2007 Roundup of Automotive Electronics Suppliers

Autoliv Inc
2007 Sales: $6,769 million
Change from 2006: up 9.4%
2007 Net Profit: $287.9 million, 4.3% of sales, compared with 6.5% net margin in 2006

Outlook for 2008: Assuming a 5% drop in vehicle production in North America and Western Europe, the regions from which Autoliv derives 70% of its revenue, the company expects organic sales growth of 2% (excluding currency effects and acquisitions) and consolidated sales growth of 7%.

Standard & Poor's Credit Rating: A-/
Stable/A-2

Autoliv notes that sales of its seatbelt products, which grew 7% (excluding currency effects and acquisitions) in 2007, outperformed global light vehicle production, which increased 5%. Autoliv attributes the growth in seatbelt product sales to higher value-added products such as belts with pretensioners and active seatbelts. Organic sales of airbag products increased by 2%, aided by sales of curtain airbags, which offset lower sales of frontal airbags. Recent NHTSA rulings that require increased head and chest protection will boost side airbag sales in the next few years.

New products from Autoliv include a front bumper airbag for SUVs, which is designed to reduce injuries to pedestrians and occupants of a smaller vehicle if it is struck by the SUV, and the Safety Vent multi-stage airbag that reduces injuries to small or out-of-position passengers.

Bosch Automotive Technology Sector
2007 Sales: 28.5 billion euros
Change from 2006: up 4.5%

Bosch’s Automotive Technology business sector accounted for 62% of total Bosch

Electronics Manufacturing Outsourcing Accelerates

Major tier-one automotive electronics suppliers and some carmakers are buying into the business case for outsourcing electronics manufacturing, and that has caused sales at some of the leading electronics manufacturing services (EMS) companies to soar. Flextronics, one of the world’s largest EMS providers, says its automotive segment will grow at 75% per year between its 2007 and 2009 fiscal years, not counting its recent acquisitions of Solectron, Invotronics and Sidler Automotive. In fiscal 2009, Flextronics will ship $1 billion worth of products to automotive customers.

Another large EMS provider, Jabil Circuit, has seen automotive electronics sales grow at the annual rate of 17% between its 2000 and 2007 fiscal years, from about $200 million to $615 million. Sanmina SCI has seen automotive sales grow at 30% to 35% per year over the last three or four years, to more than $200 million this year.

These automotive EMS providers are growing much faster than the automotive electronics market’s 5% to 7% annual growth, and their penetration of the market seems finally to be reaching a critical mass. Compared with other industries, automotive electronics suppliers have been very slow to embrace contract manufacturing. Kimball Electronics, which will ship more than $200 million worth of automotive electronics in 2008, has been making electronics for TRW, and Jabil Circuit has been making electronics for Johnson Controls at least since the mid-1990s. But in 2008, EMS providers will still account for less than 5% of the global auto electronics build. In contrast, says Oliver Digel, senior vice president of multimedia and automotive systems for Sanmina SCI, “EMS providers handle 70% to 80% of the telecommunications build.

“The automotive space is a little more difficult. The automotive tier-ones are already operating at low gross margins, between 5% and 10%. Compare that with telecommunications companies, which operate with gross margins in the 30% to 50% range. The outsourcing cost benefit for automotive suppliers is not so great,” explained Mr. Digel.

Still, observed Brian A. Ilhaver, Jabil vice president in charge of the automotive segment, the outsourcing trend is gaining traction. “There is more openness, and there is more actual direct activity moving toward outsourcing automotive electronics than I have ever seen. As companies are forced to expand their manufacturing footprint around the world to support

The Case for Outsourcing

Auto Electronics Manufacturing

- Move from high to low labor-cost manufacturing locations
- Quickly gain a global manufacturing footprint without a major investment
- Eliminate manufacturing assets and inventory and thereby improve return on capital employed
- Free resources to focus on other, potentially more distinctive competencies
- Make manufacturing a variable expense that tracks with sales
- Update manufacturing technology without a big investment
- Reduce time to market
- Improve purchasing leverage: Take advantage of economies of scale for some purchased components
- Gain access to know-how from other higher-volume industries e.g. hard-disk drives or LCD modules
Except at Honda, Active Noise Cancellation Not Very Active

Eberspächer Active Mufflers Could Improve Horsepower 2%

Honda has been using active noise cancellation (ANC) since 2003 to quiet the low-frequency noise produced when cylinders are deactivated to save fuel at cruising speeds. The ANC feature, which comes with Honda’s V6 variable cylinder management engines, uses the car’s four audio speakers to generate out-of-phase sound waves to cancel out any undesirable noise resulting from three-cylinder operation.

“When several cylinders are deactivated, the balance of the engine is lost, and that makes a kind of low-frequency, booming noise that is irritating,” said Tony Nakajima, senior chief engineer, Honda R & D. “You can live with such a noise, but our purpose is to establish a very quiet cabin environment.” Honda further reduces cabin noise with active engine mounts, which automatically adjust their firmness to absorb energy and help keep engine vibration at a minimum when cylinders are deactivated.

Honda has been employing active noise cancellation in vehicles with engines that have the cylinder deactivation feature since 2003 in Japan and since the 2005 model year in North America, where it was introduced on the Odyssey minivan, hybrid V6 A accord and Acura RL. ANC is also part of the 268-hp V6 engine used on the redesigned 2008 Honda A accord, which has variable cylinder management. That vehicle gets an EPA estimated 19 mpg in the city/29 mpg on the highway. According to Mr. Nakajima, future deployments of engines with variable cylinder management will also use active noise cancellation. Honda’s active noise cancellation system is currently supplied by Panasonic.

The idea to use active noise cancellation in automotive applications is not at all new. It was first used for cabin quieting on the Nissan Bluebird A RX-Z introduced to the Japanese market in 1991. At that time many carmakers and suppliers were seriously considering noise cancellation technology, not only for interior noise applications but also for active engine mounts, active air induction systems and active mufflers. In the early 1990s Texas Instruments was strongly advocating for the technology as an application for its digital signal processors. But according to TI marketing manager Charles Murphy, active noise cancellation is not something TI’s automotive customers are pursuing at this time.

Peter Wiese, an automotive systems engineering expert at Freescale, observed that with processor technology advancements over the past 15 years, active noise cancellation would no longer be done on a specific semiconductor component designed solely for that purpose, as was the case with TI’s DSPs. The more practical and more cost effective solution today is to implement active noise cancellation in software on a general-purpose microcontroller that would likely be part of the infotainment system. Given that evolution, active noise cancellation is not a hot topic at Freescale, nor is it at semiconductor suppliers Infineon, Renesas or NEC. But the matter is on the minds of infotainment companies such as Alpine. Steve Witt, Alpine’s vice president of brand marketing, said Alpine receives RFPs for premium audio system designs where the application of digital technology to address noise, vibration and harshness factors is part of the scope of the project.

In Honda’s ANC system, cabin noise is sampled by two microphones, one in the headliner above the driver and one at the rear of the cabin. The noise canceling is done by the existing audio system, which gets its control signal from a separate noise-canceling ECU connected to the audio amplifier. Rather than using an expensive DSP, the noise cancellation is done on a microprocessor. In the future, Honda will continue to employ active noise cancellation in vehicles with variable cylinder management, but nowhere else.

Separately, General Motors has an active noise cancellation project underway in its electrical technology engineering department to see if the technology can lead to fuel economy innovations.

Active Mufflers

A newer company that hasn’t stopped working on active noise cancellation since its heyday in the early 1990s is the German exhaust-system maker Eberspächer, which continues to sample its active muffler to carmakers. Eberspächer says it has overcome one of the main challenges in active muffler design by developing speakers that can withstand high temperatures. Inside the muffler, temperatures can climb as high as 800 degrees C. Working with a speakermaker, Eberspächer has developed a speaker that can handle 150 degrees C, and a way to durably package it inside the muffler. “The whole art of this patented technology is the construction of the speaker into the muffler to provide a thermal barrier so the speaker maintains temperatures in the 150 degrees C range, yet is able to project sound into that hot exhaust system,” explained Marty Romzek, vice president of advanced engineering at Eberspächer.

Mr. Romzek believes Eberspächer’s active mufflers could be an answer to cylinder deactivation noise. “We have some conventional exhaust systems on the Chrysler 300, one of the first vehicles to use cylinder deactivation. The problem is that when you go from eight cylinders to four, the frequency of the noise lowers, and the load of each cylinder doubles, so...”
their customers, and as they are also dealing with scarce financial resources, they are learning to put those funds into things that differentiate them and bring value to their customers,” Mr. A. Lihaver noted.

Not only is the auto industry beginning to embrace the outsourcing business model, it is gaining confidence that EMS contractors can deliver automotive quality products. “The auto industry is now moving heavily in this direction; our automotive business is growing way faster than it was before,” noted Herbert Schoeffmann, president of Flextronics Automotive. “But business will grow only for those EMS companies committed to the automotive industry. By dedicating complete buildings and operations to automotive and providing specialized automotive training for our people, we have generated a certain momentum and made it a lot easier to attract new automotive customers.”

Lower Entry Barriers

Existing tier-one automotive electronics suppliers aren't the only companies benefiting from the EMS business model. New entrants are as well. For example, Honeywell’s new automotive electronics business initiative, which has had some success penetrating the automotive market, is built on the EMS model.

Frederic Ramioulle, now a partner in McKinsey & Co., recently ran a business innovation center at Honeywell that was taking some of Honeywell’s technology and applying it to adjacent markets. “One of the businesses we created was this entity that was taking an aggressive look at how to separate hardware and software design from hardware manufacturing in the automotive supply chain. We had quite a bit of success unbundling elements of the braking systems and getting into active safety, essentially running a business without any factories. Leveraging your intellectual property this way allows you to have returns on invested capital that are closer to the returns of a software company, above 30%,” said Mr. Ramioulle. Honeywell’s EMS provider is Jabil.

At McKinsey’s Detroit office, Mr. Ramioulle wants to continue the kind of work he did at Honeywell, but on a bigger scale. “[This EMS model] will enable a new breed of companies, perhaps from China or India, to win in automotive electronics without having to worry about how efficiently they can run a manufacturing network.”

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Outsourcing...

Continued from page 1

Noise...

Continued from page 2

Jabil Circuit Automotive Group Sales

in $ Millions

<table>
<thead>
<tr>
<th>Year</th>
<th>2000</th>
<th>2007</th>
<th>2008</th>
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</thead>
<tbody>
<tr>
<td>FY 2000</td>
<td>200</td>
<td>615</td>
<td></td>
</tr>
<tr>
<td>CAGR: 17.4%</td>
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Jabil's fiscal year 2000 ended August 31, 2000

Major Electronics Manufacturing Services Providers with Automotive Experience

- Benchmark Electronics (Angleton, Texas)
- Celestica (Toronto, Canada)
- Flextronics (Singapore)
- Jabil Circuit (St. Petersburg, Florida)
- Kimball Electronics (Jasper, Indiana)
- Sanmina SCI (San Jose, California)

Experience Services Providers with Automotive Experience

- Sanmina SCI (San Jose, California)
- Kimball Electronics (Jasper, Indiana)
- Jabil Circuit (St. Petersburg, Florida)
- Celestica (Toronto, Canada)
- Benchmark Electronics (Angleton, Texas)

Continued from page 1

Continued from page 2
The Company Profile... Kostal Group

Thumbnail Sketch

Leopold Kostal GmbH & Co. KG
Headquarters: An der Bellmerei 10
58513 Lüdenscheid, Germany
Tel. 49 2351 16-0; www.kostal.com
2007 Consolidated Sales: 1,280 million euros
2011 Estimated Sales: 1,670 million euros
2012 Estimated Sales: 1,783 million euros
R&D: 6.9% of sales
Capital Expenses: 6.3% of sales
Major Products: Steering column modules, ECUs, control panels and switches
Number of Employees: 11,185
Sales per Employee: 114,000 euros
Ownership: 100% owned by the Kostal family

Background

Kostal was founded in 1912 in Lüdenscheid, Germany, by Leopold Kostal, and the company remains owned by and under the leadership of the Kostal family today. The company produced its first automotive part, a turn signal switch, in 1927 and since 1953 has focused almost entirely on the automotive industry. Kostal’s first international subsidiary, Kostal of Mexico, was established in 1973. Ninety-six years after its founding, the company operates in 28 locations in 14 countries on four continents with a workforce of more than 11,000.

Since 1995 Kostal has been organized into four business units: Automotive Electrical Systems, Connectors, Industrial Electronics and SOMA Test Systems. By far the largest division, Automotive Electrical Systems, accounts for 87% of sales in 2007.

Kostal Group sales totaled 1,280 million euros in 2007, a figure the company estimates will grow to 6.9% per year reaching 1,783 million euros by 2012. In the prior five-year period, from 2002 to 2007, Kostal’s sales expanded at the annual rate of 5.9%.

So it can optimize and control its manufacturing processes, Kostal is vertically integrated, manufacturing in-house 80% of the parts it uses. All important processes including tool making, plastic molding, metal stamping and stuffing printed circuit boards are performed in-house. Not exceeding the level of 80% in-house production allows Kostal to better tolerate business downturns without radical cutbacks in employment.

Kostal first set up shop in North America in 1981, in Schaumburg, Illinois. Kostal of North America’s first project was with Nissan; by 1993 Kostal was also doing business locally with Ford, Chrysler and General Motors. After the Kostal North America headquarters moved to Novi, Michigan, in 2001, and this year will expand its operations and relocate to Troy, Michigan. The new facility in Troy will become one of Kostal’s three R&D centers of excellence.

In North America last year, Kostal produced nearly $170 million in sales. Forty-one percent of that revenue was in switches. Steering-column modules accounted for 34%; electronics, 21% and rain sensors 4%. Kostal’s biggest North American customer today is Chrysler, followed in order by Mercedes, BMW, Ford and General Motors.

Inestimates will grow at 6.9% per year to reach 1,783 million euros by 2012. In 2007, Kostal’s sales expanded at an annual rate of 5.9%.

In the eighty years Kostal has been making automotive switches, it has developed a great deal of experience with which to satisfy customers. “We have a very clear understanding of the tactile and haptic feedback that the end user ultimately requires in the vehicle,” said Dale Boka, vice president of sales and marketing for Kostal of North America. A mechanical engineer, Mr. Boka came to Kostal nearly ten years ago after working in sales and operations at Kelsey-Hayes (now TRW Automotive).

“That expertise is embodied in the standards we’ve developed internally for our switches. We have 3D cam curves that depict the way a switch feels as it ramps up, switches and ramps down, and how the effort changes relative to the switch’s position,” he explained. “We have a number of home-grown development tools in our repertoire that allow us to tune the switch to the exact feeling our customers like.” Kostal’s software tools can be widely applied across its switch product line. “It can be a rotary switch such as headlamp

Kostal Automotive Electrical Systems Sales by Year

<table>
<thead>
<tr>
<th>Year</th>
<th>Sales (in millions of euros)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2002</td>
<td>860</td>
</tr>
<tr>
<td>2003</td>
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<tr>
<td>2006</td>
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</tr>
<tr>
<td>2007</td>
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Kostal Automotive Electrical Systems Sales by Product Group

2007 Total Sales: 1,112 million euros

- Central electronics, body ECUs, 33%
- Sensors, 3.7%
- Components, 3.6%
- Rotary switches, 8.2%
- Electronics, 24.7%
- Push button switches, 26.5%

Switches

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able to give that German quality to the leaders in styling and surfaces. Now we are man OEMs were always recognized as molding processes and equipment. “German technological advances in materials, switches.

500 milliamps typifies low-current amps or more of in-rush current; 300 to 400 milliamps typifies low-current switches, which can handle 25 amps with up to 60 milliamperes of in-rush current. Low-current switches are smaller, which makes them easier to integrate into compact mechatronics packages. High-current switches handle 250 to 500 milliamps and typify low-current switches.

Kostal’s newest switches incorporate technological advances in materials, molding processes and equipment. “German OEMs were always recognized as leaders in styling and surfaces. Now we are able to give that German quality to the rest of the world, especially here in the U.S. where we see a clear trend toward high interior quality,” noted Walter Maisel, president and CEO of Kostal of North America. To achieve the German look and feel, Kostal produces switches where the gap between the button and the bezel is less than 0.5 millimeters; on older switches a one-millimeter gap was typical. “We’ve been able to reduce the gap by first designing the switch right, and by choosing the right materials and understanding how all the tolerances stack up. We have high standards and very stable process controls for the molding equipment, angle presses and all the tools we use,” said Dr. Maisel.

A nother element in creating a high quality appearance is the ability to match unlike materials. “For example, sometimes in order to retain rigidity and stability over temperature, you need to use a stronger material such as PA 6 nylon for the bezel, the larger portion of the switch, but the buttons might be molded in PC/ABS (polycarbonate/acylonitrile butadiene styrene),” noted M. R. Boka. “That’s not an easy accomplishment to match the color, grain and gloss of the different materials.”

A utomotive Product Portfolio

Not wanting to be seen solely as a company that makes electromechanical switches, Kostal explained that its products are comprised of equal measures of switches, mechatronics and electronics, each representing roughly one-third of its total automotive output.

Steering Column Modules

Kostal has been delivering steering column switches to the auto industry for more than 50 years. In addition to standard components such as direction indicator, windshield wiper switches and rotary coupler, the latest steering column modules are perhaps the most complex examples of mechatronics in the vehicle. Along with the switches, with all of their moving parts, steering column modules contain a CPU and sophisticated electronics to process the steering-angle data and communicate information from steering-wheel-mounted switches to a LIN bus.

Kostal manufactures camera-based steering angle sensors that provide directional information accurate to 0.1 degree, which is a requirement for active front steering.
Kostal Group

The rotary coupler can have a large number of tracks including one sufficient to carry enough current to heat the steering wheel.

HMI

Because almost everything Kostal makes has a user interface of some sort, the company has created a rich legacy of HMI (human machine interface) expertise. “Mechatronics and understanding the man-machine interface, what we refer to as ‘mechatronics for people,’ are two of our greatest competitive strengths,” said Christopher Sanders, in charge of subsidiary coordination and corporate planning at Kostal.

Kostal does much more than just provide an on-off switch, noted Dr. Maisel. “Each switch has a haptic component—a certain feel and a certain sound—which gives feedback to the user that the switch has functioned properly. We are concerned about the accessibility of the switch, how it is illuminated, how to cluster functions and how many functions can be safely accommodated without distraction. Using our hundreds of man-years of experience and know-how, we can partner with the OEM’s in HMI design and functionality.”

Thirty of Kostal’s engineers, from Lüdenscheid and Dortmund, Germany, and Novi, Michigan, are dedicated to HMI projects. Twenty of them work on pre-development; the rest focus on R&D and advanced business development. HMI expertise comes from very long and close relationships with its customers, the carmakers, and from the market research it conducts independently. “We carry out our own consumer market evaluations, we employ psychologists, we run tests of our products with a large number of people to get their feedback, and sometimes we monitor their real-life experience with our products over time.”

JaguarDrive Selector

One of the best examples of Kostal’s world-class expertise with mechatronics, styling and the human machine interface is the new Jaguar XF shift-by-wire control panel. The multifunction switch located on the center console helps to establish the XF’s identity. Jaguar’s website describes it: “The XF has its own handshake. At a start up, the button in front of the unique JaguarDrive Selector rises—softly, into the palm of your hand.”

When the driver presses the ignition starter switch, the gear selector knob is automatically lifted from a flush position on the center console by means of a motorized, belt-driven, screw-like gear. The driver rotates the knob to select park, reverse, neutral or drive. With a push and turn, he can select sport mode, and use the paddle shifters on the steering column to up- or downshift.

The illuminated panel on the Jaguar center console includes the ignition on-

### Kostal Automotive Electrical Systems

**Sales by Customer**

2007 Total Sales: 1,112 million euros

- Honda, 1.2%
- Porsche, 1.7%
- Fiat, 3.6%
- GM, 2.2%
- Chrysler, 3.2%
- Ford/PAG, 13%
- BMW, 18%
- Peugeot, 1.1%
- VW/Audi, 29%
- Daimler AG, 21%
- Others, 6%

### Kostal’s Automotive Products

- **Overhead Modules**
  - Cameras*
  - Rain sensors
  - Light sensors
  - Cabin illumination
  - Communications gateways
  - Tilting/sliding sunroof controls w/roof protection
  - Security monitoring of passenger compartment
  - Displays
  - Hands-free microphones
  - Emergency call device activation

- **HMI (human machine interface)**
  - Each switch has a haptic component—a certain feel and a certain sound—which gives feedback to the user that the switch has functioned properly. We are concerned about the accessibility of the switch, how it is illuminated, how to cluster functions and how many functions can be safely accommodated without distraction. Using our hundreds of man-years of experience and know-how, we can partner with the OEM’s in HMI design and functionality.

- **Steering Column Modules**
  - Direction indicators
  - Windshield wiper selection switches
  - Steering angle sensors
  - CPU central microchips
  - Rotary couplers
  - Latching systems

- **Body Control Units**
  - Light and power distribution
  - Load management
  - Central locking
  - Fluid level monitoring
  - Sensor evaluation
  - Windshield wiper controls
  - Fuse and relay functions
  - Current sensor and power management
  - Gateway functions
  - Anti-theft control
  - Movement control
  - Door functions

- **Seat Control Modules**
  - Memory
  - Power seat switches
  - Power window switches

- **Control Panels and Switches**
  - Switches
  - Lighting
  - CAN or LIN networking
  - Diagnostics
  - Steering wheel switches
  - Rotary light switches
  - Power seat switches
  - Power window switches
  - Other
  - Keyless entry
  - Passive entry
  - Driver assistance camera*
  - With and without rain and light sensor
  - *Not yet in high-volume production

### Jaguar XF Shift-by-Wire Control Panel

The knob is geared to rotate two magnets over two sensor packages, which each contain two Hall-based sensors. The function is similar to a magnetic steering angle sensor, but the assembly cannot rotate more than one turn. The sensors provide both digital and analog outputs for the angle determination. All the signals are acquired by a microcontroller and transmitted over a CAN bus.
off pushbutton, a parking brake switch, and additional keypad-type pushbutton switches to select winter driving mode, deactivate stability control, activate ASL (automatic speed limiter) or in the SV 8, track mode. The rotary switch can be locked with a solenoid, for instance to keep the gear selector in park until the driver steps on the brake.

According to M. Boka, the greatest challenge was getting the actuators and the tactile elements understood, defined and realized in the final design.

ECUs

Kostal works closely with its customers to define optimal ECU functionality and location, and takes into account the customer’s cross-platform strategies to achieve the most cost-effective use of resources and components. Kostal has shipped 20 million of its patented pinch-protection systems since developing the technology more than 20 years ago.

Kostal’s door control units also include functions such as central locking and mirror controls. The company recently won new business with Audi for its sensorless (ripple) motor control.

Kostal produces a wide range of body control ECUs— for luxury vehicles like the Mercedes S-Class to entry level vehicles from Chinese OEM’s Chery and Brilliance & Co. Kostal’s central body control units handle multiple functions including light and power distribution, central locking, the operation of lights and wipers, and monitoring fluid levels and temperatures.

Driver Assistance Systems

In addition to mechatronics and the human machine interface, Kostal produces a fair number of overhead, or roof, modules, which accounted for 6% of sales in 2007. Overhead modules can include switches to control a tilting and sliding sun roof. They can also include cabin illumination, microphones for voice-operated controls, cabin-security sensors and remote-keyless entry receivers.

Because it is near the windshield, the overhead module can house the electronics and software needed to process camera signals for lane-departure warning, lane-keeping assistance, obstacle and pedestrian detection systems, sign-recognition systems and driver-monitoring systems.

Kostal also makes rain sensors, which attach to the windshield’s interior surface, but can be integrated with the overhead module. This capability means Kostal is well-positioned to produce forward-looking camera front ends that could be packaged either with the rain sensor or independently.

“The same camera used to detect lane markings could also detect rain on the windshield, or whether it is dark enough to turn on the headlamps, or safe enough to turn on high beam,” noted Dr. Maisel. “Although we can only see a short distance with a camera, by using our own more general digital signal processing technology we will be able to support wider ‘visibility’ through data communications from vehicle to infrastructure or even to other vehicles,” he added.

In April 2008, Kostal will make a presentation in Detroit at the SA E 2008 World Congress about the camera front end it is developing, which attaches to the windshield’s inside surface. In order to keep the on-glass package size and footprint on the windshield as small as possible, the device uses two prisms—one to deflect the light beams and the other to compensate for spectral splitting—to steer the image into the camera’s lens. Sealed directly against the glass, the Kostal prototype shields the camera from moisture, reflections, dust and smoke. The assembly occupies less than 10 square centimeters (1.5 square inches) of the windshield.

While Kostal hasn’t yet booked any development contracts or orders for any camera-based driver assistance systems, there are at least two OEM’s with whom Kostal is jointly developing camera applications; Kostal will likely get spec’d in on those projects. Kostal recently equipped a vehicle with a camera front end for an OEM’s internal ride-and-drive event.

Looking into the future, Kostal is working on expanding applications for its camera module and further integration of software, which could be packaged in the roof module. One current development project is focused on fundamental technology that correlates lane wandering with drowsiness. According to M. Sanders, there is substantial interest in the OEM community in these types of driver monitoring systems, although serious issues concerning liability remain unresolved.

International Expansion

When we last profiled Kostal in 1996 the company was emphatic in its commitment to fostering a global presence, not only to support its customers worldwide but also to lower labor costs. In 1996, Kostal already employed 60% of its workforce in countries other than Germany; by 2007 the percentage of Kostal’s workers employed abroad had increased to 71%.

Given its international footprint, Kostal is now anticipating strong revenue growth abroad, especially in the United States, China, Russia and India, where it will continue to make capital investments and bring on more employees. “We see substantial opportunities in the States, particularly with the application of more sophisticated technology,” noted M. Sanders. “We also see significant opportunity at both of our locations in China as car production there increases. We have been in China for 12 years. “We also anticipate fast growth in the Russian market, which we can service along with other European customers from our facilities in the Ukraine, where our costs are on par with China. In the medium term, India is becoming an increasingly relevant market in a very different sector, the low-cost end of our portfolio.”

In January 2008 Kostal signed a memorandum of understanding to establish a joint venture with NTT FIL (Netur Technical Training Foundation Industries Ltd.), an established, India-based automotive components, parts and tooling supplier. NTT FIL makes electrical switches and controls for automotive OEMs including Maruti Suzuki, Mahindra & Mahindra, Eicher Motors, Force Motors, Tata Motors and others, and also has a joint venture with the Toyota-affiliated supplier Aisin Seiki.
Roundup...

Continued from page 1

sales in 2007, as it did in 2006.
In 2008, Bosch expects significant growth in products that improve fuel economy and reduce emissions; high pressure diesel injection system unit sales will increase 19%; gasoline direct injection system sales will double by 2009; unit sales of start-stop systems will grow from half a million in 2008 to more than a million in 2009.

Gentex Corp.
2007 Sales: $653.9 million
Change from 2006: up 14%

2007 Net Income: $122.1 million or 18.7% of sales, similar to last year’s 19% margin

Outlook for 2008: Gentex estimates net sales will increase 10%.

Gentex attributes its solid growth to a combination of its long-term strategy of aligning its percentage of business with each carmaker to that carmaker’s global market share, and to growth in unit sales of its higher value added products, SmartBeam and Rear Camera Display mirrors. According to the company, “Those products have average selling prices that are at least three times higher than the price of one base feature auto-dimming rearview mirror.”

Unit shipments of auto-dimming mirrors, Gentex’s major product, grew 13% in 2007. Gentex shipped approximately 65,000 Rear Camera Display mirrors in 2007, mostly to Ford, and anticipates sales of RCD mirrors will exceed 250,000 units in 2008.

Johnson Controls Inc.
Automotive Experience
Fiscal year ending September 30, 2007
FY 2007 Net Sales: $17.552 million
Change from FY 2006: down 4%
FY 2007 Segment Income: $519 million, or 3.0% of sales. Segment income fell 14% from fiscal 2006.

Outlook for FY 2008: Sales will be flat, with two-thirds of sales going to European and Asian OEMs. Increasing penetration of electronics should boost sales in the fastest growing world markets, especially India, China and Southeast Asia. JCI’s joint venture with Chinese automaker Chery is scheduled to begin production this year. Segment profit margins are expected to increase to 3.4% to 3.8% of sales.

Standard & Poor’s Credit Rating: A- / Stable/A-2

JCI’s Automotive Experience segment, which produces seating, overhead, door and cockpit systems, accounted for 51% of JCI’s total FY 2007 sales, compared with 68% of total sales five years ago. The company estimates A automotive Experience sales will drop to 45% of total sales in FY 2008.

A automotive sales declined for the second consecutive year. Decreased production of light trucks, minivans and SUVs—where JCI content is high—contributed to a 10% decline in sales in North America, following last year’s 5% sales decline in that region. Combined sales to GM, Ford and DaimlerChrysler North America accounted for 10% of sales; global sales to the Detroit Three represented 28% of total Automotive Experience sales.

Lower volumes in Europe and Japan also hurt sales, but were offset somewhat by favorable currency exchange rates.

At the close of fiscal 2007, Automotive Experience had a $3.9 billion, three-year backlog of new incremental business; $900 million applies to FY 2008. Seventy-five percent of the backlog business is outside North America including contracts with Fiat, Peugeot, Chery and Russian OEMs.

In November 2007, JCI agreed to acquire a Saline, Michigan, interior components plant from Ford Automotive Components Holdings. The plant was formerly operated by Visteon.

In JCI’s Power Solutions business segment, sales were up 17% over the prior year, although unit sales of automotive batteries remained flat.

JCI reports it has twelve development contracts for lithium ion batteries for plug-in hybrids, and two production orders. A JCI joint venture with Saft in Nersac, France, will begin production of lithium ion batteries for vehicles this year. Power Solutions provides both OE and aftermarket batteries.

Lear Corp.
2007 Consolidated Net Sales: $15,995 million
Change from 2006: down 10.3%
2007 Net Income: $241.5 million or 1.5% of sales; in 2006 Lear lost $707.5 million.

Outlook for 2008: Sales will decline to approximately $15 billion, based on the assumption that production by the Detroit Three will drop by 9%. Lear expects production volumes for its top 15 North American platforms will be down 12%.

Standard & Poor’s Credit Rating: B+ / Negative

Ford and GM together accounted for 49% of sales in 2007, compared with 55% of sales in 2006. Sales in North America represent 45% of Lear’s total sales; Europe accounted for 43%.

The $3.1 billion in Electrical and Electronic segment sales include $2.2 billion in electrical distribution systems and $900 million in electronics products. Lear ranked fourth among global wiring harness suppliers according to CSM Worldwide. Profit margins in the Electrical and Electronic segment was low, just 1.3% of sales, down from 3.4% the prior year.

Earnings in the Seating segment were far better: $759 million or 6.2% on sales of $12.2 billion.

Lear shareholders in July 2007 rejected a buyout bid from Carl Icahn’s American Real Estate Partners, against the recommendation of Lear’s board. The termination of the merger agreement made by the board in February 2007 required Lear to pay Mr. Icahn’s company $12.5 million plus $12.5 million worth of stock. Lear had posted an additional $11.7 million in costs related to the transaction in the first half of 2007.