and VW all present their own automobile history without any gaps. Audi aims to provide a very special history lesson: on the former premises of the Horch plant in Zwickau, the Ingolstadt-based company is building a museum that will document the car-making tradition of the region. Next year will see both its inauguration and an anniversary celebration. On the 10th of May 1904, August Horch moved the site of his company to Zwickau to found August Horch & Cie Motoren-Werke. In 1909, after falling out with his business partners, he founded a new company in Zwickau. The new company bore his name translated into Latin: Audi.

Whether it's a small private collection or a factory-organized exhibition, the German car museums have something for every taste. For example, the Motor Sport Museum at the Hockenheimring ([www.hockenheimring.de](http://www.hockenheimring.de))





offers not only an extensive collection of classic vehicles and modern racers, but also a realistic race simulator and a multimedia show in a separate cinema. The largest and also one of the most important collections of sports cars in the world is in the Automuseum Rosso-Bianco near Aschaffenburg ([www.rosso-bianco.de](http://www.rosso-bianco.de)): the vehicles exhibited come from over 50 manufacturers in all.

### NOT JUST FOR THE PURISTS

The Dortmund Automobile Museum Dortmund ([www.oldiemuseum.de](http://www.oldiemuseum.de)) is particularly proud of its collection of celebrity-owned vehicles, including the Jaguar MK V B of oil magnate Rockefeller and the Jaguar MK I of Heinz Rühmann, the German film star. More than 200 veteran and vintage cars can be admired in the museum of Fritz B. Busch, housing one of the biggest private collections ([www.automuseum-busch.de](http://www.automuseum-busch.de)). Among its prized exhibits is the original Cadillac of Hans Albers, another well-known German film star.

A project that's probably unique in Germany was implemented in May of this year in Berlin. In Moabit, in what was Europe's big-

gest streetcar depot 100 years ago, is the "Meilenwerk" – a mecca for all lovers of classic cars ([www.meilenwerk.de](http://www.meilenwerk.de)). They'll find everything they need to make them happy on an area 16,000 square meters in size: low-cost parking spaces, workshops for restoration, maintenance, upholstery work and electronics, dealing and rental of vintage and veteran cars, technical inspection service, shops for accessories, a bookshop for car literature, club/conference rooms, special event areas and restaurant/bar. To ensure that not only the owners but also visitors are lured into the hall, the initiators have designed the "Forum for Driving Culture" to be as transparent as possible, the aim being to make it a center for experience. The 90 parking spaces therefore comprise glass boxes that permit study from every angle. Unlike in a museum, visitors do not pay an entry fee here. The same applies for the workshops too: the restoration work by the specialists can be watched closely through large windows. This makes the "Meilenwerk" almost like a township for classic cars – not just for the purists.

*Michael Drost* ■

### A PLETHORA OF PLATES

There is even a museum dedicated to license plates. The international museum for license plates, traffic and registration history ([www.nummernschildmuseum.de](http://www.nummernschildmuseum.de)) shows the history and the development of license plates. In addition to historic license plates and documents from Germany, from 1890 to the present day, license plates from more than 170 other countries and territories are on display.

Incidentally: since 1997, the fans of classic cars have enjoyed tax privileges if they choose historic license plates. A license plate of this type requires that the car is at least 30 years old and that the vehicle is used first and foremost for the preservation of our engineering heritage. A prior inspection by the TÜV or Dekra inspection organizations is necessary.





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