Europe Goes Big for Start-Stop

Up to Eight Percent Fuel Savings in City Driving

You're sitting at a sidewalk café, and the vehicles lined up waiting for the nearby red light to change are silent and exhaust-free; the air is fresh and you don't have to shout to be heard. While you know you are dreaming, that dream is no longer so far-fetched. There is a very real likelihood that, in Europe at least, most cars will soon come with start-stop systems that shut the engine down when the vehicle slows or comes to a stop, and automatically and instantly restart it as soon as the driver releases the brake.

"While the market for micro hybrids has just started, with PSA, BMW and Smart in production, in the next five to 10 years we see it getting to about 50% of the market in Europe," declared Derek DeBono, director of Valeo's electrical system product line. A micro hybrid is a conventional gasoline- or diesel-powered vehicle equipped with the start-stop feature. "Eventually it will be 100%. There is not one OEM in Europe or even North America that is not talking about implementing the start-stop system," Mr. DeBono said, adding, "What is especially appealing about stop-start is the cost — it can be applied to conventional vehicles without pricing them out of the range that's attractive for everybody." Thus far, Valeo and Bosch own most of the market for start-stop systems in Europe.

The big driver of start-stop in Europe is the European Commission's rules that cap CO₂ emissions at 120 grams per kilometer by 2012 and levy fines for noncompliance. According to Bosch, start-stop systems reduce fuel consumption by up to 8% using the urban component of the New European Driving Cycle (NEDC), which calls for twelve 15-second stops over a distance of seven kilometers. There is an equivalent reduction in CO₂.

A controling to Nick Pascoe, CEO of Controlled Power Technologies (www.cpowert.com) fuel savings can be much greater. "If you were to go into the center of London, where the average speed is maybe 8 mph, you will see a 20% to 25% benefit." CPT, which was spun off in 2007 from Visteon, is working with several European carmakers on micro hybrid systems based on switched reluctance motor technology from Emerson Electric.

"There is also a clear trend toward start-stop in Asia and the emerging markets, driven not so much by CO₂ reduction but by high fuel prices," noted Markus Schmidt, executive vice president of sales and marketing for the starter motors and generators division of Bosch.

"That is why we believe that start-stop will have a good chance in China, India and Brazil. We are already in discussions with the local OEMs in those countries, some of which will start production in the 2010 or 2011 timeframe."

Turn to Start-Stop, page 3
Continued from page 1

**Denso**

**FY 2008 Consolidated Net Sales:** ¥4,025.1 billion ($38.4 billion)

**Change from FY 2007:** up 11.5%

**FY 2008 Consolidated Net Income:** ¥244.4 billion ($2.3 billion), 6.1% of sales; Net income increased 19.1% from FY 2007

**Outlook for FY 2009:** Denso expects sales to be flat—just 0.1% growth—due to the appreciating yen, lower volume car production in North America, and rising material costs. Net income is expected to decline to ¥200 billion.

Denso’s sales increased in all regions of the world, lead by Asia (excluding Japan) where sales were up 28.3% as a result of increased Japanese OEM production there, followed by Europe, which saw 19.4% growth due to increased sales of diesel common rail systems and air conditioners to Ford, PSA and Fiat. Sales in Japan rose 7.3%.

Japan accounted for 67.7% of FY 2008 sales. Toyota, Denso’s largest customer by far and largest shareholder, was responsible for 49.2% of total sales. Following Toyota in order of sales were Honda, with 18.8%, and Fiat, with 3%. Thermal is Denso’s largest business segment, accounting for 32% of sales in FY 2008. Second largest is Powertrain Control, with 23.4% of sales, followed by Information and Safety Systems, 16.2%; Electric, 9.1%; and Electronics, 8.7% of total sales. Worldwide, car navigation sales increased 26.2% to roughly 1.5 million units.

**Omron Automotive Electronic Components (AEC) Business**

**FY 2008 Sales:** ¥107.5 billion ($1.03 billion)

**Change from FY 2007:** up 15.2%

**FY 2008 Operating Income:** ¥1,408 million ($13.4 million) or 1.3% of sales, compared with a loss of ¥1,229 million ($11.7 million) last fiscal year

**Outlook for FY 2009:** Omron expects a challenging year ahead considering the weak dollar, the sluggish North American market, and declining car sales in Japan. Nearly two-thirds of AEC sales are from those regions. Higher expected vehicle production volumes in other markets will help, as will expanding sales of new products such as electric power steering controllers. AEC is projecting ¥108.5 billion ($1.04 billion) in sales. Operating income for the segment is expected to fall by 64.5% to ¥0.5 billion ($4.8 million).

A automotive Electronic Components contributes 14% of Omron’s total net sales. AEC’s major products include keyless entry systems, power window switches, relays, laser radar, tire pressure monitoring systems and electric power steering components.

North America is AEC’s largest market, accounting for 39% of sales. North American sales increased 12% in fiscal 2007, with the help of strong sales of keyless entry and other wireless devices. Sales in Japan grew 7.4%. European sales were up 41%, and sales in China more than doubled, accounting for 3% of total AEC sales.

Omron established a new automotive sales and production subsidiary in Haryana, India in August 2007. Production of components and devices including keyless entry and body control modules is scheduled to begin in the second half of FY 2009.

**Pioneer Car Electronics**

**FY 2008 Sales:** ¥373.9 billion ($3.6 billion)

**Change from FY 2007:** up 4.5%

**FY 2007 Operating Income:** ¥26.2 billion ($250 million), or 7% of sales, an increase of 18.3% over the prior year

**Outlook for FY 2009:** Pioneer is forecasting 9.7% growth in sales for the year ending March 31, 2009, due mainly to increased sales of aftermarket navigation systems. A aftermarket sales are expected to account for 63% of Car Electronics sales next year. The company expects operating income to decline to ¥20 billion ($191 million) due to higher OEM development costs, lower unit prices and a slower North American market for car audio.

Pioneer’s Car Electronics business, which includes navigation and audio systems, produced 39% of sales in the OEM market compared with 36% in OEM sales the prior fiscal year. OEM navigation sales increased in North America in fiscal 2008; OEM audio system sales grew in North America, Japan and China. Sales in Japan accounted for 33.8% of Car Electronics business.

In April 2008, Pioneer introduced its AVIC-F in-dash navigation devices that use flash memory for map data storage and allow users to connect portable entertainment devices and Bluetooth phones. In the North American market, the devices will offer an English language conversational voice interface from VoiceBox Technologies. MSN Direct subscribers will see traffic information overlaid on their selected route.

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<th>Japan's Auto Consumer Electronics Shipments, 2007</th>
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<tr>
<td><strong>OEM and Aftermarket</strong></td>
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<td>Car cassette stereos</td>
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<td>Car CD players</td>
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*Including portable devices

Data: J EITA (Japan Electronics and Information Technology Industries Association)

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**THE HANSEN REPORT**
**ON AUTOMOTIVE ELECTRONICS**


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Page 2, June 2008
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Bosch says it will deliver 500,000 start-stop systems in 2008 and expects as many as 1.5 million Bosch units to ship in 2009. Its first major customer is BMW.

High fuel prices are also an issue in North America, and while micro hybrids are expected from Ford and from Chrysler, the North American market isn’t nearly as promising as Europe. “It really boils down to the habits of the people in the region and what they expect from their vehicles,” explained Scott Spodeck a technology manager with Delphi. “For example, in South Miami in august with the windows rolled up, how long do you want to sit there with the engine not running? If somebody wants air conditioning no matter what, you either sacrifice start-stop availability, or you power the A C compressor with an electric machine. And that’s an additional cost.” Some carmakers are installing a switch in micro hybrid vehicles that lets the driver choose between the A C setting, which disables the start-stop system, and the economy setting, which employs it.

**BAS vs. Starter-Based System**

Suppliers of start-stop systems have taken two different system approaches. Valeo, CPT and Delphi employ belt-driven alternator starters (BAS), which replace the starter and the alternator with a combined machine that performs both functions. Bosch’s system simply replaces the starter with one that is more robust, designed to handle many more starts. Start-stop systems start the engine hundreds of thousands of times in a vehicle’s lifetime, depending on how aggressively the carmaker aims to reduce fuel consumption. More frequent engine start downs mean greater fuel savings but increased wear on the starter. For comparison, conventional vehicles are started tens of thousands of times.

Like the Bosch system, Magneti Marelli’s start-stop system is starter based. Simpler and with fewer new or modified elements, starter-based systems are less expensive and can be applied to existing engines more easily than BAS systems. And they can be applied to any size engine, large or small. But, according to Delphi’s Mr. Spodeck, “The belt system is much quieter than the starter motor solution, which you can hear inside the vehicle. With the belt you don’t have metal to metal contact, which transmits noise and vibration.” The metal contact is a result of the starter’s pinion gear engaging.

According to Valeo, its belt-driven system can also handle large vehicles. “We have a demonstration in the United States on a GM Envoy with automatic transmission and a 4.2 liter inline six,” said Mr. DeBono. “It’s on a vehicle with a 14-volt architecture, but we have to use a floating voltage with an ultracapacitor to move up above 14 volts. We recover energy when you are coasting, with your foot off the accelerator, and we store it in ultracapacitors. We use it to give you better fuel economy, or with larger engines, more cranking power.”

Valeo will soon begin production of its second-generation belt-driven alternator starter system, which will reduce the added cost of start-stop by 30% to 40% compared with generation one. “We’ve packaged the power electronics, which had been in a separate ECU, right into the machine,” noted M. DeBono. “And we’ve gone from a diode design to a MOSFET design. We drastically improved not only the cost but the efficiency of the machine.” Valeo’s second-generation machine can be more precisely controlled to restart the engine very quickly and provide a faster, smoother stop. “We can use the machine as an engine brake and actually shut the engine down faster so you don’t feel any shake as it stops,” he added. The newer system also allows what Valeo calls “change of mind.” For example, as a driver brakes approaching a red light, the engine will shut down when the vehicle is still moving, at approximately six to 10 kilometers per hour. Should the light turn green before the vehicle completely stops, the driver can take his foot off the brake, and the engine will instantly restart.

**Definitions**

- **Micro hybrid**: start-stop only
- **Mild hybrid**: start-stop plus regenerative braking and electric traction boost
- **Full hybrid**: start-stop plus regenerative braking, capable of electric-powered drive

Bosch is also working on a second-generation system that will stop more quickly and produce less noise.

**Electric Supercharger and Micro Hybrid**

Controlled Power Technologies is developing an electric supercharger that it believes will significantly broaden the market for its 14-volt belt-driven alternator starters in micro hybrid applications. Both products are based on switched reluctance motors, jointly developed with Switched Reluctance Drives Limited (SRDL), a subsidiary of Emerson Electric Technologies. SRDL’s SR Drive system consists of a brushless DC motor with a dedicated electronic controller. Magnetic attraction of the steel rotor to stator electromagnets produces torque.

Superchargers and micro hybrids complement each other. Superchargers employ an air pump or blower motor in the engine’s air intake system that compresses the air and thereby increases the power output of the engine. With an electric supercharger, the engine can be downsized by 30% and produce the same power as an engine without a supercharger, noted CPT’s Nick Pascoe. “According to one European study, a 30% reduction in cylinder capacity yields a 15% reduction in CO2.”

“But unless the vehicle has the sort of energy management system employed by the micro hybrid, there would be concern that you would get half-way up the hill and not have enough current to drive that two-kilowatt electric supercharger. With the switched reluctance motor, you are able to spin the supercharger up to 70,000 rpm in 350 milliseconds. With a turbocharger you have a three- or four-second delay, and then you get a kick in the back. The electric supercharged vehicle feels like a big naturally aspirated engine.”

The supercharger lets the carmaker provide a sufficiently powered vehicle despite the downsized engine, without the added expense of escalating from a micro to a mild hybrid. With a mild hybrid the vehicle would get a traction boost electrically from a bigger, more expensive alternator starter operating at a higher voltage and fed by a bigger energy storage system.

continued on page 8
The Company Profile… Hella KGaA Hueck & Co.

Headquarters: Rixbecker Strasse 75, 59552 Lippstadt, Germany; telephone: 49 (0) 29 41 38-0; fax: 49 (0) 29 41 38-71 33; www.hella.com

FY 2007 Sales: 3,667.3 million euros
R&D: 7.8% of sales
Capital Expenditure: 5.9% of sales
Cash Flow from Business Operations: 289 million euros
Net Margin: 0.6%
Ownership: Privately held by the Hueck family

Products: Lighting, electrical and electronics components and systems
Employees: 25,451 as of May 31, 2007; 3,117 work in R&D
Sales per Employee: 144,093 euros
FY 2008 Sales Estimate: 3,900 million euros

Hella Electronics Division
FY 2007 Sales: 1,024.7 million euros
R&D: 14.2% of sales
Products: Car body electronics, driver assistance systems, sensors and actuators
Employees: 5,750 as of May 31, 2008
Sales per Employee: 178,209 euros
FY 2008 Sales Estimate: 1,090 million euros

Top Three Customers Ranked by Sales: Volkswagen, Mercedes, General Motors
Hella’s 2007 fiscal year ended on May 31, 2007. Beginning in 2007, electronics for lighting are reported in the Lighting Division’s sales.

Background
Hella KGaA Hueck & Company, parent company of the Hella Group, was founded in 1899 to make candle and kerosene lamps and bulb horns. The Hella brand was first used in 1908, applied to an acetylene gas headlamp that incorporated the company’s system of lenses and mirrors. Throughout the next century Hella continued to improve and broaden its line of automotive lighting products, from early twin filament bulbs in the 1920s, to halogen in the 1960s, to xenon lamps in the 1990s, and in the early 2000s, LEDs. Hella is one of the industry’s first suppliers of high-volume full LED headlamps, which debut on the 2009 Cadillac Escalade. Hella’s largest lighting customers today, listed in order of sales, are Volkswagen Group, Ford, Daimler, BMW and GM.

With sales of 3,667.3 million euros in its 2007 fiscal year, Hella produces a surprisingly broad range of systems and parts for a company its size. Not only does it produce all types of front, signal and interior lighting components, Hella also makes a wide assortment of electrical and electronics components and systems—relays, horns, many types of sensors and actuators, DC/DC converters, as well as complete driver assistance systems including automatic parking, adaptive cruise control, radar blind-spot warning, and lane-change assistance systems.

This profile focuses on the Hella Electronics division, which at 28% of Hella Group’s total sales, is the smallest of the company’s three divisions. Body electronics is Hella Electronics’ largest product group, producing 48% of the division’s annual sales. Sensors and actuators make up 46% of the business; driver assistance systems account for 6%.

While camera- and radar-based, software-intensive driver assistance systems get a lot of attention, the market for them is developing very slowly. Despite the driver assistance systems already in Hella’s product line or soon to be introduced, the rain/light sensor, which includes the functions for automatic wiper control as well as automatic light switching, is still Hella’s best-selling driver assistance product. Hella sells approximately 30 million euros worth of rain/light sensors per year.
Volkswagen and Mercedes. The company but most of that business is with low, Hella profits from high volume sales, dealers, for example, even though margins are one or two carmakers. With body control-NAFTA market comes from Lear, Bosch, America. The closest competition in the employs roughly 120 engineers in North of sales are GM, Chrysler and Ford. Hella electronics division’s top cus-2007 fiscal year, the division won new customers in the NAFTA countries in order to support that effort, Hella has been making large investments in R & D and in resources to increase customer support throughout the world.

Hella has been broadening its engineering footprint to be closer to its end customers. “We did this in NAFTA, and we are doing it in Japan, China, India and Korea [through a joint venture with SL Corp.],” said M r. Tarabbia. In Japan, Hella had just four engineers in 2003; this year there are 20, and by 2012 that number will double. The Korean joint venture currently employs 30 engineers; another 40 will be hired in the next four years. Engineering employment in India will increase fivefold, from 50 in 2008, to 250 by 2012.

By 2012, 40% of Hella Electronics division engineers will operate in countries such as China, India and Romania, where engineering labor costs are low, compared with just 2% in 2006. Hella is working to modularize some of its products so they can be easily adapted to different customers, each with slightly different applications. Hella has had good success in applying this modular concept to its line of inductive pedal sensors, which determine pedal position and produce pedal haptics. The parts of the product that remain the same regardless of the application are kept standard and are partitioned from the parts that must accommodate variety, such as the electrical interfaces. Precise and robust, Hella’s inductive sensor can easily be customized to fit almost any application economically.

A bread and butter product for Hella, first introduced in 2001, inductive pedal position sensors will generate about 90 million euros in sales in the 2008 fiscal year. While the demand for Hella’s pedal position sensors is expected to continue growing—20% per year by volume—with unit prices in decline, euro sales will increase by just 10% per year. “We need to develop these kinds of products where we limit the application engineering, reduce the time to market and thereby increase the production volumes,” declared M r. Tarabbia.

Joint Ventures

More than most companies in our industry, Hella relies on joint ventures as a way to extend its product range and brand. “In order to grow the company we could invest in our own products, which we do, but we especially like partnerships,” explained M r. Tarabbia. “We try to find partners who are similar in size and have the same long-term approach to business. If we can find a good partner, we can both benefit from our experience, our

The Company Profile Continued

Hella Electronics Top Customers

<table>
<thead>
<tr>
<th>#1 Volkswagen</th>
<th>Hella Product</th>
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</thead>
<tbody>
<tr>
<td>#2 Mercedes</td>
<td>Inductive throttle position sensors</td>
</tr>
<tr>
<td>#3 General Motors</td>
<td>Auxiliary heaters</td>
</tr>
</tbody>
</table>

Hella Electronics also serves 150 tier-one and tier-two suppliers, which together account for about 16% of sales. The following, listed alphabetically are among the largest.

Company | Hella Product |
---------|--------------|
Bosch | Inductive throttle position sensors |
Eberspaecher | Auxiliary heaters |
Lear | Memory seat control units |
Honeywell | Turbocharger actuators |
TRW | Steering sensors |
Webasto | Auxiliary heaters |

Hella Electronics Sales by Product

| FY 2007 Total Sales: 1,024.7 million euros |
| Actuators, 21% |
| Car Body Electronics, 48% |
| Sensors, 25% |
| Driver Assist Technologies, 6% |

Hella Electronics Market Development

Hella Electronics’ sales have grown quickly in the NAFTA region—from $90 million in FY 2004 to $190 million in FY 2008, a 20.5% annual growth rate. In the 2007 fiscal year, the division won new business contracts worth more than 1.4 billion euros.

Hella Electronics division’s top customers in the NAFTA countries in order of sales are G M, Chrysler and Ford. Hella employs roughly 120 engineers in North America. The closest competition in the NAFTA market comes from Lear, Bosch, Continental and Delphi.

While Hella’s product line is broad, many of those products are sold only to one or two carmakers. With body controllers, for example, even though margins are low, Hella profits from high volume sales, but most of that business is with Volkswagen and Mercedes. The company
**Hella KGaA Hueck & Co.**

Hella's joint ventures begin informally. That was the case when Leoni and Hella began to work together in 2000 to develop a body-control architecture for the Opel Vectra. Leoni supplied the electrical distribution system and Hella the body control unit. In 2001, that cooperation led to the formation of the Intedis joint venture, which later won business with Ford, Daimler, Volkswagen and BMW.

More Hella joint ventures are likely. Martin Fischer, president of Hella Corporate Center USA, and responsible for all of Hella's U.S. business, sees opportunities in North America, for example, for cooperation between a mechatronics supplier and Hella's Electronics division.

“I think we have a footprint and a size that can be beneficial to some of the mechatronically oriented suppliers, perhaps in the area of roof control modules or lift gates—whoever needs a supplier of power controls,” he noted.

Dr. Fischer believes the corporate culture at Hella supports long-term, mutually beneficial joint ventures: “We have a very good mixture between our professional side—we fight fair and hard—and our human side. The management of this company really treats our people and our business partners with respect and with care.”

Winfried Menge, director of marketing for the electronics division, suggested that the strategic decision to pursue joint ventures usually makes good economic sense for Hella. “A joint venture uses exactly the competencies it needs. You limit overhead, and you focus sharply on a product for a certain market. Yes, it gives you half the profit, but with half the investment.” Menge has been with Hella since 1982. Prior to taking his current position, he was responsible for product marketing in North America.

**New Products**

- **Intelligent Battery Sensor**
  
  One of Hella’s most promising new products is one that has already been on the market for a few years, the intelligent battery sensor. It measures the battery’s current, voltage and temperature and uses a software algorithm to deduce from the data the state of charge (the amount of energy left in the battery), state of health (general condition) and state of function (cranking ability). The information from the battery sensor can be used to optimize the charging process and thereby trim CO₂ emissions by 2.4 grams per kilometer. The information from the sensor is also used to manage energy consumption while the vehicle is parked so enough energy to start the engine is always held in reserve.

  **Camera Applications**

  Hella expects carmakers to respond positively to several forward-looking camera applications under development, especially those that take advantage of the company’s headlamp expertise. Most of the camera and pattern recognition technology that Hella aims to deploy came by way of its 2006 acquisition of Aglaia, the Berlin, Germany, engineering firm that specialized in intelligent vision sensor systems. Aglaia, which produced 2.5 million euros in sales in 2005 and in 2006 had 30 employees, is now Hella Aglaia Mobile Vision, with more than 100 engineers.

  A **daptive cutoff line**: Hella uses the camera to continuously control the range of the high beams to illuminate as much of the road scene as possible without interfering with vehicles traveling in the lane ahead or with oncoming traffic.

  A **glare-free high beam**: This application uses a camera to continuously monitor oncoming vehicles. It controls headlamp direction in the vertical plane to light as much of the roadway as possible without producing glare for oncoming traffic.

  A **marking light**: Hella’s marking light product uses a camera to monitor the road ahead and modify the headlamp beam pattern to call the driver’s attention to obstacles or pedestrians along the side of the road, outside the area normally illuminated. Headlamp regulations will have to be modified to accommodate the marking light, but Hella is optimistic that it can

<table>
<thead>
<tr>
<th>Hella Joint Ventures</th>
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<tr>
<td><strong>BHTC (Behr-Hella Thermocontrol GmbH)</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Products</strong>: Climate controls, linear and cycled blowers</td>
<td></td>
</tr>
<tr>
<td><strong>Location</strong>: Lippstadt, Germany</td>
<td></td>
</tr>
<tr>
<td><strong>2007 Sales</strong>: 254 million euros</td>
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</table>

| **Employees**: 1,100 |  |
| **Ownership**: 50-50 Behr and Hella |  |
| **Founded**: 1999 |  |

| **HBPO (Hella, Behr and Plastic Omnium)** |  |
| **Products**: Vehicle front end modules |  |
| **Location**: Lippstadt, Germany |  |
| **FY 2007 Sales**: 761 million euros |  |

| **Employees**: 1,250 |  |
| **Ownership**: Hella, Behr and Plastic Omnium, one third each |  |
| **Founded**: 1992 as Hella-Behr Fahrzeugsysteme GmbH, a 50-50 J.V. In 2004, Plastic Omnium joined the company, and the name was changed to HBPO. |  |

| **Intedis** |  |
| **Products**: Development and optimization of the electrical/electronics (E/E) vehicle systems for OEMs |  |
| **Location**: Würzburg, Germany |  |

| **FY 2007 Sales**: Any resulting product revenue is attributed to either Hella or Leoni. |  |
| **Employees**: 50 |  |
| **Ownership**: 50-50 Hella and Leoni |  |
| **Founded**: 2001 |  |

| **Behr Hella Service** |  |
| **Products**: Joint development of the global independent parts aftermarket for vehicle air conditioning and engine cooling products |  |
| **Location**: Schwäbisch Hall, Germany |  |
| **FY 2007 Sales**: 124 million euros |  |
| **Employees**: 220 |  |
| **Ownership**: 50-50 Behr and Hella |  |
| **Founded**: 2005 |  |

| **HSL Electronic Corporation** |  |
| **Products**: Headlamp leveling systems, xenon control units, safety stop lamps, application development of pedal sensors |  |
| **Location**: Daegu, Korea |  |
| **FY 2007 Sales**: 47.7 billion KRW ($46.2 million) |  |
| **Employees**: 153 |  |
| **Ownership**: 50-50 Hella and SL Corp. |  |
| **Founded**: 2000 |  |
warns drivers when they inadvertently identify it and then react to what's on the ing: "It's very hard to move your eyes to a which is where the driver is already look-

Tarabbia thinks drivers will prefer a sys-

tries the beam profile according to vehicle

merations, Mr. Tarabbia cited European

also that it can function without disturb-

the safety benefits of marking light, but

depart from their lane. Hella has worked

Hard to make its system effective even in dark or snowy conditions, when lane

markings are hard to pick up.

Early in 2009, Hella will begin produc-

tion of its first, and at this time only, cam-

markings are hard to pick up.

Two other carmakers, two of which are German, are working with Hella on camera applications. Two of the three have development contracts with Hella; the third is working in a joint development project. A II of the carmakers are considering multi-use applications of the camera. "Nobody is putting a camera into a car for a single safety function," noted M r. Menge.

◆ Lane Change Assist

Hella's lane change assist system, which uses two rearward facing, 24 GHz radar sensors, one on each side of the vehicle to monitor the adjacent lanes, has found production with Audi, Mazda and Volkswagen. Mazda uses the safety feature in vehicles sold in the U.S. and in Japan.

Other Japanese carmakers have shown interest in Hella's lane change assist, because it is the only system that can be used legally in Japan without special approval. According to the company, Hella's system is the only one that can operate within the 76 M Hz bandwidth limitation.

Hella's system monitors oncoming vehicles as far away as 164 feet and measures both distance and relative closing speed to alert the driver when a fast approaching vehicle would make changing lanes unsafe. "This is especially helpful in Germany on the Autobahn where one vehicle is traveling at 80 km/h and the other at 130 km/h. You need to identify that a car is coming and the speed of the car, something that other suppliers don't do," noted Mr. Tarabbia.

One downside of Hella's approach is that the system works only at speeds greater than 30 kilometers per hour. The system is deactivated at 30 km/h and below to avoid misinterpretations which can occur when traffic is heavy. Hella is working with its customer on a second-generation system that can work down to 10 km/h. Hella expects its lane change assist product line to produce 100 million euros in sales in 2012.

◆ Electric Vacuum Pumps

One product that has been receiving more attention than you would expect is Hella’s electric-motor-driven vacuum pump for the brake booster. Carmakers run into situations where the engine provides insufficient vacuum to support the brake booster, and the option of running a vacuum pump full time off the fan is not acceptable. For example, Volkswagen is using the electric vacuum pump in high altitude applications in Mexico and the United States. The electric vacuum pump is also needed in hybrid vehicles, because the engine isn’t always operating and providing a vacuum source. Hella claims to have the only electric vacuum pump in mass production on the market. ◆
We spoke recently with Chrysler's top electrical engineer, Bill Mattingly, about Convergence 2008 and electronics at Chrysler. Mr. Mattingly is General Chair for this year’s Convergence conference, a must for anybody who’s serious about automotive electronics. Well supported by the global automotive electronics industry, Convergence is a place to meet the players and learn about the latest trends in business and technology.

Presented October 20-22, 2008, at Cobo Center, Detroit, the Convergence theme this year is “Vehicle Electronics Converging on Real Customer Needs.”

“This year our focus is not just on adding features to the vehicle, but rather on how we are going to help the customer make a connection with new features and find value in them,” said Mr. Mattingly. “That has to do with how effectively they are integrated into the vehicle. Here we can look for inspiration to the iPod, which dramatically improved the customer’s experience of music and video with an easy-to-use HMI on a device that’s affordable.”

Reflecting the dire challenges—or opportunities—our industry faces as a result of painfully high fuel prices and the necessary limitations on carbon dioxide emissions, three of the nine technical sessions will cover energy stewardship and protecting the environment. Topics of the remaining technical sessions are: safety, the connected vehicle, the human machine interface, product development process and testing, targeting consumer needs, and standards.

Another highlight of the conference is the Car Makers Speak panel, where top electrical engineers from the OEs, including Mr. Mattingly, will talk about how suppliers can help, about the latest industry trends, opportunities and challenges, and about their level of support for particular standards. Other panelists include Jim Buczkowski, director of E/E systems engineering at Ford; Toyohi Nakajima, senior chief engineer, Honda R & D; Chris Thibodeau, General Motors’ director global technology engineering for E/E products; and Dr. Günter Reichart, BMW vice president, driver assistance, body E/E and electrical networks.

Convergence exhibitors can be assured that plenty of customers will be making the rounds. “I intend to make sure that every electrical engineer from Chrysler is encouraged to go to the conference,” Mr. Mattingly said, “and I’ll urge other automakers to do the same. I am trying to break some attendance records.”

For more on Convergence, please visit www.sae.org/events/convergence.

Electronics at Chrysler

Mr. Mattingly also commented on some recent developments in electrical/electronic technologies engineering at Chrysler under the company’s new owners.

♦ Chrysler will increasingly turn to China and to India for electronics hardware and software components and engineering services. A mong the services most likely to be sourced from China and India are those for which the supplier doesn’t need access to the vehicles. “That would include things like validation and requirements documentation,” noted Mr. Mattingly. “We are near to the point with a supplier where we can do hardware-in-the-loop testing over the Web, even though the hardware exists in another region.”

♦ Daimler A G still has a minority stake in Chrysler, and Chrysler relies on Daimler for a number of advanced engineering projects. Chrysler will be working with Detroit area universities on other advanced projects.

♦ Roughly 20% to 25% of the cost of Chrysler vehicles comes from electrical and electronics content, a percentage that will stay about the same in the coming years for non-hybrid vehicles. “We’ve increased content but kept the average cost about the same,” said Mr. Mattingly.

Carmakers Embrace Start-Stop Micro Hybrids

BMW

Start-stop from Bosch is fitted to all BMW 1 and 3 Series four-cylinder engine and manual transmission models, and to the 2008 Mini.

Chrysler

Micro hybrids will be coming “pretty soon” according to Frank Klegon, executive vice president product development, speaking at the Los Angeles Auto Show in November 2007. Chrysler would not add to Mr. Klegon’s remarks except to refer us to three concept vehicles introduced at the Detroit Motor Show 2008, but noted that we’ll see “something from Chrysler’s ENVI development center” in three to five years.

Fiat

Starting in fall 2008, Fiat will offer start-stop from Magneti Marelli on the 500 models with 1.2 liter gasoline engines, followed by 1.5 liter diesels. Fiat will roll out start-stop on all its other models next year.

Ford

Ford has no micro hybrids in volume production now, but said, “We continue to evaluate this technology for future applications.” There is speculation the new Ford Ka in Europe, coming this fall, could have diesel stop start.

Mazda

Mazda will introduce its in-house developed Smart Idling Stop System (SISS) in the Japanese market in 2009. Mazda’s system does not use an electric starter motor. Rather, the system injects fuel directly into the cylinders while the engine is stationary and ignites the fuel to create downward piston force that starts the engine.

Mercedes

ECO start-stop supplied by Valeo will be available in September 2008 on BlueEfficiency models of the A 150 and A 170 and the B 150 and B 170. Start-stop is also available on the Smart MHD platform (fortwo micro hybrid).

Toyota

The Vitz in Japan has had start-stop available as an option since 2005. Whether or not Toyota will adopt start-stop to other models or bring it to other markets is currently under study by the company.

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