Japanese Carmakers Still Lead

Every year, The Hansen Report turns to Consumer Reports' Annual Car Reliability Survey to see how the world's carmakers compare with each other in the reliability of their electrical and electronics content and features. Japanese carmakers took the top two spots in each of the categories we examined: electrical, power equipment and audio. General Motors scored lowest in electrical and power equipment; Mercedes was last in audio.

In power equipment, Ford ranked number three, right behind Honda and Toyota.

In power equipment, Mercedes was last in audio. General Motors scored lowest in electrical and power equipment and audio. General Motors was lowest in the audio category. In power equipment, Ford ranked number three, right behind Honda and Toyota.

General Motors’ last place result in the audio category is influenced by the much worse than average problem numbers. Likewise, M ercedes' last place finish in audio was influenced by the much worse than average problem numbers. Honda and Toyota.

In power equipment; Mercedes was last in audio. General Motors scored lowest in electrical and power equipment and audio. General Motors was lowest in the audio category. In power equipment, Ford ranked number three, right behind Honda and Toyota.

TomTom Engages Embedded Navigation Market

Targets Low- to Mid-Range Vehicle Market

A ready crowded with more competitors than it needs, the OE market for navigation systems may soon have to make room for another major player: TomTom, the number-one portable navigation device maker in Europe and number-two in the United States. "The navigation market began with embedded systems, and that market has been growing slowly and steadily," explained Rik van Aken, marketing director for TomTom’s automotive OEM business unit. "Then portable navigation devices came along and the market exploded, and we had a big part in that. But there is no reason to believe the embedded market can’t explode as well.”

TomTom has already won 50% of the European PND market and has nearly 30% of the U. S. market, according to the company. In 2007 TomTom sales were 1.7 billion euros with net margin of 18.2%.

"Right now navigation is being offered as a niche product for high-end cars. We think navigation should be repositioned, and it should be offered as an option, or in a couple of years, as a standard on low-end and mid-range car lines. That’s where we think the market should go, and that’s where we think we can play a role,” declared M. r. van Aken.

"The take rate for navigation in low-to mid-range cars is just 10%,” he continued, "but we think the take rate can be increased to between 30% and 50%.” While acknowledging that TomTom can’t control an OEM’s final price for a navigation option, he believes that higher penetration can be achieved by lowering the retail price for embedded units to no more than 500 euros. With portable devices retailing for about 200 euros, M. r. van Aken is confident that more consumers will find embedded systems an attractive option.

In making claims to the OE market, M. r. van Aken believes that TomTom can demonstrate important advantages compared with the competition. “There are at least two places where we differ from the competition, areas the auto makers are very interested in: One is making updates, not only to the map but also to the navigation unit itself. ... In our consumer PND market, we bring new products, with a new software release and new features to the market each year or half year. We want to bring the concept of the consumer electronics lifecycle—having very quick updates with new features—to the automotive world. The other differentiation is the content and services we offer, starting with HD Traffic.”

TomTom Home

TomTom’s strategy for delivering regular updates to the vehicle uses the Web-based service it calls TomTom Home. "TomTom Home is a combination of a Web shop and self-service Internet portal, where the end user can manage his device, get new software releases, new maps and new content,” said M. r. van Aken.

TomTom is offering to help carmakers develop their own portals, which TomTom would co-brand. A s of March 2007, TomTom Home had one million registered users; by the end of 2007 the number of users had climbed to 3.5 million.

End users download software from TomTom Home to a PC or laptop and install it on their navigation devices in different ways, depending on the type of device. “If you have a portable product, you can bring the PND to the computer,” said M. r. van Aken. “If it's an embedded product, you could use either an SD card or USB memory stick.”

Problem Ratings for MY 2007 Vehicle Electrical Systems

The carmaker with the fewest reported problems is at the top of the list.

- Nissan
- Toyota
- Honda
- Mazda
- Chrysler
- BMW
- Ford
- Mercedes
- VW
- Hyundai
- GM

Includes alternator, starter, battery and cables, engine harness, coil, ignition switch, electronic ignition, distributor or rotor failure, spark plugs and wires, sensors or module.
German Automotive Electronics Conference Recommended

I’ll be in Ludwigsburg, Germany, June 17-18 at the 12th International Advances in Automotive Electronics Conference to see what more I can learn from the Germans, who have pioneered much of the electronics technology used in cars worldwide.

One of the things I like about this conference is its intimacy; only about 400 mid- and upper-level managers from carmakers and suppliers are expected at the two-day event. I also like the presentations, most of which are given by VIPs from the German automotive electronics industry with a smattering of presentations from non-Germans. For example, Martin Thoma, general manager of Microsoft’s automotive business unit will give a talk, as will Tsutomo Miki, general manager of Renesas’ automotive business unit.

The conference is chaired by Peter Thoma, Elmos Semiconductor supervisory board member, formerly BMW’s top electrical engineer. I asked Dr. Thoma which of the presentations he was most looking forward to, and he pointed to a session of four presentations entitled “OEM/Supplier Collaboration.”

“Until recently, our German and European industries have been a model of real cooperation, where the carmakers and suppliers were each careful to enable the other. But now we are in a critical situation where everyone is focused on price. The suppliers are pressed and their OEMs have not found the right way to reduce their own costs. There is a lot of overhead within the OEMs. And then we have the problem of engineering competence—where does it reside? In the past it was clear. You knew what capability was with the carmaker, and the supplier handled the rest. But now a lot of engineering is outsourced to companies like Bertrandt, IVM and Volke—there are at least twenty such companies—and that has led to some confusion about who is responsible for what,” explained Dr. Thoma. The “OEM/Supplier Collaboration” session was organized by Willibert Schleuter, Audi’s top electrical engineer, who will make one of the presentations, “Managing Cooperation between OEM’s, Suppliers and Engineering Service Providers.”

Other presentations will cover these themes: Consumer Electronics; E/E—Its Role in Reducing Fuel Consumption; Architecture and Processes; and Hardware and Software.

Simultaneous translation to English is available. For more on the conference please visit www.elektronik-taugung.de or contact the conference manager Marcus Dworak, m.dworak@m-i-c.de. ◆

Reliability...

Continued from page 1

average rating given to the E-class, the carmaker’s second-best selling model.

“Worse than average” in Consumer Reports’ reliability survey means just that—more problems than the average model, but not necessarily “unreliable.” Industrywide, reliability in the categories we studied was consistently high, notably in electrical systems, where quality has improved dramatically over the fifteen years we have been reporting Consumer Reports’ reliability data.

To determine our rankings, we assign a numerical value to Consumer Reports’ relative reliability scores, which the magazine illustrates with red and black filled or partially filled circles, for model year 2007 vehicles. (The vehicles included in the survey were generally less than six months old and had been driven an average of 3,000 miles.) We weight our assigned value with U.S. sales for each model, using sales figures published in Automotive News or provided by the carmakers. The results are displayed graphically below.

### Problem Ratings for MY 2007 Vehicle Power Equipment

<table>
<thead>
<tr>
<th>Carmaker</th>
<th>Problem Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>Honda</td>
<td>1.29</td>
</tr>
<tr>
<td>Toyota</td>
<td>1.57</td>
</tr>
<tr>
<td>Ford</td>
<td>1.73</td>
</tr>
<tr>
<td>Mazda</td>
<td>1.94</td>
</tr>
<tr>
<td>Hyundai</td>
<td>1.99</td>
</tr>
<tr>
<td>Nissan</td>
<td>2.03</td>
</tr>
<tr>
<td>VW</td>
<td>2.42</td>
</tr>
<tr>
<td>Chrysler</td>
<td>2.44</td>
</tr>
<tr>
<td>BMW</td>
<td>2.59</td>
</tr>
<tr>
<td>Mercedes</td>
<td>2.90</td>
</tr>
<tr>
<td>GM</td>
<td>3.52</td>
</tr>
</tbody>
</table>

Includes cruise control, heated or cooled seats, body control module, keyless entry, wiper motor or washer, tire pressure monitor, lights, horn, gauges, 12V power plug, alarm or security system, backup camera/sensors

### Problem Ratings for MY 2007 Vehicle Audio Equipment

<table>
<thead>
<tr>
<th>Carmaker</th>
<th>Problem Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mazda</td>
<td>1.08</td>
</tr>
<tr>
<td>Honda</td>
<td>1.25</td>
</tr>
<tr>
<td>Hyundai</td>
<td>1.36</td>
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<tr>
<td>Toyota</td>
<td>1.47</td>
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<tr>
<td>Nissan</td>
<td>1.52</td>
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<tr>
<td>Chrysler</td>
<td>1.70</td>
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<tr>
<td>Ford</td>
<td>1.76</td>
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<tr>
<td>GM</td>
<td>2.06</td>
</tr>
<tr>
<td>BMW</td>
<td>2.16</td>
</tr>
<tr>
<td>VW</td>
<td>2.32</td>
</tr>
<tr>
<td>Mercedes</td>
<td>3.70</td>
</tr>
</tbody>
</table>

Includes navigation system, radio, speakers, CD or DVD player and changer, cassette player, antenna, satellite radio, video screen, communications system

THE HANSEN REPORT ON AUTOMOTIVE ELECTRONICS

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TomTom...

High Definition (HD) Traffic

A nther way to connect an embedded navigation device to the outside world is by means of a mobile phone chipset installed in the device. HD Traffic, TomTom’s newest mobile service, uses a SIM card and GPRS to provide traffic updates covering all highways and most national roads to TomTom devices every three minutes.

HD Traffic, developed in cooperation with Vodafone, converts transmissions from four million cell phone users throughout the Netherlands into traffic probe data. The floating car technology, which came with TomTom’s 2006 acquisition of Applied Generics, generates road traffic information based on analysis of mobile network usage and cell-switching.

Introduced in the Netherlands in November 2007, HD Traffic will be rolled out in Germany, Switzerland and the United Kingdom later this year and in France in 2009. Subscriptions to the service cost 10 euros per month.

Automotive Business Unit

To support its strategic interests in the OE navigation market, in June 2007 TomTom acquired Siemens VDO’s Eindhoven, Netherlands, development activity, with nearly 90 engineers experienced in the OE automotive infotainment business. The engineering group came to Siemens VDO by way of Mannesmann, which had acquired the Philips Car Systems business. Eindhoven now serves as the base of TomTom’s automotive business unit, formed in the second quarter of 2007.

“In Eindhoven, we take the heart of TomTom’s PND technology, which is updated every six months, and make sure it meets automotive quality standards, has the proper interfaces to the rest of the vehicle, and set up the automotive supply chain,” explained M r. van Aken.

The TomTom automotive business unit has defined four OE product lines:
- Integrated embedded navigation systems
- Detachable portable navigation devices
- PND/vehicle connectivity solutions
- Services

According to M r. van Aken, TomTom is committed to further developing the services part of its business. “We see that as a complete, integrated and holistic experience for the user: navigation plus services. So we are moving more toward the services environment,” he said.

Tele Atlas

TomTom’s offer to buy digital mapmaker Tele Atlas was extended until May 30, 2008, to give the European Union’s antitrust authority time to complete its investigation into whether the merger would have an adverse effect on competition. The latest deadline for a decision from the EU is May 21, 2008. According to IDG News Service, TomTom initially offered 2 billion euros for Tele Atlas in July 2007 but raised its offer to 2.9 billion euros after a rival bid of 2.3 billion euros from PND maker Garmin. Tele Atlas had 308 million euros in sales in 2007 with an 8.1% EBIT margin.

Toyota Yaris

Last fall TomTom announced what it called, “the world’s first embedded portable navigation solution,” which debuted on the Toyota Yaris in Europe. TomTom makes the detachable navigation device for a built-in, multi-source CD/U SB receiver supplied by Fujitsu Ten. Fujitsu Ten is partly owned by Toyota. The product for the Yaris is similar to the TomTom Go device but packaged in a different housing, with different connectors and a touch-screen user interface that can also control the radio. It is being sold in parts of Europe as a dealer-installed option.

M r. van Aken believes TomTom’s experience with Toyota will lead to other OEM deals.

A similar product, the AVN2210p, designed to work in any vehicle with a 2 DIN opening, was launched in the U.S. aftermarket in the spring of 2007. Available through Fujitsu Ten’s Eclipse dealer network, the AVN2210p retails at big-box stores for under $500.

Garmin Eyes OEM Market

Like TomTom, Garmin, the world’s number one portable navigation supplier, is also looking to expand into the automotive OE navigation market with full featured devices whose capabilities rival those of traditional embedded systems. In January 2008 Garmin and Panasonic announced they would collaborate on customized navigation products for automotive OEMs globally. Both companies will continue to pursue independent initiatives as well.

While declining to comment on whether any factory-install business might be in the works, Clint Steiner, senior sales manager for automotive OEM accounts, described Garmin’s role as the navigation software supplier for Ford Works Solution, available on the 2009 Ford F-150 and Super Duty pickup trucks and some commercial vans. Ford Works is a combination in-dash computer, communications and navigation system for contractors.

“We are taking our Garmin Mobile XT, which is a smartphone application based on the Windows Mobile platform, and porting it to Ford’s Microsoft Auto-based head unit,” said M r. Steiner. “It will have onboard maps but also connectivity to our services like traffic information and gas prices. It really is the first true OEM-installed product that just uses Garmin software. We are delivering real-time content through their system, working with our software.”

We asked M r. Steiner why carmakers should buy from a traditionally consumer oriented, portable device supplier like Garmin when the supplier pool is already filled with highly qualified embedded navigation tier ones. “We have our user interface in the brand. People recognize a Garmin unit, they feel safe and secure with it,” he said. “We have the in-house engineering capability to be able to customize a product, and we can deliver so many different platforms, whether it’s an embedded navigation board, a black box, a regular PND or a software solution.” Garmin has supplied the black box navigation element for Kenwood’s in-dash navigation systems for several years.

Turn to Garmin, page 8
With the acquisition of Siemens VDO in December 2007, Continental joined the ranks of the world’s top three suppliers, along with Bosch and Denso. Please refer to the March 2008 Hansen Report for part one of the Continental company profile, which includes a deeper analysis of the Siemens VDO acquisition and what it means for Continental.

This month the profile focuses on Continental’s three automotive divisions: Powertrain, Chassis & Safety, and Interior. Among the new products under development, we take a look at those that Continental believes hold significant potential for future sales.

**Powertrain Division**

*2007 Sales:* 1,177.0 million euros* (including Siemens VDO sales since December 1st)

*R&D:* 12.3% of sales

*Capital Expenditure:* 11.4% of sales

*EBIT Margin:* (6.2%)

*Operating Assets:* 5,686.2 million euros as of December 31, 2007

*ROCE:* (1.3%)

*Employees as of December 31, 2007:* 31,608, of whom 5,000 are engineers

*2008 Sales:* 5.3 billion euros (Hansen Report’s rough estimate)

**Powertrain Division Background**

Most of what is now Continental’s Powertrain division was part of Siemens VDO; division headquarters are in Regensburg, Germany, where Siemens VDO was based. In a restructuring of the Powertrain division announced in late March 2008, Continental combined three business units into one: Gasoline Systems, Diesel Systems and Electronics were merged into the Engine Systems business unit. The main point of the restructuring was to accelerate the unit’s drive to profitability. By 2010 Continental expects the business units acquired from Siemens VDO to deliver the level of operating margins typically seen at Continental, which have been greater than 10% for the past three years.

The Engine Systems business unit and the Powertrain division now report directly to Karl-Tomas Neumann, a member of Continental’s executive board. Until April 2008, the Powertrain division was headed by Dieter Rogge, who recently retired.

The Powertrain division, with its emphasis on technologies that make cars more energy efficient and less polluting, is well positioned to benefit from the rise in fuel prices and increasingly stringent emissions mandates.

According to Continental, the division is the world market leader in fuel supply systems, engine actuators, pressure sensors, transmission and drivetrain controls, and number two in diesel and gasoline injection systems.

**New Products**

- **Turbochargers**
  Continental is working with several carmakers on a new turbocharger, which is set to go into production in the 2010 timeframe. By combining turbochargers with direct injection, carmakers can use smaller, more economical engines without compromising performance, while reducing CO₂ emissions by 15% or more.

We asked Mr. Rogge what will be different about this turbocharger, developed by Siemens VDO, compared with what is already on the market. “The difference is we are using other materials, which makes it lighter and more robust. And that means a longer lifetime,” he noted. “We have developed a range of interacting measures to improve thermodynamics, robustness and costs,” Mr. Rogge added.

The global market for turbochargers is expected to grow dramatically in the next five years. Industry estimates of the global market size vary—from 15 million to 21 million units sold in 2007, and reaching...
The Company Profile Continued

18 million to 30 million units in 2012. Continental will be competing with established turbo suppliers BorgWarner and Honeywell, who dominate the market today. According to J.D. Power and Associates, Honeywell had a 56% share of the market in 2007; BorgWarner had 25%. Daimler recently announced it would expand its own production of turbochargers through a joint venture with IH I of Japan. Bosch and Mahle just established Bosch Mahle Turbo Systems, a joint venture to be based in Stuttgart, Germany.

◆ New Piezo Fuel Injectors

By 2010, Continental will complete the development of its third generation piezo fuel injectors for diesel and gasoline, which could reduce CO₂ emissions by up to 6% compared with the current piezo injectors. The new injectors can cycle on and off faster than their predecessors. Thus far, the division has produced a total of 25 million piezo injectors.

◆ Hybrid Systems

Continental has been shipping power electronics components and starter alternators for mild hybrid systems since 2003 and says it has booked an order for a complete, full-hybrid system that will start shipping in 2009. “Continental previously focused on hybrid components, but since the Siemens VDO acquisition, we have combined our component know-how with their systems know-how,” said Mr. Rogge. Presently 400 engineers are working on hybrid projects at Continental.

In 2006 Volkswagen AG and Continental announced a strategic partnership for the development and supply of power electronics for future hybrid projects. Continental has also been working on hybrid drives in cooperation with ZF.

Continental will begin production of a high-performance lithium-ion battery for hybrid vehicles at the end of 2008 for the Mercedes S 400 BlueHYBRID. It will also supply the DC/DC converter, the link between the hybrid battery and the vehicle’s standard electric system, and the inverter.

Alliances

Among the division’s alliances, Mr. Rogge pointed to two that he feels are valuable to the division: its hybrid partnership with ZF Sachs, and its part ownership of IAV, an engineering joint venture with Volkswagen. Volkswagen owns the majority position. “IAV does work not only for Volkswagen but for other customers and helps us to stay on the right track with our developments,” said Mr. Rogge.

Chassis and Safety Division

2007 Sales: 4,648.6 million euros, including Siemens VDO sales since December 1st.
R&D: 7.5% of sales
Capital Expenditure: 6.0% of sales
Operating Assets: 5,021.5 million euros as of December 31, 2007
ROCE: 11.3%
Employees as of December 31, 2007: 27,809, of whom 4,500 are engineers
2008 Sales: 5.3 billion euros (Hansen Report’s rough estimate)

Chassis and Safety Background

Much of what comprises the Chassis and Safety product line originally came to Continental from its late 1990s acquisition of ITT’s Brake and Chassis business, and its 2001 purchase of Temic, which included Temic’s radar technology. Continental Chassis and Safety claims to be the world market leader in foundation brakes, air springs and airbag electronics, as well as driver assistance systems; and number two in electronic brake systems and brake boosters.

The division’s broad product portfolio today includes, for example, electronic stability control and advanced braking systems, active and passive safety systems and adaptive cruise control. Continental has been working for two years on a development project it calls ContiGuard to integrate active and passive safety, telematics and driver assistance features. Company literature states that ContiGuard’s “safety control module... calculates the likelihood of an accident and initiates appropriate, staged responses that prevent an accident completely or mitigate the effect of an accident."

Ralf Cramer, a mechanical engineer, is president of the Chassis and Safety division and a member of the Automotive Board. The division’s main competition comes from Bosch and Denso.

New Products

◆ Radar Sensor

Among all the new products being readied for production by the division, the new A RS 300 radar sensor is among the most promising in terms of future sales, according to Dr. Cramer. “Our newest radar sensor combines far-range (200 meters) and near-range (one meter) sensing into one sensor. In the past you needed a 24 GHz sensor for short range and a 77 GHz sensor for the long range. Now we do this with just the 77 GHz device by scanning up and down in the vertical axis, at 2 degrees and at 15 degrees.”

The A RS 300 radar sensor, which is expected to find production with a German carmaker this year, will bring down the cost of stop/start ACC “drastically,” Dr. Cramer believes. A further significant price reduction is expected in 2010 or 2011 when the sensor will be implemented not in gallon arsenide as it is today, but in silicon germanium. Increasingly, radar will be combined with camera sensors, which Continental also makes.

◆ Lidar Closing Velocity Sensor

A Continental laser sensor and electronic braking system will be part of the new Volvo XC60 crossover vehicle, which comes to market in the fall of 2008. It automatically applies the brakes if there is a risk of a rear-end collision and the driver either fails to react or reacts too slowly. Fitted level with the inside mirror in the area cleaned by the windshield wiper, the sensor uses three infrared beams to probe the road up to six meters in front of the vehicle. The system is designed to work only at speeds up to 30 km/hour. According to Continental, 75% of accidents recorded by the...
police occur at speeds below 30 km/hour. Volvo claims it is the world’s first
car maker to offer such a system and is ex-
pected to offer it as standard equipment
on all models, eventually.

◆ Electronic Stability Control

As one of the two leading suppliers of
ESC, along with Bosch, Continental ex-
pects to receive a continued boost from
growing worldwide sales of this life-saving
feature. By 2011, ESC installation rates
will reach nearly 100% of N orth A meri-
can vehicles, more than 60% of European
vehicles and more than 40% of Japanese
vehicles, according to Continental. Con-
tinental will soon introduce a new version
of its ESC system that integrates the yaw-
rate and acceleration sensors into the
electronics control unit. That will yield a
15% to 20% cost savings. The next cost-
reduction step will be to integrate the ac-
celeration sensor itself with the yaw rate
sensor.

◆ Wedge Brake

With its acquisition of Siemens VDO, Con-
tinental gets the Wedge Brake devel-
opment program, which for a time occup-
ied 98 Siemens VDO engineers. Unlike
other electromechanical brake actuators,
the Wedge Brake can be operated at 14
volts, because it relies on the mechanical
advantage of the wedge. Siemens VDO
had been aggressively pursuing the tech-
nology with the expectation that it could
have the product ready for a hybrid ve-
cicle application by 2011.

But while Continental will continue to
develop the Wedge Brake, it will do so
less aggressively and wouldn’t introduce
the technology until a few years after
2011. “We definitely want to be the first
company in the world that does electrical
braking,” said Karl-T homas N eumann,
“because in the long run we want to get
rid of hydraulics.”

A s a first step toward that end, Conti-
nental will introduce its Electrohydraulic
Combi brake (EHC), a combination sys-
tem that uses conventional hydraulic
brakes on the front axle, while most of
the braking energy must be applied, and
electric brakes on the rear. The Wedge
Brake will not be used for rear braking, at
least not in the first implementation. In-
stead, an electric-motor-actuated spindle

Electronic Brake Systems
Electronic brake systems, e.g. ABS
and ESC
Control units for motorcycle brakes
ABS for motorcycles
Regenerative brake systems
Software for control functions
Hydraulic valves

Hydraulic Brake Systems
Brake discs
Drum brakes
Brake calipers
Parking brakes
Electric parking brakes
Brake boosters
Tandem master cylinders

Mechanical, electronic and
hydraulic brake assist systems
Brake actuation modules
Brake pressure controllers
Brake hoses
Duo-servo parking brake systems

Sensorics
Inertial sensors for stability and
ESC applications
Sensors for active chassis control
Steering angle and torque sensors
Speed sensors for wheels,
engines and transmissions
Sensors and switches for seat belt
locks and seat position

Passive Safety & ADAS
Airbag units
Hybrid gateways
Precrash sensors
Force sensors
Occupant classification systems
Driver assistance systems
(radar, lidar, camera)

Chassis Components
Steering systems
Suspension systems
Chassis electronics
Electronic components
Windshield and headlight cleaning
systems

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Chassis and Safety Division’s Business Units and Products

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The vast majority of what has become
the Interior division was part of Siemens
VDO so it makes sense that Continental
would choose an up-and-coming Siemens
executive to head that division. The
president of the Interior division is
Helmut M atschi, who was a member of
the board of Siemens VDO. Now at Con-
tinental he is also responsible for VDO
Automotive AG.
Prior to its acquisition of Motorola's automotive division in 2006, Continental made very few products for the interior of the vehicle. Now the largest of Continental's three automotive divisions, Interior has 70 locations worldwide.

The division's strategic goal is “Always On: We keep you better informed with better connections at lower costs.” A company statement, “The division sees itself as an automotive information manager and is out to optimize the flow of information, develop new functionalities to connect the vehicle with the outside world, and present the information in such a way that the driver understands it intuitively.”

Instrumentation

Even though Continental is now the world's largest supplier of instrumentation, Mr. Matschi is expecting its instrumentation product line to generate strong sales growth, not only in passenger car applications but in commercial vehicles as well. “We see two different trends. One is for low-cost instrumentation aimed at affordable cars, and the other is at the high end, where we are seeing strong demand for full-color displays and head-up displays. There we are looking at what can we take from the consumer electronics [industry] and migrate that toward an automotive capable standard.”

Continental expects the market for affordable vehicles (retailing for 10,000 euros or less) to grow dramatically, from about 6.5 million units today in India and China alone to about 11 million per year by 2017. And it is at this segment of the market that Continental is aiming its development of so-called “single tube” gauges. In single tube gauges only the essential information is displayed along with the stepper-motor-powered speedometer. “We are looking at how you can use the human machine interface in the most ergonomic way to present information to the driver while providing the best value for the money,” said M r. M atschi. “With regard to the mid-segment of the instrumentation market, where you have the highest volumes, it is all about manufacturing productivity.”

Microsoft

Continental has decided to base all its future infotainment developments, including portable device connectivity, navigation and entertainment, on the Microsoft Auto software platform. “In the past we developed on open standards our own connectivity software—including portable device connectivity, navigation and entertainment, etc. This took a lot of engineering resources,” said Dr. N. eumann. “Most successful consumer devices already have a Microsoft interface, so we wanted to leap forward by establishing a stable long-term relationship with Microsoft to focus more on our real automotive related development tasks.”

According to current plans, the next new Continental product based on Microsoft software will go into production in 2009.

Continental is already the exclusive supplier of the Ford Sync hardware platform, on which runs the Microsoft A uto platform. Ford Sync users can effortlessly connect almost any portable music player, iPod or not, via a USB 2.0 connector to take advantage of vehicle-mounted switches, displays and the car's speakers.

Stepping off from the Ford Sync platform, which Mr. M atschi says is based mainly on a speech user interface, Continental is presently developing its own Seamless M obile Integration platform, which goes further than Ford Sync to integrate portable devices with the vehicle. “For example, for drivers who are running navigation software on their cell phones, the cell phone displays are just too tiny. We want to migrate that display to the vehicle’s display.”

Continental is also developing a higher level multimedia platform based on Microsoft A uto. “The platform will be capable of 3D navigation with integrated telephone, video, TV, rearview cameras, and a variety of different H M Is such as dual-screen and touch-screen displays. Continental is planning to start production of the new multimedia platform in late 2009 or soon thereafter.”

Microsoft Interface for Continental

Microsoft: Continental is planning to base all its future infotainment developments, including portable device connectivity, navigation and entertainment, on the Microsoft Auto software platform. "In the past we developed on open standards our own connectivity software— including all the necessary device drivers for the mobile phones, etc. This took a lot of engineering resources," said Dr. N. eumann. "Most successful consumer devices already have a Microsoft interface, so we wanted to leap forward by establishing a stable long-term relationship with Microsoft to focus more on our real automotive related development tasks."

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Valeo
2007 Sales: 9,555 million euros
Change from 2006: up 1.3%
2007 Net Profit: 88 million euros, or 0.9% of sales, compared with 1.8% net margin the prior year

The figures above do not include sales from the wiring harness business, which Valeo sold to Leoni Group in December 2007, for 143 million euros. The wiring harness business generated sales of 551 million euros in 2007 and 545 million euros in 2006.

Other transactions in 2007 include the acquisition of Connaught Electronics Ltd. (CEL) in Ireland. CEL's camera technology will be used to enhance Valeo's Park4U parking assist systems. Valeo also created two joint ventures with partners in India. One of the joint ventures will specialize in automotive security systems; the other will make starters and alternators. Valeo also increased its investment in the Japanese lighting manufacturer Ichikoh from 29.4% to 31.6%.

Valeo's chairman and CEO Thierry Morin hopes that additional Valeo content per vehicle, especially high value add systems for park assist, blind spot warning and lane departure warning, will help the company ride out lower OEM production volumes expected in 2008. Valeo anticipates penetration of park assist systems such as its Park4U will reach at least 20% by 2010. According to Mr. Morin, Valeo has "nearly 15" orders for Park4U. Valeo's Sta RS micro-hybrid starter alternator is already used by Citroen and Smart and the company has development contracts with five other customers.

About two-thirds of Valeo's sales come from European customers; Renault-Nissan is the largest. In 2007, sales to the Detroit Three accounted for 22% of Valeo's O E M sales, while 15% of OE sales were to A s i a n carmakers.

Climate control, engine cooling and lighting systems remain Valeo's top three product groups, accounting for 42% of sales.

Leoni AG
2007 Sales: 2,367 million euros
Change from 2006: up 10.9%
2007 Net Income: 86.2 million euros, 3.6% of sales, compared with 3.8% net margin in 2006

Wiring Systems Division 2007 Sales: 986 million euros, up 3.3% from 2006
Wire & Cable Solutions Division 2007 Sales: 1,381 million euro, up 19.7%

Outlook for 2008: Total sales are expected to increase to 3 billion euros.

In 2007, approximately 65% of Leoni's total sales were automotive; the Wiring Systems division is principally focused on the motor vehicle market. Leoni attributes the 3.3% growth in the Wiring Systems’ sales to the growth in complexity of wiring harnesses due to additional electronics content, and to increased business with BM W and Volkswagen and commercial sales outside Germany.

New orders worth one billion euros over the next four years came from Audi, BM W, GM, Mercedes and commercial customers. One new contract engages Leoni in developing and producing wiring systems for a GM global compact car platform. Leoni's manufacturing is located exclusively in low wage countries.

Effective January 2, 2008, was Leoni's largest ever acquisition, the takeover of Valeo's wiring business. Included were development centers and 12 production facilities in Europe and North Africa, making Leoni the leading supplier of wiring systems in Europe, with a 24% share of the market. Following the acquisition, Leoni estimates its volume of business will grow by nearly 60%, bringing sales for the Wiring Systems division to about 1.6 billion euros in 2008. The acquisition, to be known as LWS France, expands Leoni's customer base to include former Valeo customers Renault-Nissan, PSA, Fiat and Seat.

LWS France also will increase Leoni's component business, a product area Leoni has been working to expand. In August, Leoni set up a new Components business unit and has ongoing development work in switches and sensors including an optoelectronic anti-pinch sensor.

According to Leoni's annual report, the company is considering further acquisitions to expand its worldwide business. Today sales outside Europe account for only 28% of sales.◆

Garmin...

In 2007 Garmin began supplying an embedded navigation board for Kenwood's DNX series.

A nother important component Garmin can offer applies to carmakers' and consumers' desire for connectivity with services beyond the vehicle. Garmin invested heavily in server-based technology to build up its mobile phone services business and now sees an opportunity to leverage that back-end technology to deliver content and services to the vehicle.

Garmin's nüvifone, a combination GPS/ cell phone/Web browser, is scheduled to begin shipping in the third quarter of 2008.◆

TRG's Worldwide Navigation Market Forecast by Type

<table>
<thead>
<tr>
<th>(thousands of units)</th>
<th>2008</th>
<th>2012</th>
<th>CAGR</th>
</tr>
</thead>
<tbody>
<tr>
<td>In-Vehicle Navigation</td>
<td>11,852</td>
<td>17,769</td>
<td>10.7%</td>
</tr>
<tr>
<td>Portable Navigation Devices</td>
<td>46,532</td>
<td>82,090</td>
<td>15.3%</td>
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<tr>
<td>Smartphone/PDA w/Navi</td>
<td>20,166</td>
<td>67,933</td>
<td>35.5%</td>
</tr>
<tr>
<td>Cell Phones w/Navi (Off-board)</td>
<td>22,124</td>
<td>114,522</td>
<td>50.8%</td>
</tr>
<tr>
<td>Total Portable Navigation</td>
<td>88,822</td>
<td>264,545</td>
<td>31.4%</td>
</tr>
<tr>
<td>In-Vehicle + Portable</td>
<td>100,674</td>
<td>282,314</td>
<td>29.4%</td>
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