

Edited by **Kevin Jost**

Ford, Microsoft team to get young buyers talking

Targeting the youth market with high technology is a centerpiece of **Ford's** new small-car strategy. The redesigned Ford Focus features Sync, a voice-recognition system developed with **Microsoft** that reduces distraction while letting drivers pick songs or tie a Bluetooth phone to the vehicle's audio system.

The Focus brings voice recognition, until now only a luxury-car feature, to the small-car market as an option with a \$395 price tag. Though Sync will soon be on **Lincoln** and other higher-end vehicles, Ford is clearly aiming at younger buyers as part of its turnaround strategy. Building a high-tech image is a key part of that strategy.

"This is the first time we've launched a technology in the same way we launch cars," said Barry Engle, General Manager of Ford Division Marketing. In addition to launching the technology in the small-car segment that attracts nearly half the first-time buyers, Ford has focused on youth by partnering with **MTV** and **YouTube**. Ford has less than 10% of the small-car market. Roughly two of three Americans aged 18 to 24 own an MP3 player, according to research company **IDC**.

Using voice control is considered one of the best ways to reduce driver distraction. "Voice recognition is the natural choice for certain interfaces, especially handling music databases and dialing phone calls," said Michael Ippoliti, Research Director, Telematics & Automotive at **ABI Research**.

However, some observers wonder if voice-recognition technology is ready for the automotive environment. In early driving tests by journalists, Sync occasionally responded to the instruction "play genre classical" by asking "do you want to play John Lennon?" even on smooth roads with windows closed.

That is something the companies hope to reduce in the future. "Speech is still an evolving technology where there's work to be done," said Jason Whitehorn, Product Unit Manager at Microsoft's Automotive Business Unit. "Going for-



The redesigned Focus is the first of 12 Ford vehicles that will employ Sync, which lets drivers control MP3 players and phones with voice commands.

ward, we'll continue to make significant investments."

On the hardware side, universal connection is the key to controlling the device and providing upgrade options. "The USB connection gives us a lot of opportunities. You'll see more in the future," said Tom Gibbons, Ford's Vice President of Specialized Devices. That is a positive feature, analysts noted. "One intelligent thing about Sync is that it's upgradable," Ippoliti said.

At present, Sync can hold phone-book and playlist information for as many as 40,000 items in 2.5 MB of Flash, according to John Emmert, Ford's Sync Marketing Manager. That can be purged easily when vehicles are sold, he added.

Ford, which worked quickly to develop Sync with Microsoft in 18 months, has an exclusive agreement for Sync through November 2008. By the end of this year, Ford plans to unveil 12 Sync-equipped vehicles over the next few months. The Ford system is multilingual, supporting the primary languages for North American English, French, and Spanish.

Terry Costlow

Capacitive sensors increase safety, comfort

Window regulator, door, and seat-system specialist **Brose** is relying on sensor technology to achieve more comfort and higher safety levels with increasingly intelligent systems. At the Frankfurt Motor Show, the German group, which has U.S. headquarters at Auburn Hills, MI, showed an **Audi** Q7 concept demonstrator vehicle equipped with iClose side-door and liftgate drives. In both cases, capacitive sensors are employed for anti-trap protection.

The same sensor type provides the technology basis for the newly developed four-way power-headrest adjuster. This new seat system, which was shown for the first time, seeks to avoid whiplash injuries in rear-end collisions. Looking at a

world total of around 1 million rear-end collisions per year, the supplier is convinced that the new system will increase passive safety.

"Eighty-five percent of all headrests in passenger cars are not adjusted to the optimum position," said Periklis Nassios, Managing Director of Brose seat systems. As the ideal distance between a passenger's head and the headrest is just 20 mm (0.8 in), there is no optimum whiplash protection without precisely adjusting the headrest. Few car drivers and passengers take the time to do this though. "Even existing crash active systems provide no answer to out-of-position headrests," said Nassios.

Existing headrest-adjustor systems are

tions, the headrest is adjusted to the optimum height and position for the individual seat occupant. The headrest adjuster is triggered either by the belt buckle or by ignition. In theory, the technology could be used to adjust the headrest every time the person in the seat moves, but the supplier focuses on an initial adjustment to avoid too much autonomous headrest movement that could make the seat occupant feel uncertain about what is going on.

To power the new system, Brose cooperates with a Japanese supplier specializing in neodymium-based permanent-magnet technology to develop a new type of electric motor. The resulting drive is compact and efficient, and needs no more than a low two-digit level of watts, said Sandro Scharlibbe, Vice President, customer business unit seat systems.

As lightweighting is extremely important to the supplier, the new electric motor design is likely to be used in other systems as well. Though the technology is currently still fairly costly on account of high rare earths prices, scale effects will bring the cost down to an economic level, Scharlibbe expects.

In response to the question of whether highly equipped seat systems contribute to the constant weight gain of cars, Klaus Deller, Brose Executive Vice President and Board Member, reported several figures. By applying a modular seat-design approach with many highly optimized standard parts, Brose claims to be able to eliminate around 10 kg (22 lb) of mass per car on average when compared to other seat solutions.

"In some cases, this can go up to 20 kg (44 lb)," Deller said. Compared to the situation five years back, the supplier has brought down the mass of its seat systems to around 20% while adding new functions. This progress is based on "self discipline in component weight plus the use of high-tenacity steels."

Reducing component mass can mean step changes in design. The new Brose seat adjuster gearbox for longitudinal positioning has a mass of 17 g (0.6 oz) and is the smallest component of its type worldwide according to the company. The first generation of this gearbox had a 330-g (11.6-oz) mass.

Jörg Christoffel



Brose showed its four-way sensor-controlled headrest adjuster system for the first time at the Frankfurt Motor Show. A sensor detects occupant head position by measuring its effect on an electric field.



Optimum safety is a question of millimeters, the supplier says: The optimum distance between headrest and head is roughly four-fifths of an inch.

based on contour detection, according to Brose. However, this can lead to incorrect adjustment caused by the shape of hats or voluminous hairstyles, the supplier claims. To avoid such influences, Brose has integrated a capacitive proximity sensor and two antennas plus compact control electronics in the headrest. When a person sits down in the car's seat, the head functions like an electrode that weakens the electric field above the sensor.

By calculating the signal distribution between the two antennas and referencing it against known floor and roof posi-

Sonceboz expands mechatronic offerings

Mechatronic drive systems such as stepper motors, torque motors, and linear drives are an integral part of a growing number of automotive applications. One of the specialist suppliers in this field is **Sonceboz**, a Swiss company that has manufactured around 90 million stepper motors since 1995, including licensed production worldwide.

Although Sonceboz has only been manufacturing in large numbers for the past three years, the company is now one of a few existing suppliers in some appli-

cation-specific areas. By early 2008, Sonceboz plans to install another new, fully automated assembly line for stepper motors in Switzerland, which will increase production capacity to a maximum of 100,000 units a day.

Among the specific solutions Sonceboz has developed from standard products are highly compact linear actuators used as part of the bend lighting system offered by **BMW** and other OEMs.

Looking at the production figures, miniature stepper motors for instrument

clusters are a core expertise of Sonceboz. These mechatronic units are replacing the conventional cross-coil gauges that were traditionally a part of vehicle-instrument clusters. The switch to stepper motors is driven by their compact design, low weight, longevity, and their suitability for high-volume production. Within its product portfolio, Sonceboz has slim-line motors such as the AFIC 6405 that has a mass of only 7 g (0.2 oz) and fits within 10 mm (0.4 in) of installation height.

One of the advantages of this type of

We don't just talk about performance



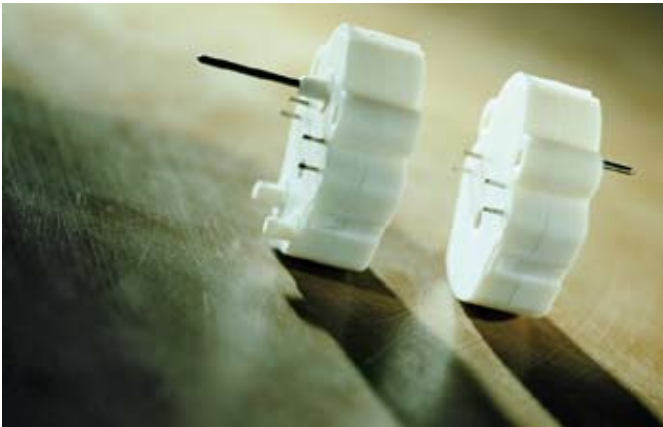
we live it.

Driven by a culture of performance and ingenuity, we produce virtually every machined vehicle component for the automotive industry. Our powertrain groups share best in class processes and the unrivalled engineering expertise of McLaren Performance Technologies. We excel at collaborating internally, and with our customers, to design and build products of the highest quality and precision.

Our ability to deliver a diverse line of value-added solutions – from parts, to modules, to fully assembled systems – is what defines us as a world-class manufacturer, and your supplier partner of choice.

Welcome to the new vision of Linamar. A vision powered by the most enterprising and passionate people working in our industry.





This slim-line single-shaft stepper motor for instrument clusters has a 7-g (0.2-oz) mass and can be directly driven by a microprocessor signal.

stepper motor is that it can be digitally driven by the output signal of two-phase microprocessors such as the **Motorola** GDIC MC33991/33970/33976, **Fujitsu** MB89940 series, or **NEC** 780'973/780'974, μ PD78080x.

As the supplier's strategy is to come up with application-specific designs, the product range includes such specialties as stepper motors for pointer illumination. The driveshaft of this motor design serves as a light guide that transmits LED light from underneath the motor to the pointer itself. According to Patrick Thalmann, Deputy Director of Sonceboz, pointer illumination is becoming increasingly popular as it creates even and ergonomically beneficial

display lighting. For this drive type, Sonceboz is one of two established suppliers, with **Siemens VDO** being the other. For the U.S. and Asia, Sonceboz has licensed the design to partners.

For dual-indication instruments, the Swiss company has developed a 13-g (0.5-oz) dual stepper motor with a shaft-in-shaft design. The upper and lower output shafts can independently drive two gauges such as speed and rpm or fuel and temperature from one concentric position.

To drive automotive actuators such as diesel throttles or exhaust gas recirculation valves, or to adjust the turbine blades within variable turbine geometry turbo-



Sonceboz' compact linear actuators are used in bend lighting systems.

charger designs, the supplier has developed a torque motor that offers a contactless direct-drive solution. As the torque motor needs no step-down transmission, it supports compact design applications: the rotor is directly connected to the moving part of the application. Travel angles of up to 70°, a response time of less than 50 ms, and a peak torque of up to 1.05 N·m (0.77 lb·ft) makes these motors an option for precisely adjusting the gas flows of exhaust-relevant vehicle systems. For closed-loop control, the torque motor can be equipped with a noncontacting magnetic-position sensor.

Jörg Christoffel

Eaton takes VORAD to next level

Eaton's next-generation VORAD safety system delivers a number of new options to meet the diversified safety demands of fleets and owner-operators. New safety features include a standard collision warning system with forward-looking radar, BlindSpotter side sensor, and SmartCruise adaptive cruise control.

VORAD's collision warning system is designed to help drivers take evasive action before accidents occur by emphasizing safe following distances and warning them of potential hazards ahead. Incorporating both audio and visual warning signals, the system alerts drivers to such hazards as a stopped or slow moving vehicle up to 500 ft (152 m) ahead, even around curves. The system also helps drivers navigate safely through adverse weather conditions such as fog, snow, dust, and heavy rain, and provides



Features available with Eaton's next-generation VORAD VS-400 safety system include standard collision warning with forward-looking radar, BlindSpotter side sensor, and SmartCruise adaptive cruise control.

continuous safety awareness, even when the driver is tired or distracted.

Blind-spot monitoring begins with the BlindSpotter sensor, which is mounted along the side of the vehicle to provide a 120° field of view. When an object is detected within the blind spot, a red light is displayed on a companion unit that is mounted in line of sight with the side mirrors. If the turn signal is activated while an object is within the blind spot, BlindSpotter triggers an audio signal that further warns the driver that there is an object alongside the vehicle. The system can detect both stationary and moving objects.

When the vehicle is getting too close to another object, such as a stationary or slow-moving vehicle, SmartCruise, VORAD's adaptive cruise control technology, receives a command from the forward-looking radar to de-fuel the engine and reduce engine speed using an engine

brake. Working together with an Eaton automatic transmission, the system automatically downshifts to maintain a safe following distance. When conditions change—for example, if the slow-moving vehicle moves to another lane—the system returns the vehicle to the previously set speed.

New upgrades to the Fleet Resource Manager safety package give fleets the ability to monitor, benchmark and proactively improve driver and fleet safety. Real-time wireless transfer of data can be provided through a subscription to the safety package within Eaton's Fleet Resource Manager, powered by @Road, a Web-based mobile resource management tool for the trucking industry. Data can be analyzed using a Windows-based PC to review such parameters as engine idle, hard braking events, road speed, fuel consumption, and driving time. Safety information can be accessed wirelessly

and in real time.

A new 77-GHz forward-looking radar comes fully integrated with the collision warning and adaptive cruise control systems. The Doppler-based radar transmits low-power, high-level electromagnetic energy that is reflected back by vehicles in front of the VORAD-equipped vehicle. Reflected energy is analyzed by the system's microprocessor to determine the other vehicle's distance, relative speed, lane position, and direction of travel. The new radar, which is 70% lighter and 60% smaller than the existing EVT-300 radar, can track multiple objects simultaneously within the radar's effective range of view. Installation has been simplified, with a reduction of the number of wires from 18 to 4. Data from the radar is communicated to the appropriate vehicle system via the **SAE** J1939 data interface.

Darlene Fritz



ENGINE PERFORMANCE
EMBEDDED CONTROL SYSTEMS
 CONTROL SYSTEM DEVELOPMENT



MAHLE Powertrain has the capabilities to support you as the control systems in vehicles grow ever more complex. Our experience in developing control systems has taken us from hydrogen mass transit engines to supercharged V8's. Whether your needs are system architecture, software, hardware, or model development, MAHLE Powertrain has the experience and resources to support you on a world-wide basis.

www.mahle-powertrain.com

MAHLE
 Powertrain