Conversation with Aston Martin’s Top EE, Alan Bennett

I recently got to sit down with Alan Bennett on the train from Narita Airport into Tokyo. We were traveling together on a speaking tour organized by Mentor Graphics, the company that produces CHS, the auto industry’s top electrical system tool suite, and the Volcano network tool suite. I was on the tour to talk about trends in automotive electronics. Mr. Bennett, a happy user of Mentor Graphics products, talked about the unique problems of developing engineering solutions for a carmaker whose annual volume, according to reports, is only 5,000 cars, approximately.

“The big thing for low-volume producers is you want to go where most of the people go. Because if you are left out, with a small number of suppliers doing your architecture or your communications network, then you’ve limited yourself in terms of the availability of modules,” he said. “The frustration for me is the promise of standards that never actually become real standards. The auto industry is notoriously bad at producing standards and sticking to them. You end up with flavors of standards that then restrict development of standards-based ECUs.

“For example, there are several generations of MOST; it is not truly an open standard. High piece costs have kept some high-volume buyers from using it. The problem for us isn’t so much the piece costs, the problem is the lack of standard modules. So when you go to make some changes, say, to integrate the iPod, you have to develop a specific module to fit the MOST generation you are using. If nobody’s done it already then you’re hit with a fairly big development cost,” Mr. Bennett explained.

Mr. Bennett has been developing Aston Martin’s electrical and electronics Turn to Aston Martin, page 8

Restraint Systems Update

Because airbags can be counted on to save lives and reduce injury, they are mandated by many countries. A according to restraint system supplier Autoliv, 100% of the passenger vehicles produced for sale in North America are equipped with airbags, as are 98% of vehicles in Europe and Japan. Global penetration of airbags in new vehicles in the rest of the world is already at 65% and is growing.

Airbags have been around since the late 1980s. The market has become huge and, if it weren’t for the global recession, would still be growing, with not a lot of new entrants to threaten the leading incumbents: Autoliv, TRW and Takata.

A according to Autoliv, $14 billion worth of airbags, electronics and seatbelts will ship in 2009, down from $18 billion in 2008. Takata estimates that 200 million airbags and 50 million airbag electronic control units (ECUs) are sold each year.

An airbag ECU, including the crash sensors within, costs carmakers between $35 and $50. In addition, carmakers can install up to 20 satellite sensors—crash sensors and occupant classification sensors —outside the ECU, says semiconductor maker Freescale. Each airbag system includes an average of eight squibs, one for each airbag and one for each seatbelt pretensioner, according to TRW.

Even though the passive restraints market is a mature one, suppliers and carmakers continue to develop new technologies and more advanced systems to better protect all the occupants in a vehicle if an accident cannot be avoided. We spoke recently with the leading airbag suppliers to learn what is new and where restraint systems are headed.

More Airbags per Vehicle

The fastest moving product in terms of revenue is side-curtain airbags, said Autoliv’s vice president of corporate communications, Mats Odman. “Mercedes and Volvo first started using curtain airbags in 1998, and now the penetration rates are increasing all over the world. Penetration [in new vehicles] was 60% in Europe and 80% in North America in 2009,” he noted. Curtain airbags cost from $50 to $100, depending on the length of the vehicle. A according to Mr. O dman, some curtain airbags are so long they require two inflators.

Demand for curtain airbags has been picking up quickly in the United States in anticipation of stronger side-impact protection requirements. A revision to FMVSS 214 requires that, beginning in September 2010, 20% of all new vehicles be fitted with side impact protection, increasing 20% each year to 100% by 2014. Curtain airbags will most likely be used to fulfill the requirement. And further, in early December 2009, the U.S. government proposed that side-curtain airbags be made larger to cover the window opening, be made more robust to remain inflated longer, and be made sufficiently strong to prevent an occupant from being ejected through the side window. Phase-in of the proposed new regulation would start in the 2014 model year and cover all vehicles by the 2017 model year.

A according to Takata, in addition to side-curtain airbags, other types of bags are proliferating, especially those that will better protect elderly drivers, children and rear-seat occupants. Increasingly popular are knee airbags for lower leg protection and occupant positioning, rear-window airbags, pedestrian airbags and inflatable seatbelts. Ford announced plans to equip rear seats in its 2011 Explorer SUV, with inflatable seatbelts developed by Key Safety Systems.

Other Safety Functions Integrated Into Airbag Controllers

Located in the center tunnel, close to the vehicle’s center of gravity, the airbag ECU is a good place to locate other electronics, for example, the inertial sensors used for stability control. A according to Turn to Restraints, page 3
Nvidia Module to Run High-End Infotainment for All Volkswagen Group Vehicles

Graphics Processor Unit Inventor’s Auto Business Lights Up

Beginning with the new Audi A3, which goes into production in the summer of 2012, Nvidia, the Santa Clara, California-based visual computing company, has inked a deal to supply a state-of-the-art computer module to power every high-end infotainment system installed in Volkswagen Group models. The infotainment system was designed by Audi engineers, who are responsible for the high-end infotainment systems used throughout the Volkswagen Group. Harman will be the tier-one supplier.

At the heart of the module will be Nvidia’s brand new Tegra 2 multimedia computer-on-a-chip. With eight dedicated processors, it is probably the most powerful computer ever embedded in a vehicle.

The multiprocessor system-on-a-chip includes a GeForce-class GPU (graphics processor unit), two Cortex A9 ARM CPUs, an ARM7 processor, an image processor, an audio processor and an HD video processor. Nvidia’s GeForce GPU’s employ a massively parallel, general-purpose computing architecture. Cortex A9 is ARM Ltd.’s newest 32-bit RISC (reduced instruction set computer) multicore processor, considered ideal in systems requiring low power consumption.

The Tegra 2 chip supports the QNX operating system, which is what Audi will use, at least initially. It also supports Linux, Android and Windows CE. QNX is a division of Harman International.

“Audi engineers selected Tegra 2 because it allows them to run a lot of stuff simultaneously, which is essential to high-end infotainment,” explained Taner Ozcelik, general manager of Nvidia’s automotive business unit. “For instance, you need to be able to run a 3D navigation system and a DVD system on a dual view display in the front of the vehicle, and two displays in the back for playing movies from a flash drive or games. Audi was looking for a chip with very low power consumption so the system would not impact the vehicle’s fuel efficiency. Tegra 2 consumes between two and three watts, compared with 15 watts drawn by the first-generation Tegra chip used in Audi’s current infotainment system, MMI 3G. MMI 3G required a separate box, a radio unit, which can now be integrated into the head unit. There is no other chip, including Intel’s Atom, that comes close to this chip in performance,” Mr. Ozcelik asserted.

Designed for Web computing, Tegra 2 will see most of its applications in the consumer electronics market—in tablet PCs, smart books, notebooks and mobile Internet devices.

The Volkswagen Group’s Nvidia computer module includes other components besides the Tegra 2 processor. It also includes a 64-gigabyte solid state memory and boot flash. “It’s basically a small microcomputer that will be connected to online services all the time,” said Mr. Ozcelik.

The idea for the module was taken from Nvidia’s notebook experience. Called an MXM (for mobile PCI Express module), it conforms to the MXM standard that defines the interface between PC and graphics subsystems. MXM covers the mechanical, electrical, thermal and software interfaces, including the connector.

The software framework for Volkswagen Group’s high-end infotainment system is being developed by e.solutions GmbH, a joint venture set up in 2007 between Audi subsidiary Audi Electronics Venture (AEV) and Elektrobü. (See page-one article in the July/Aug 2009 Hansen Report) “Audi is extremely hands-on with this platform development,” said Mr. Ozcelik. “They take pride in architecting the system and knowing exactly what will be built. Rather than having tier-one companies try to do it all, the e.solutions joint venture performs a little like a tier-one-and-a-half supplier.

e.solutions is like a Silicon Valley company but set up in Ingolstadt, Germany [where Audi has its headquarters].”

Nvidia, which invented the programmable graphics processor in 1999, says it was “pulled into” the automotive market in 2004 by Magneti Marelli, and began shipping infotainment system GPUs to them in 2006 for Peugeot, Citroën, Dacia, Lancia and Maserati vehicles.

All of Audi’s 2010 cars fitted with the MMI 3G infotainment system employ a GPU from Nvidia, except for the A8. When the new A8 comes out at the end of 2010, it will be the world’s first car to feature Google Earth, with its 3D satellite images, topographic details, Wikipedia tags and Panoramic photographs, all enabled by an Nvidia GPU.

continued on page 3
TRW, that integration would eliminate one enclosure, some wiring, a connector and a power supply, saving carmakers $10 to $15 per vehicle. “Not only do you save money, but with the additional sensor data you get improved airbag performance in side-impact and rollover crashes, and you can interface with the braking controllers,” noted Sharath Reddy, passive safety electronics director of engineering at TRW. “We can process that data to make better judgments about how best to protect the occupants.” Data from stand-alone inertial sensor clusters has always been available on the vehicle CAN bus, but gets updated too slowly to be of much use in crash detection. If the inertial sensors were in the airbag controller, their data could be processed more quickly, while still maintaining brake system performance.

“A first carmakers were a bit reluctant to integrate the inertial sensors into the airbag ECU,” said Martin Thoone, vice president of engineering electronics, Global Electronics at TRW. “A active and passive safety groups are sometimes in separate organizations. But now, especially in this economic climate, carmakers are moving extremely fast.” TRW recently won two orders for its airbag controller with integrated ESC sensors, one from a large European carmaker and the other from a Japanese carmaker for transplant production in Europe and the United States. Both pieces of business will start shipping in 2012.

Last year airbag supplier Autoliv integrated ESC sensors into its airbag controller for the Ford F-150 truck and has contracts with other carmakers to do the same. Autoliv said its integrated airbag ECU works with ESC systems from all the major suppliers.

“If a U.S. mandate requiring rollover sensors becomes law, a market could develop for a dual gyro sensor that senses both yaw for stability control and roll,” said TRW’s M r. Reddy.

Continental is working on systems that integrate active and passive safety. Passive restraint systems would benefit from early warnings provided by radar and vision sensors. “With that data, right before the crash you can adjust the seat, tighten the belt, adjust the steering column, and close the windows and the sunroof to optimize protection,” explained Jürgen H erold, head of systems engineering at Continental. “Then if the crash happens you can adjust airbag behavior, perhaps delay firing between the stage-one and stage-two inflators.”

Crash Impact Sound Sensor

Today airbag systems benefit from accelerometers situated within the airbag ECU as well as from accelerometers that are placed at the front and sides of the vehicle. In order to improve the response time for side airbags, which must react in 5 to 10 milliseconds, carmakers are installing pressure sensors in the door cavity that instantly detect deformations caused by crashes from the side.

In frontal collisions, the airbag ECU has between 10 and 40 milliseconds to calculate when and with what force to deploy the airbags. To provide better early information about crashes at the front of the vehicle, Continental developed a crash impact sound sensor that instantly picks up the sound generated as the front bumper begins to crumple. “We use a capacitive sensor element that is optimized to detect frequency ranges up to 16 kilohertz. The sensor is inside the airbag ECU, which is acoustically coupled to the vehicle chassis,” explained Michael Feser, a safety engineer at Continental. “This gives us information about the severity of the crash and tells us how to control the airbag in the best way to protect the occupant.” The sound sensor has been in production for a year on the Volkswagen Golf.

Active Seatbelts

Demand is growing for active seatbelts, so-called reversible seatbelt pretensioners, which are controlled not by pyrotechnics but by an electric motor. “If the driver manages to avoid the crash, you can release the seatbelt,” noted Autoliv’s M r. Odman. Autoliv’s active seatbelts, used only by Mercedes and BMW thus far, cost more than twice what seatbelts with traditional pretensioners cost. A autoliv sees the market for active seatbelts growing as active safety systems with pre-crash sensing become more widely available. “You need pre-crash sensors to take full advantage of these active seatbelts,” said M r. Odman.

Low-Risk Airbags

Early airbag systems could deploy with sufficient force to injure small or out of position passengers. Because some carmakers now use so-called low-risk or continued on page 8

Continued from page 1

Nvidia

So far, Nvidia chips are installed on seven vehicle brands, 21 models in all, with more to come. While today those automotive chips are used almost exclusively in infotainment systems, Nvidia has numerous projects in the works involving instrument cluster displays and driver assistant systems.

Instrument clusters, which are becoming more graphics intensive, are Nvidia’s next most promising automotive application. Nvidia chips will power combination clusters that employ one or more TFT displays along with stepper-motor-driven instruments. They will also power reconfigurable digital clusters. Demand for combination clusters is growing much more quickly than demand for digital clusters.

“Driver assist systems have nothing to do with pixels or graphics,” said M r. Ozcelik. “They use our GPUs, based on Nvidia’s CUDA (Compute Unified Driver Architecture) technology, as compute devices to process images in real time for applications such as blind spot detection, intelligent back-up systems and collision avoidance.” A nnounced in 2006, CUDA lets programmers work in C and C++ to employ the GPU in massively parallel computations. “We are engaged with the research departments of several automotive companies doing research on CUDA for a variety of automotive applications in active safety and driver assistance,” M r. Ozcelik added.◆
The Company Profile... Nippon Seiki

**Background**


While automotive instruments are the company’s largest product line, accounting for 43.5% of total sales, Nippon Seiki is the world’s number one supplier of motorcycle instrument clusters. Its relationships with carmakers like Honda and Suzuki began when those companies only made motorcycles. Nippon Seiki is now the majority supplier of instrument clusters not only to Honda Motor, but to Mazda and Mitsubishi Motors as well. It also supplies about 20% of BMW’s and Chrysler’s clusters.

Outside the motor vehicle industry, Nippon Seiki makes instruments for construction equipment manufactured by Caterpillar, Komatsu, Hitachi, Kobelco and Sumitomo; Kawasaki and Yamaha jet skis; and for Bombardier personal watercraft, among many other customers.

In contrast with its major competitors, Nippon Seiki is a company with a very narrow product focus: 70% of sales come from instruments. Nippon Seiki believes its toughest U.S. competitor is Continental; in Europe the toughest competitors are Continental, JCI and Magneti Marelli; in Japan it’s Denso. We asked why carmakers buy from Nippon Seiki rather than from their competitors and the company gave three reasons: (1) Nippon Seiki provides its customers with better service over the long term, from R&D through to the end of production; (2) Vertically integrated, Nippon Seiki makes almost all the components used in its products in-house, so it is able to keep costs low and quality high; (3) Nippon Seiki writes all the control and graphics software used in its products, so it can closely monitor software quality.

Nippon Seiki has a good handle on its costs. With sales declining by 15.1% in fiscal year 2009, from ¥197 billion to ¥167.2 billion due to the global recession, the company still managed to turn a profit.
The Company Profile Continued

Nippon Seiki Automotive Instrument Cluster Sales
FY 2005 to FY 2009 CAGR: 4.8% in ¥ billions

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Nippon Seiki Non-Automotive* Instrument Cluster Sales
FY 2005 to FY 2009 CAGR: 6.5% in ¥ billions

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</table>

*Motorcycle, marine, construction, agricultural equipment and other

of 4.9% of sales. Nippon Seiki did a lot of cost cutting but did not reduce the number of employees, who were only asked to accept bonus reductions. The average age of Nippon Seiki's consolidated employees is 41.5, which is fairly typical of manufacturing companies located in Japan. The company carefully watches its balance sheet. Notes payable and short-term loans payable amounted to just ¥4,325 million ($48.6 million) as of September 30, 2009. Long-term loans payable were just ¥260 million ($2.9 million). Despite the challenging business environment, Nippon Seiki expects modest sales growth for its fiscal year ending March 2010.

Automotive Cluster Components

Of the fourteen Nippon Seiki factories worldwide that make instrument clusters, eight serve automotive customers. Most Nippon Seiki instrument clusters end up in B- or C-segment vehicles, though some are fitted in D-segment vehicles. All automotive clusters have pointers that are driven by stepper motors—small, inexpensive, brushless motors that can be positioned precisely without a feedback mechanism. On average there are 2.5 stepper motors per cluster. Most automotive clusters are about 12 inches wide.

In addition to the stepper-motor-driven instruments, about 95% of clusters include either a monochrome LCD (liquid crystal display) or an OLED (organic light emitting diode) display. LCD images are made using black or colored segments that cover a bright LED-illuminated background. At night you see light bleeding through, which some people don't like. Some of Nippon Seiki's cluster customers prefer OLEDs because they are light emitting devices that create graphics with bright segments on a black background.

and maintains an international purchasing office in Hong Kong.

A utomotive C luster C omponents

Top Nippon Seiki Customers
Ranked by Sales (All Products)

1. Honda
2. Yamaha
3. Mazda
4. Optrex (non-auto)
5. BMW
6. Fuji Xerox (non-auto)
7. Suzuki
8. Subaru

Top 11 Automotive Customers
by Sales, All Divisions

Total FY 2009 Consolidated Automotive Sales: ¥73 billion ($820 million)

- Honda* 46%
- Mazda 11%
- BMW 7%
- Subaru 6%
- Chrysler 5%
- Mitsubishi 4%
- Suzuki 2%
- PSA 2%
- Jaguar/Land Rover 1%
- GM 1%
- Daihatsu 1%
- Other 14%

*Honda purchased ¥33 billion ($371 million) worth of automotive instruments.

Other cluster components include a microprocessor, and when a color TFT display is part of the cluster, a graphics controller. Graphics controllers are supplied by Fujitsu and Yamaha. Nippon Seiki’s primary semiconductor suppliers are Renesas and Fujitsu.

In addition to producing its own stepper motors, the company still makes air-core meters. In the past, air-core meters were common in auto applications but now are used only in motorcycles because they perform well in high-G vibration applications. Roughly one-third of Nippon Seiki’s automotive instrument clusters are for motorcycles.

Distinctions Claimed by Nippon Seiki

- The company produced 7.6 million automotive instrument clusters globally in FY 2009, which amounts to an 11% share of the market.
- The company produced 100,000 head-up displays in FY 2009, accounting for more than 80% of the global HUD market.
- Nippon Seiki is the only HUD supplier using a plastic concave mirror, which it makes in house.
- Serving Honda, Suzuki, Kawasaki, Triumph and Yamaha, among others, Nippon Seiki is the world's number-one supplier of instrument clusters for motorcycles.

continued on following page
Seiki’s motorcycle clusters use air-core movements. The company also makes monochrome LCDs and OLEDs in house, and it fabricates the plastic material used in its clusters as well.

**TFT Clusters**

Nippon Seiki believes the market for electromechanical, stepper-motor-driven instrument clusters will not be quickly replaced by solid-state TFT clusters. TFT clusters account for only about 1% of the global cluster market today. One obstacle to their widespread adoption is cost: TFT clusters are 50% to 150% more expensive. A nother is that there is not much to see when the TFT cluster is turned off, which means there is little that distinguishes one carmaker’s cluster from another’s.

Still, Nippon Seiki is watching the Chinese and Indian markets closely to see if consumers in those countries, who were quick to adopt cell phones, might be more open to digital displays than consumers in Europe, North America and Japan are. According to the company, motorcycle owners in India already seem to favor digital clusters.

**Combination TFT Stepper-Motor Clusters**

Nippon Seiki presently makes about 450,000 clusters per year that combine two to four electromechanical instruments with a TFT LCD color display. Demand for combination instrument clusters is booming, according to the company, growing at 30% to 40% annually. The LCD typically is used to display functions such as the odometer, trip meter, fuel consumption data and lane departure warning alerts. It also can function as a monitor for consumption data and lane departure warning alerts. It also can function as a monitor for

**Head-Up Displays**

Head-up displays (HUDs), which project information off the windshield into the driver’s field of view as he looks at the road ahead, have been considered for the auto industry at least since the late 1980s, when Delco Electronics (now part of Delphi) began transferring the technology from fighter aircraft. Over the years Delphi, Yazaki, Continental, JCI and others have worked on HUDs. While the technology holds a lot of promise, suppliers have found it difficult to make the display bright enough to be seen in all conditions. The display takes up quite a bit of room, requiring costly reengineering of the dashboard, and as with all new technology, HUD has been very expensive. As a result, HUDs haven’t yet found a market in the automotive mainstream. In 2008 only 96,000 units were sold worldwide, according to Nippon Seiki.

Despite the slow growth in demand, Nippon Seiki has been patiently investing in HUD technology, an extension of its instrument cluster business, for 20 years and believes that persistence is one of the biggest reasons why it has managed to win an 80% share of the market.

The company is especially proud of its ability to precisely machine the free-form, concave plastic mirror that is so crucial to accurate projection of the HUD image. The display’s virtual image is projected to appear beyond the windshield, typically 2,330 or 2,500 millimeters ahead of the driver’s eyes.

Today Nippon Seiki makes a variety of monochrome, color and night vision HUDs for production vehicles including five GM models, the Honda Legend, the Citroën C6, and BMW X5, X6 and 7 Series models. All are currently offered as optional equipment, but take rates on some models have been as high as 90%, according to Nippon Seiki.

The company says it makes the brightest color HUDs available in the market. The display device used in the 7 Series HUD—a color, thin-film transistor, in-plane switching, 480 x 240 dot-matrix LCD—produces an image at the wind shield that measures 5,500 candelas per square meter. And the company has demonstrated HUDs that produce as much as 10,000 cd/m² of brightness. HUDs must be bright enough to be seen even when driving on a bright sunny day through accumulated snow.

Brightness requirements vary depending on when the display will be used and the brightness of the background. Nippon Seiki’s night vision HUD on the Honda Legend, for example, only needs 65 cd/m² of brightness to be comfortably seen at night.

One of the biggest challenges in making HUDs bright enough is finding ways to dissipate the heat generated by the LED light source and power supply. The design and location of the heat sink is very important, though more efficient LEDs with greater lumens per watt output are being developed.
Two Airbag Network Standards

Indicative of the difficulty the auto electronics industry has uniting around a single global standard, there are two standard networks for connecting remote airbag crash sensors to the airbag ECU. The Distributed System Interface (DSI) network standard was pioneered ten years ago by TRW and Freescale; the newer Peripheral Sensor Interface 5 (PSI5) standard is being promoted by the German five carmakers: BMW, Daimler, Volkswagen, Audi and Porsche. Both are medium-speed networks, which are faster than LIN but slower than CAN. Both networks use unshielded twisted-pair wiring; both are highly reliable, fault tolerant and comply with automotive electromagnetic compatibility requirements.

If there were one standard, component costs would be a little lower, but engineers with experience in whatever standard is left behind would have to learn a new system, which would complicate the important work of designing airbag systems that work perfectly. A supplier who serves many carmakers must support both standards. TRW and Freescale, the founders of DSI, are also associate members of the PSI5 consortium.

Nearly a dozen carmakers use DSI, currently in generation 2.5, in their airbag systems. Toyota specifies the DSI bus for all its vehicles. Other carmakers using airbag systems that depend on the DSI bus include Hyundai, Honda, Fiat and Chrysler. Freescale says it annually ships a total of 50 million DSI chips, including sensors and master devices used in airbag ECUs. It ships five times as many sensors as receivers.

TRW and Freescale recently announced that Toyota’s airbag ECU and sensor supplier, Denso, had joined them as a coequal partner to further develop and promote the DSI standard. “Denso had suggested some improvements for [version] 2.5, so while we were talking about that, the three of us said maybe it makes sense to make the consortium a little bigger than just TRW and Freescale—bring Denso in as a full-fledged member,” said Kevin Anderson, a product and strategy manager for Freescale Automotive. The three companies have been working on version 3.0 of the spec for release at year end 2009. The spec has been updated so it can handle the increasing number of sensors required in newer airbag systems. According to

continued on page 8

T he Company Profile Continued

Today the OEM price for HUDs ranges as high as $300 to $500, depending on features, which is why they are almost always associated with high-priced passenger vehicles. HUD has become a feature of the luxury car segment, says Nippon Seiki.

Still the company has been working hard to reduce the cost of the feature to increase its popularity. By 2013 or 2014, the company intends to begin producing a full-featured HUD for about 40% less than its current offering. That new HUD will be nearly half the size of the present version: 2.5 liters in volume for the new version vs. about 4.5 liters today, making its accommodation in the instrument panel much less of an obstacle.

Nippon Seiki is also working on a new HUD that will project 3D images, for navigation and as a way to better distinguish between multiple graphic images. It has demonstrated the feasibility of 3D HUD but must now work hard to bring down the cost. The product could be ready by 2015.◆

Nippon Seiki HUD Product Variations

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<tr>
<td>BMW 7 Series</td>
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Products

Instrument clusters for automobiles, farm tractors, construction equipment and boats
Defi brand automotive instruments for the aftermarket
Head-up displays
- Segment (Citroën)
- Monochrome (Corvette, GMC)
- Full color (Cadillac, BMW)
- Night vision (Honda)
OLEDs for
- Chrysler Grand Cherokee
- GM Corvette
- Mercedes E-Class

Sensors
- Level
- Revolution
- Pressure
- Angle
- Temperature

Electronic devices and consumer products for non-automotive markets
- 17.3-inch flat panel monitors for copiers
- Control panels for copiers from Fuji-Xerox, Konica-Minolta and others
- Local and remote panels for Mitsubishi
- Electric air conditioners
- LCDs and LCD modules for Optrex Corp.
Airbag Standards...

M. Anderson, mid- to high-end vehicles produced in North America, Europe and Japan typically use 10 to 12 airbag sensors, including front and side crash sensors as well as passenger detection sensors. Soon other companies will be invited to join the consortium. Partially owned by Toyota, Denso makes a broad range of automotive components and systems.

DSI is not limited to one speed. “Its speed is between 150 and 200 kilobits per second, but you can run it slower and there are extensions to run it faster,” said M. R. Anderson.

But while it is more flexible, DSI networks tend to be more expensive, anywhere from one-half to two euros more per sensor, according to Continental’s Axel Gessell, senior manager, platform development, sensors and satellites. “We do not consider DSI as a standard for us at the moment, because the car manufacturers do not require DSI,” he said. Continental, Bosch and Autoliv comprise the PSI5 steering committee.

Bosch has been using PSI5 airbag sensors in systems used by many carmakers worldwide since the beginning of 2008, and carmakers belonging to VDA (the German automotive industry association) are now referencing PSI5 in their specifications, wrote Christian Ohl, the PSI5 steering committee member from Bosch, in an email to The Hansen Report. Mr. Ohl estimates that the number of PSI5 sensors sold by Bosch and others exceeds the number of DSI sensors sold.

Aston Martin...

systems for three years. Among all of the systems he has worked on, he is most proud of the audio system Aston Martin developed with Bang & Olufsen. “I believe it is the best-sounding audio system available anywhere.”

The 1,000-watt, 13-speaker, Bang & Olufsen audio system is standard on the 2009 Aston Martin DBS and sells as a £4,750 ($7,648) option on other models. “It has fantastic clarity at all volume levels, mostly because of the way we place the speakers, each in its own enclosed box. We use a DSP that lets us compensate for speaker position by varying the phase of the sound coming out of each speaker to put the sound exactly where we want it. We aim the sound at a focal point just in front of the driver or the driver can choose to also aim the sound to the front seat passenger as well.”

The Bang & Olufsen audio system will also be standard on Aston Martin’s new four-door sports car, the 2010 Rapide, which goes into production in the first quarter. In that vehicle, the sound’s focal point will automatically be shared with the back seat when the system detects those seat belts in use.

Ford Motor Co. sold Aston Martin to private investors in 2007. Other key electrical and electronics suppliers to Aston Martin include Alpine, Leoni for wiring harnesses, Visteon for engine control ECUs, and Continental for brake ECUs.

Restrains...

gentle deploy airbags, demand is slowing for occupant classification systems that measure the weight of the passenger to determine how or if the bag should deploy.

“In the past we used to make occupant sensing units to detect if somebody was sitting there or not. With low-risk airbags we are seeing a reduction in volumes for these weight classification sensors,” noted TRW’s M. R. Reddy.

Full low-risk deployment airbag systems will not injure even the smallest passengers or infants in rear facing child seats, according to M. R. Reddy. However, he sees a trend among carmakers toward adopting partial low-risk systems, which do suppress deployment on passengers fitting the injury criteria for one-year-olds.

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