More Motors, Especially Brushless

Brose, Bosch, Infineon, Freescale and IMS Research Weigh In

Ask the experts what’s up with motors these days and the answer in a nutshell is: plenty. First of all, the number of motors used in cars is high and going even higher. According to IMS Research the industry sold $18.5 billion worth of motors for automotive applications in 2011, an average of 25 motors per vehicle. By 2018, the motors market will have grown at 8% per year to $31.7 billion, averaging 29 motors per vehicle. That’s a faster pace than the growth of the overall market for automotive electrical and electronics products.

As features trickle down from high- to lower-priced vehicles, the potential for an increase in the average number of motors is great. According to Brose, a mid-sized European vehicle can have 40 or more motors, a luxury vehicle more than 100. “The power seats alone can have as many as 12 or 14 motors,” said Arnd Herwig, vice president of engineering for Brose North America.

“In Europe each headlamp has a motor for automatic beam leveling,” said Manfred Adams, vice president of global engineering for Brose’s motor drives division.

“Then if you have additional functions like the beam following the curve in the road, you need more motors. And LED headlamps require a cooling fan.”

Udo Wolz, president of Bosch’s electrical drive division, is also witnessing a growing number of motor applications. The trend toward replacing belt-driven power steering with electric motor-powered steering continues apace. Electric power steering is more efficient and more precise. “A comparable trend holds for the dual-clutch shift mechanism and for the torque split transfer case,” said Mr. Wolz. “Motors are also popular with automatic transmission manufacturers looking to drive oil pumps electrically so they can be operated according to the pressure needs actually required.”

Another fast-growing application Mr. Wolz noted is active chassis control systems, namely active roll stabilization (1% to 2% penetration thus far) and rear-wheel steering (less than 1%).

According to Benno Koeppl, a principal engineer with the automotive division of Infineon, motors ranging in current-draw from three to five amps are finding an increasing number of engine applications including throttle control, exhaust gas recirculation, variable geometry intake manifolds, variable valve actuation and variable geometry turbochargers.

Infineon principal engineer Thomas Liebetrat sees more motors in the typical HVAC system. “Most vehicles have from three to five flaps to control the air flow behind the dash. Premium vehicles could have ten flaps or more,” he said.

Brushless Motors for Energy Efficiency and Electrification

Much of the dynamics afoot in the automotive motor industry is the result of broad efforts to make vehicles more effi-
2011 Roundup: JCI, TRW, Valeo

Johnson Controls Inc.

Automotive Experience

FY 2011 Sales: $20,065 million
Change from FY 2010: up 21%
FY 2011 Segment Income: $761 million, or 3.8% of sales. Segment income was up 29% over the prior year.

Outlook for FY 2012: JCI forecasts 6% growth in Automotive Experience sales, driven by higher global production volumes and $1.4 billion in new product launches. Sales in China are expected to increase by 21%, to $4.8 billion (including unconsolidated sales). The company expects segment margin in the range of 5.3% to 5.5%.

Eighty percent of JCI’s (non-battery) automotive revenue comes from the sale of seating products. Interiors accounted for 14% and electronics, just 6%. Of the company’s $4.2 billion, three-year sales backlog, 10% is electronics business. More than half, 51%, of the automotive segment’s sales were in Europe; Asia accounts for 12%; North America, 37%.

Among its primary growth drivers for 2012, JCI cites its focus on developing business in the BRICs countries, especially China.

JCI’s battery business, the Power Solutions segment, increased its 2011 sales 20% over the prior year and increased its segment margin by 21%.

TRW Automotive

2011 Sales: $16,244 million
Change from 2010: up 12.9%
2011 Operating Margin: 7.8% compared with 8.2% in 2010. Higher commodity prices were a factor.

Outlook for 2012: Based on the company’s assumptions regarding global vehicle production and currency exchange rates, sales are expected to remain nearly flat, in the range of $16.0 billion to $16.4 billion. Europe accounted for approximately half of 2011 sales, but TRW anticipates an 8% drop in vehicle production in Europe in 2012.

TRW attributes its healthy sales growth to the rebound in global vehicle production in 2011, favorable currency effects, and greater demand for its active and passive safety products. Sales outside North America and Europe increased 16%, with sales in China alone up 30%.

Volkswagen is TRW’s largest customer, accounting for 21% of 2011 sales; the Detroit Three together account for 35.5%.

Segmenting sales by product division, 61.5% of sales were produced by the Chassis Systems segment; 23.1% by Occupant Safety; Electronics contributed 4.1% and Automotive Components (body controls, engine valves, fasteners and components), 11.3%. The company believes Chassis Systems sales will remain strong given factors such as electronic stability control mandates in the U.S. and Europe, and emissions regulations which promote adoption of fuel saving features such as electric power steering. Mandates in Brazil call for driver and passenger airbags and ABS by 2014.

Valeo

2011 Sales: 10,868 million euros
Change from 2010: up 12.8%
2011 Operating Margin: 6.5% of sales, up slightly from last year’s 6.4% margin

Motors...

continued from page 1

THE HANSEN REPORT ON AUTOMOTIVE ELECTRONICS

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Reliability Ratings from Consumer Reports

Electrical Is No Longer a Weak Spot

The Hansen Report has analyzed Consumer Reports’ Reliability Ratings data for 20 years. When we first looked at the problems that afflicted 1992 model year vehicles, the electrical system was by far the biggest trouble spot. Today, automotive electrical system reliability is vastly improved. Of the 160 MY 2011 models reported on, 136 received the magazine’s highest rating (fewest reported problems) in the electrical category, which includes hybrid batteries and related systems.

While new car reliability is generally solid, in today’s vehicles problems are more likely to show up in the areas Consumer Reports groups together as Power Equipment and Audio. (See below for which parts those categories include.)

Not surprisingly, feature-rich luxury vehicles with complex electronics and software-based infotainment and convenience functions tend to experience more problems than mid- to entry-level cars.

In its Annual Auto Issue published every April, Consumer Reports compares how a particular model stacks up against the average vehicle in 16 potential trouble spots. It assigns a relative reliability score, illustrated with filled or partially filled circles ranging from red, denoting fewer problems compared with other models, to black, for higher problem rates. Because problem rates are generally very low, the “worst” rating, solid black, is not assigned unless the model’s problem rate exceeds 3%. The “best” score, solid red, indicates a problem rate less than 1%. This year’s data is based on problems reported by owners of 1.3 million light vehicles. The 2011 vehicles were generally less than six months old at the time of the survey, and were driven less than 3,000 miles.

To reach our rankings, we assign a numerical value to Consumer Reports’ scores and weight those values with U.S. sales of each model, using sales data from Automotive News, HybridCars.com and the carmakers themselves.

In the graphs below, the best-performing carmaker is at the top of the graph. Where carmakers have identical scores, they are listed alphabetically. ◆

### Problem Ratings for MY 2011 Vehicle
#### Electrical Systems, Power Equipment and Audio Systems

<table>
<thead>
<tr>
<th>Power Equipment</th>
<th>Electrical Systems</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mazda</td>
<td>0.90</td>
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<tr>
<td>Honda</td>
<td>0.90</td>
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<tr>
<td>Nissan</td>
<td>0.90</td>
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<tr>
<td>Toyota</td>
<td>0.91</td>
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<tr>
<td>Ford</td>
<td>0.93</td>
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<tr>
<td>Volkswagen</td>
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<td>GM</td>
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<td>BMW</td>
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<td>Hyundai Kia</td>
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<tr>
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<td>Ford</td>
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<tr>
<td>Mazda</td>
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<td>Toyota</td>
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<td>Honda</td>
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<td>Ford</td>
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<td>Volkswagen</td>
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<tr>
<td>GM</td>
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<tr>
<td>Nissan</td>
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<td>BMW</td>
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<tr>
<td>Chrysler</td>
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<tr>
<td>Mercedes</td>
<td>3.76</td>
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<tr>
<td>Audi</td>
<td>3.88</td>
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</tbody>
</table>

Included are alternator, starter, hybrid battery and related systems, regular battery, battery cables, engine harness, coil, ignition switch, electronic ignition, distributor or rotor, spark plug and wires.

### Audio Systems

<table>
<thead>
<tr>
<th>Audio Systems</th>
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<tbody>
<tr>
<td>Mazda</td>
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<td>Honda</td>
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<td>Subaru</td>
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<td>Chrysler</td>
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<td>Hyundai Kia</td>
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<tr>
<td>Ford</td>
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<tr>
<td>BMW</td>
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<tr>
<td>Mercedes</td>
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</tbody>
</table>

Included are audio systems, entertainment systems, navigation, backup camera/sensors and communications systems.

Motors...

Brushed motors normally have a lifetime of only 5,000 or 6,000 hours. ... Another energy-saving advantage which factors into both continuously running and intermittent applications is that brushless motors are typically 30% lighter than brushed,” said Mr. Wolz.

An additional reason to consider brushless motors is they are quieter, both audibly and electrically, an advantage that makes them more appealing in start-stop, hybrid and electric-vehicle applications.

“In the past, 100% of HVAC motors were brushed,” noted Brose’s Mr. Adams. “But now brushless motors are even penetrated this application. Brushless motors have a long lifetime but what is especially important is their acoustic behavior. With start-stop, when the engine is not running, every motor in the passenger compartment becomes audible. There is no noise coming from a brushless motor.”

Most electric power steering motors, except for very small cars in the Asia region, are already brushless, according to Brose.

Anticipating a significant uptick in the market for brushless motors, Freescale in February announced its new S12 MagniV 16-bit family of mixed-signal microcontrollers. According to a press release, the S12ZVM family, which combines MCU, MOSFET gate drive unit, voltage regulator and LIN physical layer into a single chip solution, is the most highly integrated automotive brushless DC motor control solution on the market.

“We are targeting 200- to 600-watt brushless motor applications including the water pump, fuel pump, engine cooling fan and HVAC blower motors,” said Axel Streicher from Freescale’s automotive segment marketing team.◆
KPIT Cummins Infosystems

**Background**

KPIT Cummins Infosystems is a Pune, India, based IT consulting and product engineering company operating globally. While providing embedded software engineering and design services to automotive customers contributed only slightly more than a quarter of the company’s roughly $205 million annual sales, KPIT has already built a reputation among automotive OEMs and suppliers.

“Even new customers, if they make a quick inquiry about us, quickly learn that we are a company that delivers quality, is extremely flexible and strives very, very hard to add value for our customers,” said Anup Sable, senior executive vice president of KPIT Cummins, and head of the Automotive & Engineering (A&E) Strategic Business Unit. Mr. Sable, who reports to the chairman and group CEO of KPIT Group, and to the CEO of KPIT Cummins, has 12 people reporting to him directly.

KPIT Infosystems was incorporated in 1990. A 2002 merger with Cummins Infotech, the software development arm of Cummins Inc. (Columbus, Indiana), one of the world’s leading producers of diesel engines and related equipment, created KPIT Cummins Infosystems.

Cummins remains KPIT’s largest automotive customer, accounting for 25% of FY 2012 sales, as of the third quarter.

KPIT Cummins initially focused on growing its embedded systems business with seven targeted customers, a multi-industry strategy that proved very successful. By 2005, with increased vehicle safety, emissions and fuel economy regulations coming into play, and with increasingly complex infotainment and communications systems gaining popularity, the...
growing demand for third-party software development services brought KPIT Cummins’ focus to the automotive industry. Today, KPIT claims to be the world’s largest third-party vendor of automotive electronics engineering services. The automotive SBU has been the beneficiary of 81% of KPIT’s intellectual property development investments.

Automotive & Engineering (A&E) SBU

Almost entirely self-sufficient, with more than 2,550 employees, the A&E business unit serves more than 70 active customers. Fifteen of the biggest and most active OEM and tier-one accounts have been designated “Value Customers.” An account manager is assigned to each Value Customer to create a comprehensive engagement plan and to make investments that align KPIT’s competencies with that customer’s specific needs.

KPIT will take on product development assignments in every automotive electronics domain including diagnostics and mechanical design. Increasingly, the company aims to apply its own intellectual property to its solutions. In fiscal 2011, products and IP licenses accounted for 8% of sales, a number that will likely grow modestly. The company has no plans to manufacture what it develops.

While 100% of the Automotive & Engineering SBU’s investments are made on behalf of the automotive market, approximately 5% of the SBU’s sales come from non-automotive customers with whom KPIT has longstanding relationships.

Automotive Practices

KPIT’s automotive business unit is organized into seven practices: powertrain, vehicle networks, body electronics, safety and chassis, infotainment and instrument clusters, diagnostics, and mechanical engineering and design. A practice must have the potential to generate at least $25 million in sales. A practice operates like a small SBU, with the ability to strategize, sell and budget for R&D. The number of practices can vary over time.

◆ Powertrain

Engineers in the powertrain practice, KPIT’s largest, bring more than ten years of experience to engine and transmission control software development, diagnostics and battery management systems for hybrid vehicles.

“Not only do we have experience with traditional powertrains, but we also understand hybrid systems including motors, motor controls and battery management,” said Mr. Sable.

◆ Vehicle Networks

As a member of the Autosar consortium, KPIT has been active in the development of the Autosar standard since 2005. The practice offers Autosar software stacks for version 3.x and 4.x and supports those with engineering services. Most of this practice’s sales come from engineering services.

◆ Body Electronics

KPIT offers product design and engineering services covering the gamut of body electronics hardware and software feature development and testing. KPIT has been providing engineering support for developers of body electronics for more than a decade.

◆ Safety and Chassis

KPIT offers ISO 2662 compliant software solutions for steering, suspension, brakes, airbags and hydraulic controls. It also supports the development of ABS, ESC and other chassis systems.

◆ Infotainment and Instrument Clusters

One of the earliest core members of the Genivi alliance, KPIT has developed a Genivi-compliant infotainment system software platform. Genivi is based on the Linux operating system. The practice also has experience working with µItron, QNX, Windows CE, Android and iOS. It provides end-to-end vision software solutions and, according to KPIT, has developed more than 35 image-processing algorithms.

◆ Diagnostics

The diagnostics practice’s products include ODX (Open Diagnostic Data Exchange) and OTX (Open Test Sequence Exchange format) tools and services to support the tools.

continued on following page
Mr. Sable described the transition underway in terms of moving from the customer’s solution domain to its problem domain: “Our work has been task-based. For example, a client might give us an [instrument] cluster module and ask us to execute his test plan. He already knows what needs to be tested and how to do it. We’re simply part of his solution. But lately we have been more involved with full system projects, more involved with creating the solution.

“For example, we are developing a power steering module for one of our Asian customers. Our responsibility starts from understanding the system requirements and ends with actually developing a prototype vehicle fitted with this module. We are responsible for the ECU, the motor, fitting the motor, changing the steering column as required, everything.”

In another example, KPIT is not only taking on a bigger development role, but it is applying its own hybrid vehicle intellectual property. “We are doing feasibility studies for multiple OEMs to see if our hybrid vehicle solution will work on a given vehicle model. That begins with a CAD analysis of the packaging space and a digital simulation and from there to building an actual vehicle prototype, performance and emissions testing on a chassis dynamometer, and then delivering the prototype to the customer,” Mr. Sable explained.

Leveraging Its Presence in India

KPIT is well positioned to leverage its presence in India in two different ways. One of its competitive advantages is the relatively low price it pays for engineering and management talent in India. Engineers are paid between $5,000 to $23,000 per year; managers from $27,000 to $78,000 per year. Most of the A&E SBU engineers have bachelor’s degrees in mechanical, electrical or electronics engineering, and the company has recently begun recruiting engineers with master’s degrees in specialized fields such as control engineering. Ph.D.s are also being recruited. KPIT provides all newly hired engineering school graduates with a three-month technical training program.

But KPIT’s 2,000-plus India-based employees, primarily engineers, represent the growing Indian middle class in an emerging economy that many carmakers and suppliers have set their sights on. Of all the regions where KPIT is pursuing automotive business, it expects India will grow the fastest. KPIT will serve both Indian customers and its international customers interested in developing products for the Indian market.
KPIT has undertaken numerous market research projects on behalf of its automotive clients who want a better understanding of the Indian consumer. “Over the last few years, we have conducted in-person surveys reaching a total of 40,000 consumers in 20 Indian cities,” said Mr. Sable. “We catch them on the street or in malls. As a result of some of this work, about ten body electronics and infotainment features that we have suggested will go into production in Indian vehicle programs.” KPIT has the ability to survey 3,000 people in a span of about three months.

“One of the things we have learned from this work is to question the perception in the West that India is essentially a low-cost market,” said Mr. Sable. “It isn’t. While a middle-class Indian consumer may favor small cars, he will not choose the lowest price model. He will choose a performance model that is rich with features, a vehicle with more features than a mid-sized or premium sedan would have in the West.”

As part of KPIT’s three-year plan, Mr. Sable aims to capitalize on the company’s Indian roots. “We have been an Indian company with some global presence, but now we want to flip that and move toward becoming a global company that leverages its India presence,” he said. “We are already operating in Europe, the United States and parts of Asia, and we will significantly improve our presence in China.” KPIT is also making significant investments in Korea, and while it has an office in Brazil, it is not yet set up to pursue the automotive market from there.

Revolo Hybrid Technology Ready for Indian Aftermarket

KPIT has developed plug-in, parallel hybrid technology, named Revolo. KPIT’s 50:50 joint venture with Bharat Forge plans to manufacture and sell Revolo kits to convert conventional vehicles to hybrid drives through the Indian aftermarket via a network of certified dealerships.

With 14 patents on the related technologies filed by KPIT, Revolo kits include a three-phase AC induction motor and motor controller, a valve-regulated lead acid battery pack, a battery management system, transmission and mounting hardware. The solution, which includes stop-start, works without any interaction or interference with the existing engine management system. Although lead-acid batteries will be marketed in the Indian aftermarket kits, Revolo will work with other battery technologies, according to KPIT.

Applicable to vehicles with engines ranging in size from 800 cc to 3,000 cc, the Revolo kits are supposed to improve fuel efficiency by 35% while reducing emissions by 30%.

“We have accumulated thousands of kilometers of data from running our parallel, plug-in hybrid-vehicle prototypes on Indian roads,” said Mr. Sable.

In April 2012, the joint venture was to begin installing Revolo kits into 200 vehicles to learn what more needs to be done to ready the technology for India’s aftermarket. Of these 200 kits, 10% to 15% will be fitted with lithium ion batteries. Twenty earlier prototypes have been on the road since the summer of 2011.

The trial will last at least four months, during which time the joint venture will seek government permission to offer the Revolo kits broadly. The kits would retail for between 65,000 and 150,000 rupees ($1,302 to $3,005). Installation is estimated to take from four to six hours.

KPIT has licensed the Revolo technology to the joint venture, Impact Automotive Solutions Pvt. Ltd. Bharat Forge is contributing its manufacturing, assembly and integration expertise. Bharat Forge Ltd., (Pune, India), the flagship company for the $2.4 billion Kalyani Group, is a supplier of forged and machined engine and chassis components. The JV was formed in June 2010.

KPIT Patents

Partial List
- Resource scheduling
- Multicore systems
- Analog circuits for VLSI
- Software migration in processor generations
- Steady state detection
- Battery equalization circuit
- Sensor systems for driver safety
- Hybrid vehicle technology

KPIT Automotive Acquisitions

<table>
<thead>
<tr>
<th>Year</th>
<th>Acquisition</th>
<th>Sales</th>
</tr>
</thead>
<tbody>
<tr>
<td>2010</td>
<td>In2Soft</td>
<td>€3 million</td>
</tr>
<tr>
<td>2008</td>
<td>TVS Harita</td>
<td>$1 million</td>
</tr>
<tr>
<td>2006</td>
<td>CG Smith</td>
<td>$6 million</td>
</tr>
<tr>
<td>2002</td>
<td>Cummins Infotech</td>
<td>$1.5 million</td>
</tr>
</tbody>
</table>

In October 2010, KPIT completed the €3.0 million acquisition of In2Soft GmbH, a 34-person Munich engineering firm specializing in vehicle diagnostics.

The acquisition brought with it the VisualODX vehicle diagnostics tool chain. In2Soft typifies the sort of acquisition that KPIT has in mind for the future. “They brought us close to the German customers we didn’t have access to. Now we have a German presence and a German team that can engage with German customers. We want to replicate this model in multiple areas of the world,” said Mr. Sable.

KPIT is very aggressive in terms of acquisitions. According to Mr. Sable, the company is continually on the lookout for service- or product-oriented businesses with expertise it doesn’t have. KPIT will consider acquiring businesses with values up to $30 million.

According to Mr. Sable, KPIT Cummins’ investment on behalf of Revolo hybrid vehicle technology has spawned “about five” additional projects. Some OEMs are interested in factory fitting their vehicles with Revolo for sale in India. Another project involves equipping a Chinese OEM’s light commercial vehicle for sale in China.

Research

Headed by Vinay Vaidya, formerly of Siemens and Boeing, KPIT’s Center for Research on Engineering Sciences and Technology (CREST) is a 30-person organization within KPIT’s A&E SBU, responsible for developing technology on behalf of client projects, or proactively in areas where KPIT wants to make investments. Areas of interest include vision-based systems, hybrid vehicles, Autosar, multimedia, telematics and value engineering. Research is done both in-house and through engagements with university labs. The A&E SBU has filed 38 patents to date.◆
millon pixel cell that is coming on the market. I’d like to be able to use that sensor with the existing software and hardware interfaces so that integration and validation costs are roughly zero.

“Our let’s take the example of a parking assistance system from a tier one that uses ultrasonic sensors. I would be very interested in finding a lower-cost ultrasonic sensor, say from a Chinese or Korean supplier, but the interfaces have to be the same. ... With standards, suppliers could sell 40 million units per year as opposed to five million and thereby reach a very, very low cost,” he suggested. According to Mr. Barrand, this standardization strategy is already employed in the aircraft industry.

◆ Rare-Earth Price Stabilization

As China has cornered the market and restricted the availability of rare-earth elements such as lanthanum, used in nickel-metal hydride batteries, and neodymium, used in small, lightweight and efficient motors, prices have climbed sharply. “Today the price for these materials is not stable, and it is difficult to predict what the price will be in the future,” said Mr. Barrand. “I would be very interested in finding a supplier who guarantees a reasonable and stable price for the technologies we require, or a supplier who would invest in solutions using less rare earth, leading to a more predictable price.” Mr. Barrand has similar concerns about the price and availability of lithium for lithium-ion batteries.

◆ Multicore Micros

In five or ten years, OEMs will likely require multicore processors with hardware architecture that facilitates the segregation of data and of applications, such that part of the computer could run safety functions while another part runs non-safety functions. The chip’s segregated architecture would allow for integrating and reusing applications from multiple sources on a single chip, while reducing the amount of time required to integrate and validate the software.

Designing Linux- and Genivi-based infotainment systems to run on multicore microprocessors is relatively straightforward, whereas vehicle control systems with their safety requirements are more problematic. “We want to reduce the number of computers inside the vehicle; to do that we need multicore microcontrollers,” said Mr. Barrand. “While Autosar 4.0 already accounts for multicore solutions and embraces safety requirements, we’d like silicon providers to integrate safety mechanisms into the micro, for both single- and multicore micros.”

◆ Integrated Tools

Mr. Barrand: “We have a lot of tools for model-based systems, for PLM (product lifecycle management), for configuration management, for validation and so on. We’re not missing tools. Rather, I would ask, how do we use fewer tools in a better way? We want well-integrated tools that are simple, where the methodology is clear. ... Several providers say that they have a high-level product lifecycle management tool that connects to local engineering tools, but I am still looking for complete integrated solutions.”

What’s Next

◆ Standards

Working closely with other OEMs’ EE managers, Mr. Barrand has actively advocated for the Autosar software standard and for Genivi, the open-source infotainment software platform based on Linux. PSA is a member of Autosar’s executive board and a founding member of Genivi. Fully committed to Genivi, PSA’s first infotainment system based on the standard will find production in two years. Following the initial launch, all new PSA infotainment systems will be Genivi compliant.

“We are also very interested in all the communications network standards, including FlexRay. We see Ethernet as especially promising—in my opinion Ethernet is likely to replace MOST in the not too distant future.”

◆ ADAS

When it comes to saving lives, electronic stability control, blindspot detection and autonomous braking collision avoidance systems hold the greatest promise. Mr. Barrand is also a believer in drowsy driver alert systems. “We don’t have it yet, but we’re interested in drowsiness detection that analyzes eye and head movements. There are a number of algorithms that can optimize this function.”

Roundup...

Outlook for 2012: Based on predicted 3% to 4% growth in global automotive production, and on raw material prices remaining at their current levels, Valeo expects to grow faster than the market in each of the main vehicle production regions. Operating margin is expected to remain level.

Valeo reports four separate business groups: Thermal Systems accounted for 29% of sales; Powertrain accounted for 28% of sales; Visibility Systems (lighting) accounted for 23%; and Comfort and Driving Assistance Systems accounted for 20% of sales.

OEM customers accounted for 85% of Valeo’s sales in 2011. Valeo grew faster than the market in 2011, citing its product mix and customer base as drivers. North American OEM sales growth beat market growth by 21 percentage points. Fifteen percent of total sales were from North America.

Valeo’s 2011 sales include 227 million euros attributable to Niles, the Japanese switch maker acquired mid-year. Valeo also acquired the Variable Torque Enhancement System business of Controlled Power Technologies in December 2011. According to Valeo, the acquisition makes it the first automotive supplier to offer electric motor-driven superchargers.

Valeo is strongly focused on developing business in emerging markets, notably China. In early 2012, the company announced its acquisition of 80% of Ruby, a lighting subsidiary of Chery Automobile, with whom it will operate the lighting business as a joint venture.