Microsoft De-emphasizes Its Automotive Business

The Microsoft Automotive Business Unit is gone, as is its general manager, Tom Phillips, and numerous engineers. The engineers have left the business to pursue more interesting jobs within Microsoft.

At its peak the Automotive Business Unit had 130 employees. Now at roughly half that number, the remaining employees who continue to focus on automotive will report to Kevin Dallas, general manager of the Windows Embedded Business Unit. The Automotive Business Unit had not been profitable but was expected to break even in the next few years.

Microsoft will continue to support the Ford Sync and Fiat Blue&Me product lines as well as Hyundai, which is developing a similar line of connectivity products based on the Microsoft Auto software platform. Upcoming deals between Microsoft and some German and Asian carmakers appear to be on hold, at least until carmakers assess how the elimination of the Automotive Business Unit will affect Microsoft's automotive product.

Now that the Automotive Business Unit has been absorbed by the Windows Embedded Business Unit, whose primary product is operating systems, Microsoft's automotive product strategy appears to have changed. According to Microsoft presentations in Europe as recently as July, the Automotive Business Unit had been working on creating standardized hardware and software interfaces that would make it simple for carmakers and tier ones to connect different hardware, applications and devices, much like Windows does for PCs.

Carmakers want a choice of different hardware platforms and they want middleware that lets them use data.

**Here Come the Koreans**

**Hyundai Motor’s Success Benefits Mobis**

In the quarter ending June 30, 2009, Hyundai Motor Company’s net income was actually up 48% from the prior year, to 811.9 billion won ($680 million). Even in a horrible global economy Hyundai Motor Company is thriving, and that has emboldened its Korean suppliers, most notably Hyundai Mobis.

Korea’s largest auto parts supplier, Mobis, is aggressively investing in automotive electronics with the intention of becoming one of the world’s top five auto parts suppliers by 2020. Mobis specifically wants to become a leader in the development of automotive electronics technology and plans to invest 1.2 trillion won ($1.0 billion) in the technology between now and 2015. In that period Mobis also plans to double its research personnel to more than 2,000. A new technology research center will include a complex dedicated to automotive electronics.

The supplier also says it expects to nearly double consolidated OEM sales from 12 trillion won ($10 billion) in 2009 to 22 trillion won ($18.4 billion) in 2015, a 10.6% annual increase. That’s considerably faster than the market is growing.

Mobis intends to acquire and develop technology to cover a full range of advanced automotive electronics products including driver assistance systems, infotainment systems, LED headlamps, and parts for hybrid and fuel-cell vehicles. As a result of Mobis’ acquisition of Hyundai Autonet, the company now supplies nearly 100% of Hyundai’s and Kia’s infotainment system requirements and roughly 20% to 30% of their body, powertrain and chassis electronics requirements. Mobis’ share of Hyundai’s and Kia’s electronics control purchases will definitely rise.

Mobis completed the acquisition of its sister division Hyundai Autonet in June of 2009. Autonet had been a joint venture between VDO Automotive (formerly a division of Siemens Automotive, which was purchased by Continental) with a 23.5% share and Hyundai Motor Group with 32.5%. The remainder of Autonet was publicly owned. After the merger, Continental ended up with just 2.2% of Autonet and no seats on the board, so it decided to cash out its ownership stake. Once the Autonet Mobis merger was complete, Mobis and Continental established a strategic partnership to work jointly on some development projects and share customer and market information.

Hyundai Autonet produced 1,138.5 billion won ($954 million) worth of car multimedia, body, chassis and powertrain electronics parts in 2008 and posted a net loss of 51.2 billion won ($42.9 million).

“Hyundai Motor believes strongly in automotive electronics and controls, especially body, safety and infotainment, so they want Mobis to control all of that business,” suggested Professor Myoungho Sunwoo, president of KSAE, and director of the Automotive Control and Electronics Laboratory at Hanyang University. Professor Sunwoo has worked with Mobis since the Autonet Mobis merger.

Turn to Koreans, page 3
LCD Clusters Are the Future

But They Won’t Soon Replace Demand for Electromechanical Instruments

Like electromechanical clusters, full color TFT LCD (thin-film transistor liquid crystal display) instrument clusters provide drivers with traditional vehicle information such as speed, fuel level, battery charge, engine speed and temperature, but they can also do much, much more. Using colorful graphics and images, they can convey more information per square inch than electromechanical gauges can. The same reconfigurable LCD cluster can be used in multiple car lines, and much of the software that creates the images can be reused from model to model, year to year, allowing OEMs to change which data they are presenting, as well as the look and feel of the cluster.

According to Denso, its 12.3-inch full TFT LCD cluster for the Toyota Crown introduced in February 2008 was the world’s first thin-film transistor cluster to completely do away with electromechanical instruments. The wide aspect ratio display can be used in four modes: normal, sport, economy and Night View, where the cluster displays images from the Crown’s infrared night vision system.

Night View scans the image for pedestrian shapes and highlights them with yellow boxes. Denso believes that increased content such as night vision is what will drive sales for LCD-makers Sharp. The smallest TFT LCDs start at approximately $50 and the price increases according to the size of the display.

Probably the next biggest challenge facing virtual LCD clusters is managing all the heat generated by the back lighting, “An LCD is simply a light shutter; all LCDs are backlit by a pretty large light source, usually an LED,” said Mr. Sadrack. Heat dissipation will get easier as white LEDs are developed that deliver more lumens per watt.

Other problems carmakers have with LCDs are more related to style and design. One issue is that you don’t see the display unless it is turned on. “When the ignition is off, all you see is a plain black surface, which doesn’t show that you have a classier cluster,” noted Steve Vrablik, who handles business development for Toshiba Mobile Displays. “Some OEMs don’t see that as a problem but others do. They want to see the pointer.”

Patrick Nebout, a director of product and business development at Johnson Controls noted, “With mechanical gauges you have the opportunity to add special finishes like chrome, or special colors, and that brings a lot of value for an OEM.” And while many instrument clusters are curved, LCDs are perfectly flat, which means that the instrument panel probably has to be redesigned.

Still another challenge is operating LCDs in cold weather. “If you’ve watched displays when it’s very cold, they don’t work very well,” said Toshiba’s Mr. Vrablik. Toshiba and Sharp handle the bulk of the automotive market for TFT LCDs. “For the carmakers, the TFT LCD cluster is really quite an undertaking; an OEM would really have to put its foot down and say, ‘Yes, we are going to do it,’” Mr. Vrablik noted.

Challenges Slow Widespread LCD Penetration

The biggest hurdle to be overcome before TFT LCDs replace electromechanical clusters on a broad scale is, of course, their cost. “Electromechanical clusters can cost as little as $20 whereas a fully reconfigurable cluster fitting the same footprint could easily cost $200,” said Doug Sadrack, director of North American automotive sales for LCD-maker Sharp. The smallest TFT LCDs start at approximately $50 and the price increases according to the size of the display.

Given the many obstacles, virtual TFT LCD clusters will mostly be limited to luxury vehicles with a “smattering of introductions breaking out here and there in some mainstream vehicles in three to five years,” suggested Sharp’s Mr. Sadrack.

Combination LCD-Electromechanical Clusters Are Growing

LCDs have been used for years to complement analog clusters and, according to the experts, applications are definitely increasing. LCDs are getting larger and they are moving down market, though how far down market they will go is a matter of cost.

“In general we see the demand for TFT increasing as the penetration increases, but cost pressure is great. Maybe in the very low end you will not have a TFT display in the car as people tend to use their own GPS mobile phones for navigation,” observed Thomas Koch, Toshiba Mobile Displays’ business development manager in Europe.

A terrific example of the state of the art of combination clusters is Ford’s SmartGauge, used in the Ford Fusion and Mercury Milan hybrid vehicles. The

Turn to Clusters, page 8
Hyundai Motor Company on long term research since since 2001. 

Hyundai Mobis isn’t the only Korean company getting aggressive about serving carmakers abroad; other suppliers are as well. “Look at Mando. A few years ago they only sold their brake, steering and suspension products to Hyundai-Kia and domestic companies. But in the last half decade, their business grew overseas as well,” pointed out Professor Sunwoo. 

LG Electronics is another Korean company with a bright future. “They spent many years developing an OnStar-type system for Hyundai Motor Company. At first it didn’t perform very well, but recently their quality, value, features and affordability are much stronger. That is the reason they got a big contract from GM,” according to Professor Sunwoo. LG Electronics makes OnStar telematics control units for General Motors and has been bidding on other infotainment control units for General Motors and has been bidding on other infotainment controls for General Motors. Hans-Georg Frischkorn, who until recently was General Motors’ top electrical engineer, thinks Mobis is a very interesting supplier; and companies like LG and Samsung that have a strong base in consumer electronics and who leverage that volume base for automotive offerings are also very interesting.

Mr. Frischkorn described a trip he took some months ago to visit some Korean companies including LG Chem. LG Chem will produce the lithium-ion battery cells for the GM Volt extended-range electric vehicle. “The trip to LG Chem was one of the most interesting experiences of my lifetime,” he said. “The depth of research, the depth of manufacturing engineering, the degree of optimization, the quality controls. They already make millions of lithium-ion batteries [for consumer applications]—it’s hard to see how any of the small North American or European battery manufacturers can ever get there. ... I think they have 700 people just doing battery research. It’s unbelievable.”

LG Chem and Mobis have a memorandum of understanding to form a joint venture to produce Li-ion battery packs for Hyundai and Kia.

In a recent interview with the Associated Press, executives from Honda and Nissan acknowledged that Hyundai-Kia is the biggest threat to Japanese carmakers. The Hyundai-Kia Automotive Group has grown into the world’s fifth-largest vehicle producer, ahead of Honda, Nissan and PSA. From 2004 to 2008 Hyundai’s production volume increased 10.8% per year, compared with Toyota, whose production volume increased at the rate of 7.9% per year in that period.

But that success won’t necessarily translate into opportunities for non-Korean suppliers, unless those suppliers offer products not presently available from Korean suppliers. And even then, because Hyundai is very keen not only to have local sources but sources that are part of the Hyundai family, foreign suppliers may find their engagements with Hyundai short lived.

That was the experience of an executive from a world-class Western supplier, one that has been operating in South Korea for years. “When you work with the Koreans they have one big intention: they want to localize. That was fine for us because we have local production there. But Hyundai-Kia has its own suppliers, part of their chaebol, as they call it in Korea. It was pretty clear that they tried to use us to get the know-how and build similar competence in house using their own suppliers,” explained the executive, who didn’t want to be identified.

I asked my source his opinion about Hyundai Mobis, if he thought the company would one day be among the top five global auto suppliers. “They will definitely grow and definitely will become more successful, because they are very ambitious and hard working, and they do anything they can to acquire the know-how. Their people are very diligent. They have a very patriotic mindset. They don’t want to depend on foreign companies. They know that foreign companies have made good money in Korea so far, and they don’t want that to continue. They want to make the money themselves and grow internationally.”

Concerted Korean Effort

Intent on building a world-class, self-sufficient automotive industry with strong local sources of technology, especially.

Koreans...
The majority of Delphi's assets were acquired by a group of investors on October 6, 2009, and the company is now privately held. The new Delphi is significantly smaller, leaner and more sharply focused than the company that sought bankruptcy protection from its creditors four years ago. So much has changed since we last profiled Delphi in November 2003 that we are publishing its profile in two parts. Part One updates Delphi's corporate story, including a look at the company's new strategy and competitive positioning. Part One also includes part of the profile of one of its largest business segments: Electronics and Safety Systems. Next month in Part Two we complete the Electronics and Safety section and profile three other business segments: Powertrain Systems, Electrical/Electronic Architecture and Thermal Systems.

Background

An April 1999 press release from General Motors announced that its board finally approved the complete separation of Delphi from GM following the spin-off of its in-house parts division through an initial public offering in February 1999. More than ten years have passed since that announcement and in that time both companies have entered and emerged from bankruptcy, and GM once again has an ownership position in Delphi. GM will have a minority position on Delphi's board of managers but will have no operating role or authority over Delphi.

In its first two years as a public company, Delphi produced respectable net margins—3.7% in 1999 and 3.6% in 2000—but never achieved its initial long-term goal of 5% margins. The company lost money in 2001, made very modest profits in 2002, and posted a small loss for 2003. Net loss grew to $4.8 billion in 2004 and Delphi was on its way to a net loss of $2.4 billion when it declared bankruptcy in October 2005.

Unable to raise the capital it needed to emerge, Delphi was stuck in bankruptcy for four years, well into the global credit crisis and the worst recession since the Great Depression. Because Delphi remained a strategic supplier to General Motors, probably the carmaker's most important one, GM had the most to lose if Delphi had to liquidate and the most to gain if Delphi emerged healthy.

But GM's own financial difficulties culminated in June of 2009 when the carmaker filed for bankruptcy protection. GM didn't have the liquidity to help finance Delphi's emergence until it got its own finances in order. With a lot of help from the U.S. government, GM emerged from bankruptcy on July 10, 2009, with enough resources to contribute financing for Delphi's exit as well.

On July 26, 2009, General Motors agreed to provide capital investment and back-up financing totaling more than $2.4 billion. In return for some of those funds, GM agreed to acquire Delphi's global steering business as well as four manufacturing plants, including Delphi's electronics component manufacturing facility in Kokomo, Indiana, which was home to Delco Electronics before it became part of Delphi. Nearly all the engine controllers, safety electronics, ICs and sensors built in Kokomo are for GM vehicles. Headquarters for Delphi Electronics and Safety and its largest technical center remain in Kokomo.

Most of Delphi's assets were transferred to its debtor-in-possession lenders, who forgave loans amounting to $3.4 billion in exchange for acquiring the company.
The Hansen Report on Automotive Electronics, Portsmouth, NH USA  www.hansenreport.com October Page 5

Silver Point Capital, a distressed debt and credit-focused private investment firm based in Greenwich, Connecticut, and Elliott Management, a private investment firm based in New York, were the major lenders.

Rodney O’Neal remains Delphi’s CEO; a new board of directors will be named. And while Delphi management requested $85 million in bonuses to be paid upon emergence from bankruptcy, none will be paid and stockholders will receive nothing. Over the four years, Delphi lost nearly $8 billion and spent more than $400 million on bankruptcy-associated legal fees.

R&D

As of December 31, 2008, Delphi employed 16,500 engineers, scientists and technicians; more than one-third of them were focused on electronics and high technology products including software algorithm development. Delphi operates 32 technical centers around the globe including facilities in the United States, Europe, China, India, Singapore, South Korea, Mexico and Brazil.

Andy Brown, executive director and chief technologist at Delphi’s Innovation and Technology Office, believes that going forward the new leaner, smaller Delphi can distinguish itself from its much larger competitors by providing more

The New Delphi

- Privately held by investors; future financial statements will not be made public.
- Downsized to be cash flow positive in 2010, even with sales at $10 billion.
- Delphi now has about 100,000 employees, down from more than 200,000 in 1999 and down from 124,000 employees in June 2009. Only 5,500 employees, representing about 5.5% of Delphi’s global workforce are based in the United States. In 1999, 41% of employees were in the U.S. and Canada.
- Less dependent on GM:
  In 1999, GM accounted for 76% of Delphi’s sales. By 2008 GM accounted for just 31% of sales, and will account for approximately 15% of sales in 2009.
- Changes in focus:
  From high cost to low cost manufacturing
  From high cost engineering to low cost engineering

From low technology products to high technology products
From low margin business to high margin business
Reduced investments in non-automotive/transportation markets

- Product portfolio narrowed:
  No longer in ride dynamics business—no braking, suspension, ABS, or ESC

Global steering business sold to GM, will operate as Nexteer Automotive
Will exit occupant protection systems (airbags, seatbelts, steering wheels) by the end of 2009
Battery business sold to JCI
Global exhaust business sold to Bienes Turgon of Mexico
Interiors and closures business sold
Delphi tried to sell its cluster business in 2002 but decided to retain it in order to remain in the display and HMI business.

Delphi’s success in penetrating the established diesel injector market in Europe, and in Brazil, with engine management systems for flex fuel vehicles. Delphi also sees growth opportunities in India, China and other emerging markets. Sales in the Asia Pacific region are growing the fastest. The company won business with Tata Motors for the instrument cluster and engine immobilizer on the ultra-low-cost Nano released earlier this year, and according to Mr. Owens, “If you want to talk about competing on cost and technology, that was the acid test.” Mr. Owens is also president of Delphi’s Electronics and Safety business unit, president of Asia Pacific and officer champion for engineering.

Toyota is one of Delphi’s largest customers and its business with the carmaker is growing in all regions, especially Brazil and China, where Delphi is well established. We asked Mr. Owens why customers such as Toyota buy from Delphi, and what distinguishes the new Delphi from its larger competitors. “The ability to

continued on following page
deliver programs on time, the ability to deliver programs at a competitive cost, the ability to deliver programs with a firm management structure in place, with a supply base and a logistics chain,” he said.

Five years ago, Delphi started taking a hard look at its launch statistics with an eye to fixing underlying problems that cost the company in wasted dollars, wasted time and customer dissatisfaction. According to Mr. Owens, CEO Rodney O’Neal made it very clear that the only way customers would continue with Delphi through bankruptcy and beyond is if Delphi could execute existing business flawlessly. “Our team was able to accomplish that and make Delphi’s restructuring process transparent to our customers. And we were able to improve our launch performance across all product lines through this period,” Mr. Owens said. “I believe our launch performance now is second to none in the industry.”

Delphi is especially proud of the packaging innovations it developed to make the IGBT (insulated gate bipolar transistor) modules used in its high-voltage inverters easier to ship, pack and handle. Delphi is also supplying DC to DC converters to BMW and Daimler. “Only a few suppliers offer robust, low cost, three-kilowatt converters,” pointed out Bob Schumacher, general director advanced product and business development for Electronics and Safety.

Delphi is the recipient of an $89.3 million grant from the U.S. Department of Energy to support low cost manufacturing of power electronics components for electric-drive vehicles in the Midwest. “The grant funding will speed up commercialization of our inverters, converters and controllers and help us to establish a validation and manufacturing base. It’s a big shot in the arm,” said Dr. Schumacher. All of the funds will be spent within the Electronic Controls division (of the Electronics and Safety segment), headed by Beth Schwartz, division vice president.

Power Electronics for Electric and Hybrid Vehicles

Delphi has had people working on power electronics systems for electric and hybrid vehicles for a long time; its power electronics were used on GM’s pioneering EV1 electric vehicle back in 1996. Now power electronics to support the electrification of the powertrain is one of six technical areas where the division is focusing R&D and business development efforts.

Delphi is or soon will be shipping inverters, converters, chargers, controllers and battery packs for hybrids and EVs. Delphi supplied the auxiliary power module or DC to DC converter on the GM Tahoe and Cadillac Escalade hybrids from the Kokomo plant, which is now owned by GM.

Delphi Customers

<table>
<thead>
<tr>
<th>#1 GM (31% of sales)</th>
<th>Case New Holland</th>
</tr>
</thead>
<tbody>
<tr>
<td>#2 Ford (6%)</td>
<td>Chrysler</td>
</tr>
<tr>
<td>#3 VW (5%)</td>
<td>Citroen</td>
</tr>
<tr>
<td>Others alphabetically: AGCO</td>
<td>Daimler</td>
</tr>
<tr>
<td>Air International</td>
<td>Faurecia</td>
</tr>
<tr>
<td>Alfa Romeo</td>
<td>Ferrari</td>
</tr>
<tr>
<td>Applied Materials</td>
<td>Freightliner</td>
</tr>
<tr>
<td>Benteler</td>
<td>General Electric</td>
</tr>
<tr>
<td>BMW</td>
<td>Harley Davidson</td>
</tr>
<tr>
<td>Bosch</td>
<td>Honda</td>
</tr>
<tr>
<td>Calsonic Kansei</td>
<td>Hyundai</td>
</tr>
<tr>
<td>Caterpillar</td>
<td>Isuzu</td>
</tr>
<tr>
<td>Ivec</td>
<td>John Deere</td>
</tr>
<tr>
<td>Johnson Controls</td>
<td>Kia Motors</td>
</tr>
<tr>
<td>Kimball</td>
<td>Lancia</td>
</tr>
<tr>
<td>Lear</td>
<td>Lockheed Martin</td>
</tr>
<tr>
<td>Mack Trucks</td>
<td>Maserati</td>
</tr>
<tr>
<td>Mercury</td>
<td>Nissan</td>
</tr>
<tr>
<td>Peugeot</td>
<td>Pioneer</td>
</tr>
<tr>
<td>Porsche</td>
<td>Raytheon</td>
</tr>
<tr>
<td>Renault</td>
<td>SeaRay</td>
</tr>
<tr>
<td>Suzuki</td>
<td>Ssangyong Motor</td>
</tr>
<tr>
<td>Tata</td>
<td>TI Automotive</td>
</tr>
<tr>
<td>Toyota</td>
<td>TRW</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>
silicon, which together with other innovations like embedding the heavy copper bus bar along with the film capacitors into the printed circuit board, lets us cut the volume, mass and cost of inverters by 50%.” Delphi has booked power electronics business that includes its proprietary IGBT package. The IGBTs used in the package come from Delphi’s partners.

◆ **Battery Packs**

Ford uses Delphi’s NiMH (nickel metal hydride) battery packs on its Fusion and Mercury Milan hybrids. Delphi is developing Li-ion (lithium-ion) battery packs that could potentially be introduced on a production vehicle as early as 2010.

“We don’t build the cells; they are shipped to us. But we do everything else including the design, the mechanical system, the mounting of the individual cells, monitoring and management of the cells, the cooling of the system and ensuring its crash worthiness in a rear-end collision,” Dr. Schumacher noted. “When people think about lithium-ion batteries, they mostly think about the cells. But if you look at the cost of a battery pack, only about half the value is in the cells; the other half is in the pack.”

◆ **Power Box**

Delphi’s Power Box hybrid vehicle system includes a traction inverter, DC to DC converter, battery pack, bus distribution center, battery management controller, safety circuit and thermal management subsystems, all integrated into a single unit that fits behind the rear seat. “You use it to turn an ordinary sedan into a mild hybrid, which has power levels be-

tween 20 and 30 kilowatts,” said Dr. Schumacher. Delphi supplies the Chinese carmaker SAIC with a Power Box that uses Li-ion batteries from A123.

**Safety**

◆ **Electronically Scanning Radar**

Dr. Schumacher is especially proud of another innovation, one that he had a hand in developing some 20 years ago when he was working at Hughes Aircraft Company. Hughes Aircraft for a time was a sister division of Delphi when both were part of General Motors. “We have done a ton of work on radar here at Delphi over the past 15 years, and now we can offer an electronically scanning MMIC gallium arsenide radar transceiver that’s affordable and small, just 173.7 x 90.2 x 49.2 millimeters,” he said. (MMICs are monolithic microwave integrated circuits.)

The new radar sensor debuted this summer in the 2010 Ford Taurus’s adaptive cruise control (ACC) system. The optional ACC on the Taurus sounds an audible alert if it detects a potential collision and pre-charges the brakes so they react more quickly in a panic stop. The radar sensor is also part of the ACC systems available on the Lincoln MKS luxury sedan and the Lincoln MKT luxury crossover.

The sensor combines a wide field of view at mid-range with long-range coverage. The wide mid-range coverage not only detects vehicles that cut in from adjacent lanes but also identifies vehicles and pedestrians across the width of the vehicle. The long-range coverage keeps track of up to 64 targets in the vehicle’s path.

Delphi has also booked an order for the radar sensor with an Asian carmaker. Delphi began supplying ACC radar sys-

tems to Volvo in 2006 and in 2007 launched a radar/vision fusion system that performs collision mitigation braking. Delphi is developing an even smaller radar sensor that uses just one circuit board instead of two.

◆ **Vision Systems**

“You can’t do active safety with radar alone,” according to Dr. Schumacher.

“What you really want is a small, simple, low cost solution that integrates radar with a camera in the same package. It is something we are working on.

“We have already developed some high performance vision processing algorithms. The camera itself is really a commodity; much of the value in vision systems is in the application software. We are developing algorithms to determine which obstacles should trigger collision mitigation braking, for example, and for lane departure warning, road sign recognition and for curve speed warning.”

Delphi is also developing rearview camera systems to prevent back-over accidents. The U.S. National Traffic Safety Administration is considering mandating systems to improve rearview safety. While Delphi has already booked several rearview camera programs, it is working on ways to complement vision sensors with other sensing technologies, for example radar or IR-thermal.

◆ **Passive Occupant Detection Systems**

Of all the safety electronics products made by Delphi, the biggest revenue producer is its passive occupant detection system (PODS), designed to classify the occupant in the front passenger seat and prevent the airbag from deploying if the passenger is a child or small female.

PODS, which consists of a pressure sensor, bladder assembly (with fluid), belt-tension sensor and an IR-thermal sensor, is used in about one-third of all vehicles sold in the United States. Introduced in the mid-1990s, PODS is now available in four versions, including two that use fluid-filled bladder assemblies, and two that use sensor mats.
Clusters...

Continued from page 2

Koreans...

Low-Tech, Low-Cost Solutions Persist

While TFT LCDs represent the state of the art of bright, colorful, high-resolution digital automotive displays, virtual clusters using inexpensive TN (twisted nematic) segmented LCDs have been around for awhile. Since 2004 Johnson Controls has shipped 1.7 million of them to Renault and to PSA Peugeot Citroen. “The market for these passive, segmented or dot-matrix LCD clusters is steady,” said JCI’s Patrick Néboult. “but it is [concentrated] on low-end and small-car segments. In the upper segment, carmakers will replace passive displays with TFT LCDs, but to go much further we must first have a huge decrease in the TFT price.”

Despite the many benefits of LCDs, electromechanical instruments won’t soon be made obsolete. Electromechanical clusters with their stepper-motor gauges, drive electronics, lighting and LED telltales, are at least half and as little as one-tenth the price of TFT LCD clusters. “We are still a long way from replacing analog-type gauges completely,” Sharp’s Mr. Sadrack predicted. ◆

Microsoft...

services and applications from a variety of sources without having to change their systems. Microsoft has developed some software interfaces with middleware, for example a speech API, but it’s hard to see how all the other needed middleware will get developed with the reduced engineering resources.

Automotive product manager Velle Kolde maintains that Microsoft is still in the automotive middleware business: “We start off with the base Windows CE components, add automotive-specific middleware and drivers; we integrate them and then test the whole thing.”

According to Mr. Kolde, the one big change is that Microsoft will get away from doing the sort of custom engineering work it did for Ford and Fiat. “We are trying to continue to innovate on the platform and build in functionality that has applicability to most carmakers. Microsoft’s model is to build software with broad appeal and sell hundreds of thousands or millions of copies,” he said.

A less entrepreneurial Microsoft in the automotive infotainment industry is good news for those working on competing automotive software platforms. The Genivi infotainment systems alliance, led by Intel and its newly acquired Wind River subsidiary, BMW, PSA, Magneti Marelli and General Motors, is a likely winner. An open-source community, Genivi is developing Linux-based core services, middleware and open application layer interfaces.

Harman Becker is also poised to take advantage of any reduced Microsoft focus, as is the Finnish software developer Elektrobit (EB). EB is working with Audi to develop an infotainment system framework, which they plan to offer to other carmakers as well.

Other players who could benefit include Garmin and TomTom. TomTom has been working with European OEMs on new system designs; Garmin is currently working with a North American OEM.

While it appears that the OEM automotive business is no longer a priority for Microsoft, it has no plans to make an abrupt exit from the business. According to Mr. Kolde, the company still plans to cosponsor Convergence 2010 with Ford, but it is not at all clear which Microsoft executive will represent the company at the event. Since 2002 there have been four different managers in charge of the Automotive Business Unit. ◆