WEDNESDAY

SHOW DAILY

SAE 2003 World Congress

automotive engineering international

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The Subaru WRX has yet to score a win in three World Rally Championship races so far this season, but don't count it out yet. The Subaru team, operated by UK-based Prodrive, has won four season championships (the last one in 2001). Driver Tommy Makinnen placed second in Sweden a month ago. Subaru provides the body and engine, which Prodrive modifies for rally competition. Prodrive is showcasing its µproteus UP200 electronic control unit at Booth 1827. The unit provides full rapid prototyping capability through the use of MATLAB-generated autocode.

High pressure is Denso's diesel solution

Denso's second-generation common-rail diesel system uses the industry's highest pressure level to inject fuel into the cylinders, resulting in low NOx emissions are bringing the company closer to its goal of "zero smoke" (elimination of particulate matter).

Doug Patton, Senior Vice President, Engineering Group, Denso International America, Inc., said at a press conference Tuesday that the 1800-bar (180 Mpa) common-rail system clears EURO 4 emissions regulations. The system is installed in Mazda's MPV and Mazda 6 sold in Japan and Europe but not yet in the U.S.

Another industry-best is the system's pump, made partially of aluminum and weighing less than any other for common-rail systems, Patton noted.

Other components include solenoid injectors and a high-speed 32-bit engine electronic control unit integrated with the electronic injector driver unit.

In a common-rail system, fuel is pressurized by a supply pump, transferred to a common rail through pipes, accumulated in the rail, and then injected into combustion chambers by the solenoid injectors. Accumulating fuel at the common rail allows for pressuring of it at a higher pressure than otherwise possible. It also allows for controlling fuel pressure and injection timing independently from the engine speed. The fuel pressure in the common rail is monitored by sensor and controlled by the automatic adjustment of an electromagnetic valve in the supply pump to match an optimum value preset for various engine speeds and load factors. This enables high-pressure injection even at a low engine speed and allows fuel to be atomized sufficiently at any engine speed range, thereby reducing the amount of PM in emission.

Denso's Doug Patton stands next to a display featuring components of the company's 1800-bar fuel-injection system.

*See **DENSO,** Page **17***

Getting diesels moving

In a packed Technology Theater yesterday, several experts from the automotive industry addressed exactly what the session was titled, "Is the U.S. making diesels hard to start? If they get going, can diesel passenger cars make it in the U.S. past 2007?"

"There's hope for the light-duty diesel," said Tom Cackette, Chief Deputy Executive Officer, **California Air Resources Board**. "Much of the development work that is occurring is because of heavy-duty standards that will go into place in 2007 and will require the use of aftertreatment, which is necessary to achieve the low levels that are [required]."

There is also, obviously, a lot of work going on in Europe, where diesel particulate filters have proven their worth. According to Cackette, for diesels to be accepted in the

Tuesday's panel was moderated by SAE Fellow David Merrion, Executive Vice President Engineering, Detroit Diesel Corp. (Retired).

*See **DIESEL,** Page **3***

Engine advances needed, keynoter says

Improvements in many diverse technologies will help automakers meet tighter fuel economy and emissions requirements, keynoter Ned McClurg predicted in his Tuesday morning keynote, The Future of Automotive Powerplants.

The challenge of tomorrow is to continue or even increase the advances of the past. "We have seen a 100% increase in average specific output in 25 years," said McClurg, Vice President and General Manager for Powertrain Engineering at **General Motors**.

Tuesday morning's Keynote Speaker General Motor's Ned McClurg emphasized the need to look at all types of fuel-conserving alternatives in vehicles.

McClurg focused on the need to look at all types of fuel-conserving alternatives, from diesel engines to hybrid vehicles and direct-injection gasoline engines. Society's ultimate goal is to reduce the total number of gallons of fuel consumed, he explained.

Advances in conventional technologies have provided significant benefits for society over the past three decades both in fuel economy and clean air. "In emissions, we have made a 1000 to one change in a 30-year time period," McClurg said.

While stressing the importance of continuing improvements, he also focused on today's hot technology,

*See **ENGINE,** Page **17***

Today's Congress highlights

- **Keynote Address: Helmut List, AVL GmbH**
  The Car at the Center of Sustainable Mobility – Can It Be Done?
  SAE Technology Theater
  9:00-9:30 a.m.
- **Steering the Auto Industry Toward Sustainable Development – A Challenge We All Need to Understand**
  SAE Technology Theater
  10:00-11:30 a.m.
- **Keynote Address: George Hamilton, Dow Automotive**
  The Challenge of Managing Sustainable Development
  SAE Technology Theater
  11:30 a.m.-Noon
- **Institution of Mechanical Engineers/Society of Automotive Engineers Exchange Lecture: Ian Milburn**
  The Two Henrys - Henry Ford and Henry Royce
  SAE Technology Theater
  12:15-1:00 p.m.
- **Business Panel on Mexico**
  SAE Technology Theater
  1:00-2:30 p.m.
- **Business Panel on Canada**
  SAE Technology Theater
  2:30-4:00 p.m.
- **Spotlight Panel on Russia**
  SAE Technology Theater
  4:00-5:30 p.m.
- **Panel Debate on Raison d'etre of Fuel Cells and Hydrogen Fuel for Automotive Powerplants**
  Room D3-28
  4:00 p.m.
- **SAE International Reception**
  Cobo Room W2-62
  5:30-7:30 pm

Focus on people

Masatoshi Ano, Managing Director and Chief Financial Officer for DENSO, chats with Mitsuo (Matt) Matsushita, President and COO, DENSO International America at the SAE 2003 World Congress.

General Paul J. Kern, Commanding General of the U.S. Army Materiel Command, speaks during Tuesday's press conference at the U.S. Army Tank-Automotive and Armaments Command's National Automotive Center booth.

FEV's Bob Last demonstrates product for Ford North America purchasing executives Ermal Faulkner, Robert Dubois, and Ranga Ranja at his company's SAE 2003 World Congress booth.

How Fast is Too Fast? Electronics Panel was lively and drew a capacity crowd. From left to right are panel moderator Bernard Robertson, Senior VP, Engineering Technologies & Regulatory Affairs, DaimlerChrysler Corp.; Herbert Hanselmann, President & CEO, dSPACE; Jacqui Dedo, VP & General Manager, Worldwide Market Operations, Automotive, Communications and Electronic Systems, Motorola; and Kregg Wiggins, VP of Powertrain, Siemens VDO Automotive; and Doug Patton, Senior VP, Customer Support Division, Engineering, Denso International America, Inc.

DIESEL...*Continued from Page 1*

U.S., "the challenge is really not particulates—particulate filters work. The real challenge is NOx."

Another challenge is the customer. Kevin DeHart, Vice President, Diesel Fuel Systems, **Bosch**, cited a Bosch study that showed 62% of European diesel drivers (about 40% of all drivers) would not consider driving anything but a diesel. In the U.S., which consists mostly of non-diesel drivers, 27% would consider a clean diesel if available; 21% would consider a hybrid. However, DeHart believes that diesels will provide the better interim solution to meet fuel-economy standards. "CAFE standards will get tougher, and the diesel engine will give us that mileage that we need to meet these upcoming CAFE standards," he said.

All the panelists agreed that the technology is here today to make the diesel attractive for both U.S. standards and North American consumers. As for what may happen in the future, "Look to innovation to solve the problems of the future," said Brian FitzGerald, Director, Diesel Fuel Systems-North America, **Siemens VDO Automotive**. According to FitzGerald, some of those innovations will be focused on optimized combustion design, multiple injection events, piezo-activated injectors, smarter sensors and actuators, and the functions and software to control them.

According to John Wall, Vice President and Chief Technical Officer, **Cummins**, the ultimate challenge is not only for the engineers in the field today to make a sustainable diesel engine that takes us beyond 2007, but to work together. "To do this requires systems integration, which is not just a passing word or fancy phrase," he said, "it is the way we have to do business going forward: systems integration not only within the balance of a given company, but across the industry."

Jean L. Broge

The future of automotive A/C

The automotive industry is contemplating another shift in air-conditioning (A/C) technology, and R-744 (CO_2) is one of the refrigerants under consideration. This issue was one of many discussed at Monday's **STS** (Service Technicians Society) Conference-within-a-Conference.

According to Phil Trigiani, CEO of **UView Ultraviolet Systems** Inc., there will be multiple A/C system types and refrigerants in the market, and thus, the service equipment and testing required to maintain those systems will also be varied. "One thing technicians need to understand is there's going to be more than one system out there, and it's going to depend on geography and model line," he said. "One manufacturer may have three different refrigerants in their vehicle lineup."

The cost to the industry when switching from R-12 to R-134a was estimated at about $5 billion, said Trigiani. So why consider a new refrigerant at this time? The environment is one reason, said Trigiani. R-744 has zero-ozone-depletion characteristics and minimal global-warming potential, he noted. New vehicle platforms-such as hybrid and fuel-cell vehicles-also are driving changes with A/C technology.

Alternatives to existing HFC (R-134a) systems include enhanced R-134a, hydrocarbon-based systems such as propane or butane, secondary loop using hydrocarbon or HFC refrigerant in the engine bay, R-152a-an HFC-based refrigerant that is commonly used as a keyboard cleaner-and R-744 systems.

In fuel cells and hybrids, Trigiani believes a hermetic system will be used, similar to that in refrigerators in homes. "With a totally hermetically sealed system, hopefully you could get 10, 15, or even 20 years" of operation, he said.

Production of an R-744 system is expected to be launched in some new vehicle models beginning in 2007/2008, Trigiani stated. **SAE** and the Interior Climate Control Committee are currently updating and revising the SAE J639 - Mechanical Vapor Compression Refrigerant Systems Standard to include R-744 and possibly R-152a.

Ryan Gehm

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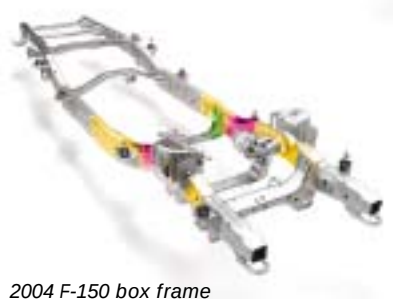
Safety and low emissions from Ford

As with the other OEMs exhibiting at the SAE 2003 World Congress, **Ford** Motor Co. decided to focus on real and immediate automotive technologies. Vehicle highlights at its booth (1653) are a display of F-150 offset crash performance, a PZEV (partial zero emissions vehicle) version of the Focus, and the **Volvo** XC90—*AEI*'s Best Engineered Vehicle for 2003.

Ford says the new F-150 was engineered with an uncompromising focus on safety. In the demanding **Insurance Institute for Highway Safety** offset frontal crash test, the company expects the new F-150 to earn high marks based on internal measurements. It also will be Ford's first vehicle to meet the stringent new Federal Motor Vehicle Safety Standard (FMVSS) 208—an updated series of federal requirements that now includes airbag and offset crash performance. In offset frontal crashes, the impact primarily affects only one side, placing a premium on the performance of energy-absorbing structures such as the bumper beam and frame rails. The new F-150's hydroformed front frame rails are built with computer-designed horns to help manage crash forces. In an impact,



2004 F-150 box frame

these areas of the frame are designed to collapse in an accordion fashion, dissipating energy before it reaches the passenger compartment.

The 2003 Focus PZEV meets California's stringent partial zero emissions standard without performance, fun-to-drive, or economical sacrifices on the part of its owners, according to Ford. To achieve these goals, company engineers concentrated on careful design of the combustion chambers of the car's new I4 engine, coupled with sophisticated electronic controls. The 2.3-L I4 has more power and torque

2003 Focus PZEV

than the current Focus engine, and the vehicle has more than 100 new parts aimed at eliminating fuel evaporation.

The 2003 Volvo XC90 sport-utility vehicle is Volvo's first attempt at a mid-size premium SUV. The vehicle has no fewer than five automotive world firsts. These include Roll Stability Control (RSC), which is designed to assist the driver in maintaining control and help prevent the XC90 from rolling over. RSC is an active stability enhancement system utilizing gyroscopic sensors to determine roll speed and angle. An impending unsafe terminal angle (the angle in which a roll over is imminent) triggers the XC90's standard Dynamic Stability Traction Control (DSTC) system, which reduces power and/or brakes the necessary wheels to induce an understeer situation until driver control is regained.

Kevin Jost

AEI Tech 2003 Awards

Each day, Show Daily editors highlight some of the top products and technologies on display at the SAE 2003 World Congress.

Exhaust measurement

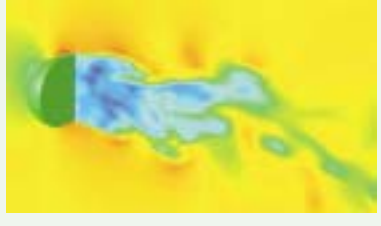
AVL North America's DVE-150 direct vehicle exhaust measurement device completes an AVL-developed system for the collection and analysis of exhaust emissions, particularly in ultra-low- and super-ultra-low-emissions vehicles. Along with the AVL BMD-150 Bag Mini Diluter and the GEM-150 control software, the unit provides an accurate analysis of the massflow rate of exhaust emissions. This compact device can be seamlessly integrated into the BMD system, in a footprint 70-80% smaller than a traditional CVS (constant volume sampler) system. The U.S. **EPA** and the **CARB** have recommended the use of BMD sampling systems for future low-emissions measurements.
Booth 701

Interior acoustics

Owens Corning is enhancing its portfolio of interior acoustics offerings with an increased focus on the VersaMat thermal and acoustic insulating material product line. The firm plans to provide composite solutions using the technology in applications such as headliners, door panels, under-the-hood applications, trunk storage systems, and under-carpet heat shields. During the molding process, the thermal and acoustic insulating material forms a semi-structural system that allows it to carry its own weight along with the electronics and ductwork of an overhead system. In addition to acoustic control, it withstands hot and damp conditions. VersaMat can be molded into complex shapes and uses different amounts and blends of fibers to meet specific performance requirements. The capability to mold complex components with thicker density in some areas for strength or specific noise control will give automakers more opportunity for functional integration into a single part.
Booth 1352

CFD simulation

Fluent Inc.'s Fluent 6.1 computational fluid dynamics software expands the automotive applications for CFD simulation. It offers dynamic mesh technology, bringing new modeling capabilities for an array of applications



including fuel injectors, IC engine modeling, and valves. Other enhancements include efficiency gains in the surface-to-surface radiation model and inclusion of a volumetric macro-based heat exchanger model, expanding the applicability of CFD for underhood thermal management analysis. It offers dynamic coupling with WAVE—in addition to GT-Power—a crevice model and a spray-wall interaction model for IC engine simulations, and a built-in capability to compute discrete Fourier transforms of time series data.
Booth 2517

Engine downsizing

Downsizing is a major way to improve the fuel-consumption levels of spark-ignited engines while maintaining the advantage of low-emissions capability of the three-way catalytic system. The **Institute Francaise du Petrole** (IFP) downsizing approach with turbocharged applications is mainly fuel-economy oriented due to innovative dedicated solutions. For example, IFP has realized a prototype engine on a 1.8-L, turbocharged, four-cylinder, direct-injection gasoline engine concept. The engine allowed engineers to take advantage of the high knocking limit of this approach to replace a 3.0-L naturally aspirated engine, with a fuel consumption benefit of more than 15% with at least the same acceleration performance. At full load, the specific fuel consumption is less than 300 g/kW•h (0.5 lb/hp•h) over the entire engine speed range, with a BMEP of 20 bar (2000 kPa) below 1500 rpm, and a power density of 82.5 kW/L (110 hp/L) with a fixed compression ratio over 10:1.
Booth 1731

AEI Tech 2003 Awards

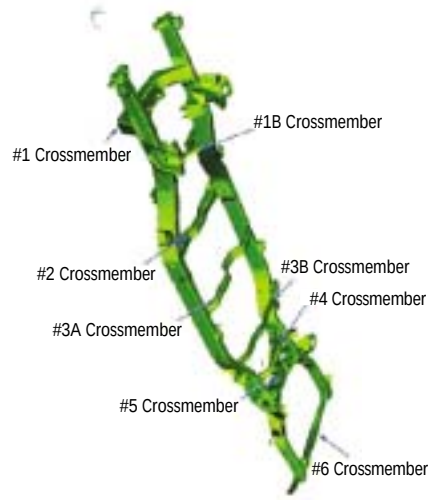
Auxiliary power unit

The U.S. Army TACOM **National Automotive Center** will showcase an auxiliary power unit (APU) that uses fuel cells to generate power for a Class 8 truck, in addition to 42-V electrical systems and an omni-directional inspection system (ODIS) robot for homeland security. The NAC, with partners **Ballard** Power Systems, **Freightliner**, and the **University of Alabama**, has developed a prototype heavy-duty truck APU with a Ballard fuel-cell stack to generate power for onboard electronics and appliances. The APU produces 5 kW of electricity with an onboard power-management system that delivers electricity to the truck's system, as well as export electricity for household power. Booth 627

Aluminum SUV frame

As part of the joint government/industry Partnership for a New Generation of Vehicles, **Ford Motor Co.**, with the support of **Alcan Aluminum** Corp. and **The Budd Company**, conducted a feasibility study into the design and high-volume manufacturing of a light-weight aluminum sport utility vehicle frame. The specific objective of the study was to assess the capability of an aluminum frame to achieve equivalent performance to the 2002 Ford Explorer frame, but at a 40% weight reduction. The details were presented at Tuesday's Aluminum Products session, and will be again Thursday morning during the Achieving Lightweight Vehicles session in Room O2-44.

Using finite element analysis, it was determined that if the design was constrained to the same section size as the production steel frame, the maximum weight savings that could be realized by using aluminum was approximately 20%. However, if the side rail sections between the front and rear suspension points could be modestly increased, the aluminum frame would match the static bending and torsional stiffness, have higher normal mode frequencies, and have an approximate 40% reduction in weight—compared to the production steel frame.



A typical Ford SUV frame. With modest section size increase, 40% weight savings can be realized with aluminum while meeting existing stiffness and natural frequencies targets.

Preliminary analysis also indicates that an aluminum frame with the gage required to achieve the desired stiffness needed for ride, handling, and NVH will have good energy absorption capability during a frontal impact.

Achievement of this weight savings is dependent upon packaging a slightly larger frame side rail section and developing a robust manufacturing process. An aluminum frame requires a minimization of MIG welding to control distortion. This may be best achieved by use of stampings in the side rails with joining achieved principally by self-piercing rivets and adhesive bonding.
David Alexander

What's New from the exhibitors

The SAE 2003 World Congress provides industry suppliers the opportunity to showcase their products, services, and technologies to the global automotive community. Show Daily editors review what some exhibiting companies are displaying this year.

Industrial panel computer

The Panel 1060-935 from **Axiom Technology** is a fan-less, 5.7-in QVGA Color STN (Super Twisted Nematic) RISC (Reduced Instruction Set Computer) panel. The compact size allows the device to be placed in space-limited applications. The

unit's LCD features resistive-type touch-screen support and five function keys. The front metal bezel is NEMA 4/12 certified. The firm's SBC9350 system board runs the panel. The SBC features a 206-MHz Intel SA1110 processor, which is a highly integrated, low-power, and high-performance 32-bit StrongARM processor based on RISC architecture. Other features include 32 MB of onboard SDRAM and 16 MB of onboard Flash memory.

Booth 835.1

Bench-top chamber

ESPEC's bench-top temperature and humidity chambers run on standard power and feature an easy-to-fill water tank, allowing small companies to perform temperature and

humidity testing in small spaces. The five SH series chambers can perform temperature and humidity testing, while the SU series units perform just temperature testing. Externally, the smaller units measure 43 cm (17 in) wide x 69 cm (27 in) deep x 64 cm (25 in) high and have a mass less than 80 kg (175 lb). They offer three different temperature ranges with lower limits of -20°C (-4°F), -40°C (-40°F) or -60°C (-76°F), and an upper limit of +150°C (+302°F). All SH series chambers have an operating relative humidity range of 30 to 95%.

Booth 206

Emergency metallurgical services

Climax Research Services (CRS) has implemented an emergency response system for customers needing emergency metallurgical services on any day or at any time. CRS provides metallurgical testing, chemical analysis, engineering consulting, and research on a diverse spectrum of materials. It is A2LA-accredited to ISO/IEC 17025 and performs its testing in accordance with relevant ASTM, SAE, and manufacturer-specific standards.

Booth 2069

Tactical information

CSM's Proteus is a tactical information system designed to help manage the marketing and business planning activities of automotive suppliers. The system provides comprehensive analysis including part forecast throughout the entire lifecycle, organization of part data, market-based forecasting, analysis of business forecast, strategic business analysis, and Web-based software.

Booth 1746

What's New
from the exhibitors

Gears and shafts

Hota Industrial Mfg. Co. is a QS 9000-certified firm that specializes in OEM and aftermarket gears and shafts for the automotive, motorcycle, forklift, and agricultural industries as well as for industrial uses. Products include gears, shafts, differentials, piston rings, and engine valves.
Booth 2300

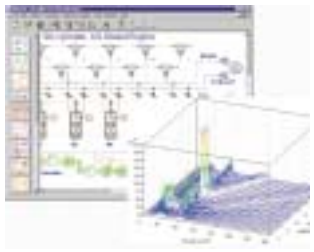
Dosing system

Kern-Liebers' DG-M01 dosing system provides easy adhesion, potting, and sealing, but can also be integrated into production lines. Features include high dosing accuracy, different types of mixing systems for static or dynamic mixing, ecological cleaning of the mixing head, and compact construction requiring a minimum of production space. The system consists of a PLC with display and keypad, flow cups for two components, precision dosing pumps with servo-drives, pressure monitoring, and static mixing unit.
Booth 352

Ultracapacitors

Maxwell Technologies' BMOD0115 ultracapacitor module has a capacitance of 145 F at 42 V and a 195 x 265 x 415 mm (7.7 x 10.4 x 16.3 in) enclosure. The firm's BMOD0117 module has a capacitance of 435 F at 14 V and an enclosure size of 195 x 265 x 145 mm (7.7 x 10.4 x 5.7 in). Both modules are suitable for automotive subsystems, hybrid-electric solutions, and UPS/backup power. These modules also work with batteries for applications requiring a constant low power discharge for continual function and a pulse power for peak loads.
Booth 2438

Simulation tool



Imagine Software's AMESim features three new application libraries. A two-phase flow library allows users to study phase changes of complex fluids in pipes (typical applications include jet propulsion and compressed gas systems). An air-conditioning library combines models from the two-phase flow library into component models typically used for automotive and aerospace air-conditioning systems. An electric motors and drives library has several magnetic machines and controller models for applications such as hybrid vehicles or robotics. A future application library for modeling simple vehicle dynamics will find application with braking, power steering, suspension, and drivetrain integrators. The release of AMESim, version 4.1, also includes new capabilities such as 3-D plots and mathematical model reduction algorithms.
Booth 2214

Crankcase ventilation

Cyclones and centrifuges from **Mann+Hummel** optimize the oil separation in closed crankcase ventilation systems. Through the use of parallel cyclones, the firm has achieved 70-80% separation efficiency. The systems thus provide a high-quality alternative to the labyrinth oil separation systems used in the past. (A higher degree of separation—over 95%—can be obtained with high-quality fleece separators, which require the fleece media to be replaced regularly.) Tests have shown that six cyclones connected in parallel can reduce the separation drop size by up to 40% compared to a single cyclone. Apart from the cyclones, engineers have also developed new centrifuge systems that consist of a disk separator and a chamber centrifuge. It is possible to achieve a degree of separation of over 95% with disk stack centrifugal separators that equals that of fleece separators.
Booth 2031.1

Anti-pinch sensors

The success of **Mayser** in Europe as a systems supplier of anti-pinch sensors has induced the German company to extend its activities to the North American market. The company's safety philosophy for the motor vehicle is based on a protection system made up of discrete yet highly effective tactile sensors. These sensors can be used on power-operated features such as front and rear windows, sliding doors, seats, roofs, softtops and liftgates, where there is a danger of someone getting trapped. In comparison with motor-controlled systems, the sensors are impervious to climatic and environmental conditions. They are controlled independently of the voltage fluctuation that often occurs in motor controls. Even in the case of large loads, the switching force is minimal and shear forces that arise due to power movement are safely eliminated. The firm's APS I anti-pinch sensor is integrated directly into the car seal, thus making it invisible. APS II, a sensor that is mounted to the frame or beauty cover in the car, is a stand-alone sensor.
Booth 2338

Imaging system

NAC Image Technologies' lightweight Memrecam fx RX5 camera offers high-speed imaging flexibility and performance in onboard automotive testing. The

system can simultaneously capture up to four views and is suitable for use in confined spaces such as footwells or engine compartments. It provides a mega-pixel system that can be modified to accept multiple cameras, thereby providing the user with an alternative that helps reduce the added weight of instrumentation systems in an onboard impact test environment. For single-camera operation, the fx RX camera head records images at 1000 pps with 1280 x 1024 pixel resolution (with optional recording rates up to 10,000 pps); the Memrecam Micro camera head records at 500 pps. Cameras can be mounted up to 18 m (60 ft) from the Digital Recording Processor.
Booth 306

What's New
from the exhibitors

Check valves

The Lee Co.'s CCPI Series Press-In Chek is a miniature cartridge-style check valve designed for installation into plastics. Available in 5.5- and 8-mm (0.2- and 0.3-in)

diameters, the unit features a robust barbed design that allows easy installation, provides retention, and prevents bypass leakage around the valve. Each valve is 100% tested for flow, leakage, and cracking pressure to ensure consistent long-term performance. The valve is offered in a range of cracking pressures from 0 to 72.5 psi (0 to 500 kPa) and is compatible with most fluids.
Booth 712

Conductive grease

Nye Lubricants, Inc.'s Nyogel 758G electrically conductive grease does not rely on problematic, short-lived metal, carbon, or organic additives. Nyogel 758G gets its conductivity

from a synergistic relationship among the grease's additives. The result is a lubricious, long-life, channeling bearing grease with 300 ohm-cm volume resistivity. The formula for Nyogel 758G includes a blend of synthetic ester oils, which have a strong affinity to metals, and lithium soap, known for its good channeling abilities. The grease also contains a proprietary combination of standard lubricant additives that not only fortify the oil and protect it from oxidation, but also work to create an electron pathway through the grease.
Booth 1844

High-speed camera

The HG-100K imaging system from **Redlake MASD**, Inc., the newest addition to the motion line, features a 1.7-megapixel CMOS sensor capable of recording rates from 1000 full frames/s to 100,000 partial frames/s. Equipped with a 1504 x 1128 sensor for sharp, high-resolution images and a 10-µs electronic shutter for enhanced light sensitivity, the camera transfers images over 1000 Base T Ethernet. The HG-100K's rugged design enables it to withstand forces up to 100 *g* in any axis, making it suitable for automotive crash and airbag deployment testing.
Booth 531

What's New
from the exhibitors

Real-time simulation

Opal-RT Technologies' RT-LAB features real-time technology with the flexibility to be applied to simulation and control problems. Its scalability provides a low-risk entry point, allowing the developer to add computation power where and when needed. RT-LAB products include the RT-LABe rapid prototyping controller, which is a PC-based modular system for control algorithm development using MATLAB/Simulink and MATRIXx/SystemBuild. It features powerful data-acquisition support, a parameter editor, and a flexible user interface package. The RT-LABi software integration tester is a dynamic simulator designed for ECU software integration testing and software/calibration co-verification. It comes with integrated data acquisition, test automation, GUI development, and model development support. The RT-LABv mega-simulator for virtual system integration is an integrated software and hardware solution for virtual-reality and mega-simulation. It helps mechanical, electrical, and control system engineers to accelerate the design process through virtual system integration. The HEVsim, real-time hybrid-electric vehicle simulator is an integrated software and hardware solution for engineers designing hybrid-electric vehicles. It covers mechanical, electrical, and control system aspects of vehicle behavior.
Booth 1123

Sintered metal filter

Purem's Sintered Metal Filters (SMFs), in various sizes for different engine sizes, offer high filter efficiency, a high degree of reliability, and a flexible design. Their large ash storage capacity makes it possible to use them over a long period under unchanged operating conditions and represents a significant contribution to low life-cycle costs. A modular continuously regenerating trap system using an SMF in a full-size muffler housing illustrates one possible regeneration method of the filter. The Purem SCR (selective catalytic reduction) is an electronic map-controlled exhaust aftertreatment system used to reduce nitrogen oxides in diesel engines of commercial vehicles in the 350-kW (470-hp) range. The special modular design of the SCR system offers considerable advantages both to the individual design space requirements and the different vehicle models as well as to the identical parts requirements.

Aqueous urea solution is used as a reducing agent, which is injected directly into the exhaust stream where it hydrolyzes to NH_3 (ammonia). At the SCR catalyst, nitrogen oxides and ammonia react to form nitrogen and water.
Booth 2340

Tolerance ring

USA Tolerance Rings' European affiliate, **Rencol Tolerance Rings**, has developed a cost-effective way for mounting low-cost bearings on the shaft of a steering column that not only permits larger component tolerances, but also provides a minimum of 50-Hz resonance in the column. Columns using expensive bearings and tightly machined components can be changed to a low-cost unground bearing and relaxed component tolerances, while maintaining the required system resonance. Rencol Tolerance Rings has designed a tolerance ring replacing a rubber steel reinforced bushing that was used to hold the bearing on the shaft in a steering column. Since the steering column mounts on, or is held by, the crossmembers of the vehicle, the frequency at which it resonates can add to the system loads, requiring stronger components to take the total resultant loads. Using a tolerance ring to provide matched frequency coupling between the bearing and the shaft then keeps the column from adding to the resonant frequency of the system.
Booth 3101

High-speed cameras

Photron's ultima 512 and APX high-speed cameras use two new and CMOS sensors to answer different issues currently being experienced in sled and barrier testing. Both cameras are tested to withstand 100 *g* for 10 ms and use a remote head configuration with the 16-ft (5-m) cable, permitting the lightweight compact camera head easy access to remote locations. Camera systems can be easily upgraded to incorporate new or different communication cards such as FireWire or Ethernet, as well as other functionality unique to the individual companies using them. Both the 512 and APX incorporate enhanced functionality with features such as over-exposure protection that enables users to set exposure limits for all pixels; dual-speed recording, allowing the change of a recording speed during image capture; 10 "GoTo" event markers for immediate access to key points of interest; and partitionable memory to enable multiple (up to 64) recordings to be made before needing to download stored images. The system provides live video output (color or monochrome) at all times, multiple record modes, and rugged and reliable design and engineering. The ultima 512 offers 512 x 512 pixel operation to 2000 frames/s and reduced resolution operation up to 32,000 frames/s. The ultima APX uses a 1024 x 1024 pixel sensor at full resolution up to 2000 frames/s, and as fast as 120,000 frames/s by reducing the resolution.
Booth 316

Exterior lighting

Docter Optics will display many types of precision-molded glass aspheric projector lenses, in diameter sizes from 30 to 80 mm (1.2 to 3.1 in), with clear, frosted, bi-focal, modulated, and sign light surface features. Multi-layer IR reflective and color coatings satisfy all automobile, truck, bus, and motorcycle OEM exterior lighting applications including halogen, HID, and LED high- and low-beam headlamps, as well as fog lamps. The aspheric projector lenses conform to SAE, ECE, and Japanese industry standards.
Booth 2901

Wheel torque sensor

Sensor Developments has a new line of wheel torque sensors including wireless signal transmission of both speed and temperature. Use of its digital FM telemetry system has eliminated the need for

slip rings or rotary transformers to transfer the rotating signals. The user can achieve complete installation without rim modifications or the need for anti-rotation brackets. All signals are represented as high-level analog outputs from the remote receiver and are fully compatible with commercial DAQ systems. The system includes a torque sensor, vehicle adapter plates for direct attachment to the axle hub, transmitter housing with power and shunt calibration switch, and digital FM telemetry.
Booth 216

Fineblanking

Principal Manufacturing Corp. (PMC), a fineblank and precision metal stamping specialist, accomplishes fineblanking using a triple-action hydraulic press that acts more as a cold metal extrusion process, thus eliminating costly secondary

operations that may be needed to complete finished components. The process also provides the opportunity to accomplish tolerances not possible with conventional stamping. This capability, along with high repeatability, is said to yield higher quality components for the customer. PMC is capable of fineblank stamping up to 500 ton (455 t). Its fineblank presses include moving and fixed punch capability, allowing smooth transition on inherited tooling.
Booth 865

Language translation

Global Language Translations and Consulting, Inc. (GLTaC) offers KWIKTRANS, a service that is said to provide engineers with high-quality machine translations at a fraction of the cost and time of a full human translation. The software's dictionaries and glossaries are updated often by people knowledgeable in the source and target languages. Since many documents arrive in .pdf format that must undergo a conversion to text to become "readable" by the MAT engine, the company's expertise with optical character recognition software, foreign language, and scanning technologies is valuable. GLTaC provides human involvement for review and post-edit, which is essential to the overall quality of the final product. Same- or next-day turnaround is often possible in Chinese, Dutch, German, French, Italian, Japanese, Korean, Russian, and Spanish.
Booth 2040

What's New
from the exhibitors

System reliability

To ensure the reliability of electronic components, devices, and systems, **RMCtech** has developed a consultancy service called the DRM (Develop Reliability Method). The company says an integrated consideration of the system is needed to ensure system reliability, and this includes software assessment, mechatronics, and production processes, as well as supplier management with series production and past model support. A total of eight interlocking DRM modules—such as the virtual analysis of circuits and processes based on the mission profile, the analysis of risk components, and the selection of precise test and measurement strategies—enable early modifications to ensure the desired reliability. The main focus of the DRM lies in support, beginning with product development and following through to ramp-up. The goal is not only to secure the quality of the products at the point of delivery, but more importantly to ensure their reliability in the market for the estimated life cycle. Using this method helps to shorten the development processes, increase the yield of production, and prevent contingency redesigns.
Booth 2033

Combustion analyzer

The DEWE-2010-CA combustion analyzer from **Dewetron** Inc. is a portable system for tuning engines' electronic control units (ECUs). Proper ECU tuning is critical for the prevention of knocking and for fuel-efficient engine operation. The system has integrated charge amplifiers, allowing direct connection of popular sensors, particularly **Kistler** combustion sensors. The system also accepts crankshaft tach signals with precision, both from the standard crankshaft tach output (60-2), or a special high-resolution 0.1° crank angle sensor. If only the built-in crankshaft sensor is available, the analyzer can interpolate greater resolution from the sensor in real time. In addition to the crankshaft signal, 15 more inputs can be recorded and displayed simultaneously. All inputs are referenced to the crankshaft's timing, which varies continuously as the engine runs, via automatic adjustment of the sampling rate to maintain an absolute correlation of data to the crankshaft position.
Booth 835.3

Driver building blocks

Trinamic Microchips' TMC288 is a monolithic, smart-power stepper-motor driver IC that ensures optimal thermal contact between the chip and circuit board. It can operate at temperatures up to 125°C (257°F). Additionally, it can be addressed via serial interface, reducing the required number of analog elements in new designs. It is short-circuit-protected and has a set of diagnostic functions that enable a debugging over the interface in complex systems. Closed-loop current control with 6-bit resolution permits high precision. The block can also control dc motors with up to 1200 mA via its internal PWM. TMC239 and TMC236 are appropriate for higher motor currents. They have similar characteristics as the TMC288, but separate control and power elements.
Booth 2248

Body inspection

The ABIS (Automatic Body Inspection System) Interactive (bottom) from **Steinbichler** uses fringe projection technology to identify, quantify, and classify

surface defects such as bumps, dings, dents, and surface waviness in sheet metal components and panels. With a data acquisition time of 1 ms, producing 430,000 points in a field of view of 210 x 265 mm^2 (0.33 x 0.41 in^2), ABIS can detect defects with depths of up to 30 µm (1.2 mil). It is highly portable with no accuracy trade-offs and does not require surface preparation such as highlighting. The system consists of a camera, fringe projection unit, sensor handling system, and PC with an image analysis system and software. The system's insensitivity to vibrations and motion allow for integration of an inline version of ABIS into a production line. It can inspect the complete surface of a car body within 90 s.
Booth 3007

What's New
from the exhibitors

Diagnostic tools

The Diag3G diagnostic tool from the **ACTIA Group** is a rugged, 400-MHz PC-based service tool with all standard interfaces including USB, Ethernet, RS232, and PCMCIA. Compact, light, and easy to handle, it incorporates a hard disk, CD or DVD drive, VCI, 10.4- or 12-in TFT display with touch-screen, and NiMh battery with charger. The firm's VCI PartX is also a rugged PC-based wireless communication interface, but it is designed for end-of-line diagnostics. It supports TCP/IP protocols and a high-speed CAN bus to download software quickly and efficiently to the relevant ECU while the vehicle is manufactured.
Booth 2220

PXI chassis

The GX7100 combination PXI chassis from **Geotest Inc.-Marvin Test Systems**, Inc. offers both 3U and 6U slots. The GX7100 is a rugged, high-performance, 14-slot chassis that accommodates a system controller and 13 PXI or cPCI instruments. Slot 1 is dedicated to the system controller (embedded or external, using a PXI bus expander); slot 2 can be used by a PXI Star Trigger controller or by any PXI or cPCI instrument; slots 3-14 support the PXI Star Trigger and can accommodate any PXI or cPCI instrument. Slots 1 through 7 accommodate 3U or 6U modules and slots 8 through 14 accommodate 3U modules only. With front-loading of instrumentation, built-in peripherals, and interfacing options, the GX7100 can be used for automatic test equipment, data acquisition, and process control applications. It takes up only 4U of rack space, reducing the overall size of the chassis while still providing the necessary density and flexibility.
Booth 936.3

Software access

Version 2.0 of EASA (Enterprise Accessible Software Applications) from **AEA Technology** provides users with simplified access to complex technical software. It delivers an intuitive Web-based environment through which users can access any software application—commercial or in-house. The new version offers the ability to include 3-D graphics within the custom applications created in the EASA environment. It also provides several new user interface options

and a graphical tool that simplifies linking the EASA applications to underlying software. The software includes a new optimization module that automatically searches a defined parametric space for the optimal solution as defined by the user. A company's experts can use point-and-click tools to author simple Web-based applications and "wrap" them around any software running on any computer on the corporate network. The resulting applets incorporate the knowledge of the experts, protecting the novice user from making mistakes, even if the underlying software is complex.
Booth 453

Self-piercing fasteners

The headed FAS-NER self-piercing, flush-mounted fastener from **AKH** joins dissimilar metals and thicknesses. The system is a simple punch and die operation, which automatically feeds, punches, inserts, and locks the unit to produce a solid joint in one high-cycle operation. The device is available in zinc-plated steel and high-strength aluminum and can be pre-painted to match the product. The one-step operation results in improved holding strength.
Booth 2927

Insulated transfer pipe

A rigid vacuum insulated transfer pipe from **VBS Industries** delivers liquid nitrogen and is suitable for main pipelines and long, straight runs. The rigid pipe complements the firm's StatiFlex bendable pipe, is modular, and can be integrated with flex pipe to meet a customer's requirements. It is fabricated by ANSI/ASME code shops with certified welders; features all stainless steel construction and close-tolerance bayonets, NPT, and field joint end connections; and has multilayer super insulation for long-term vacuum integrity.
Booth 768

What's New
from the exhibitors

Leak detector

The HLD5000 refrigerant leak detector from **INFICON** ensures enhanced quality, yield, and environmental safety during production, quality assurance, and servicing of refrigerant systems. The detector uses an infrared absorption sensor system that will not trigger a false alarm, detects leaks of less than 1 g (0.03 oz) per year, and responds in less than a second. It detects various refrigerants, including industry standards of R134A, R407C, and R410A, and can be converted for five different refrigerant gases.
Booth 2559

Gas analyzers

A family of analyzers from **GTR Tec** streamlines the sample analysis process. A single system can simultaneously analyze blended gas components; gases including oxygen, nitrogen, and CO_2; and gases, vapors, and liquids. The system optimizes test conditions via the humidification of either or both sides of the test cell. Highly accurate results are achieved with sensitive detection equipment (FID, TCD, or both). The technology combines a permeation unit with a chromatography system to separate gas components for simultaneous analysis. Proprietary test-cell configurations are easily modified to analyze gases, liquids, vapors, and volatile compounds, and to allow for measurement from 5 to 150°C (41 to 302°F). Operations are controlled by a computerized system. The analyzers have been used for the development and evaluation of gasoline tanks and automotive fuel supply systems, fuel cells, and high-performance membranes and polymers.
Booth 3022

Data-acquisition recorders

The GSR20f and GSR200f ground station and test cell recorders from **Heim Data Systems**, Inc. feature all-digital recording, high data integrity, signal interfacing, and interchangeable media. The units have plug-in media cartridges that accept tape, disk, or solid-state drives. The GSR200f is an economical, rack-mountable, 200 Mbit/s digital recorder capable of simultaneously acquiring multiple streams of data from ground, airborne, and satellite data and telemetry sources and recording them to a storage media for later retrieval and analysis. Data retrieval may be via real-time reconstruction of the original sources or by direct high-speed transfer of digital data to the user's computing platform. The GSR20f is a similar system with 20 Mbit/s capability for applications requiring lower data rates. Applications include acquisition of digital, analog, and avionics bus sources and ground replay of media originally recorded in airborne flight test recorders. Front panel controls provide optimum ergonomics for ground-based operations. An optional built-in PC allows flexible interfacing to networks and other interfaces for data distribution, and can provide an integrated platform for signal display and analysis applications.
Booth 447

Test data management

Kayser-Threde's pro_trieve data management tool features the open standards Linux and Java, and provides location-independent access to data searches. When faced with the issue of long-term data retention or archiving while ensuring test data availability and accessibility over decades, the software successfully manages these requirements. It is based on three principles, the first being description and organization. The pro_trieve tool uses a database and model to organize data, as opposed to an operating-system-dependent file. The second principle is process integration. The tool integrates seamlessly into existing business processes while optimizing the entire data handling process. Thirdly, it integrates mixed-mode storage infrastructure such as fast nearline tape systems for secure storage, hard-disk cache, and meta data duplication—all with redundancy and scalability options.
Booth 319

CAN gateway

CANbridge from **IXXAT** is a gateway that enables the flexible coupling of CAN networks. Unlike a CAN repeater, which only translates the electric signals, the CAN messages are received completely by the tool and then sent to the other CAN network under consideration of filter and conversion rules. The message filters can be defined for

individual CAN identifiers via filter masks. With the aid of conversion rules, CAN messages can be forwarded under another identifier, reducing bus load to the individual networks by only sending messages to the other network that are of interest. The unit has a 16-bit microcontroller that can process bursts at high data rates without message loss. The connection to the CAN bus is made by two SJA1000 CAN controllers supporting 11- and 29-bit identifiers. An optional board-support-package provides important interface functions and enables users to create applications quickly. The system is available in three different versions: industrial versions (9-36 V dc) in a top hat rail housing or in a robust metal housing, and an automotive version (6-16 V dc) in a robust metal housing with power-down function.
Booth 3118

Another smart truck for the U.S. Army

Responding to a natural disaster's aftermath requires a different set of tools than conducting counter-terrorism activities, but heeding the call of duty in a smartly fitted vehicle helps a rescue crew navigate through a crisis situation.

"SmarTruck II is a multi-purpose vehicle for what are, in reality, multi-purpose missions," Dennis Wend, Executive Director of the **U.S. Army** Tank-automotive and Armaments Command's National Automotive Center, said during the truck's recent unveiling at the North American International Auto Show. The second-generation truck is on display near the Technology Theatre on the SAE 2003 show floor.

Collaborating on the SmarTruck II project were the U.S. Army TACOM's National Automotive Center; Integrated Concepts & Research Corp. of Alexandria, VA; and Applied Minds, Inc.

This cockpit view of SmarTruck II shows the onboard operations center.

A **Chevrolet** Silverado 2500 full-size pickup became the SmarTruck II via a variety of modifications, including a stainless steel frame to support technology-orientated modules, the addition of a third axle, and a heavy-duty adjustable air suspension. As a 6x6, all-wheel-drive, five-ton truck, the demonstration vehicle carries four modules: static power, electro-optics, munitions, and communications.

SmarTruck II's modules support an array of technologies, such as a high-power zoom video system with thermal imaging and surveillance radar; the **U.S. Navy**'s SPIKE missile launcher system; satellite communication systems; an unmanned aerial vehicle with a 10-mi (16-km) flight possibility; a lighting system capable of illuminating up to three city blocks; three-dimensional mapping; and a "hacker system" for tapping into networks.

Plans to develop additional modules likely will address chemical/biological issues as well as provide a system for water purification. "You can swap a module out (and) and insert another. And it (the vehicle operating system) is intelligent enough to recognize it and make all of the different configurations necessary to support that particular module with power and anything else you would need," said GerMaine Fuller, SmarTruck II's Project Manager.

Beyond military applications, SmarTruck II could be adapted with specific modules for commercial uses, such as power generation (for construction companies), and satellite communications (for television reporting crews). "Let the imagination go wild and whatever you can imagine, we could do," said Wend.

SmarTruck II became a demonstration vehicle in two and a half months. "Because the entire concept was based around a largely commercial platform, it doesn't require the normal multi-year development cycles. It's really a series of up-fit packages," said Bran Ferren, Chairman and Chief Creative Officer of Glendale, CA-headquartered **Applied Minds**, Inc., the company that designed SmarTruck II.

Kami Buchholz

Pierburg measures low emissions

Modern vehicles with SULEV emissions levels make low-concentration measurements necessary. The lower the concentrations get, the closer one gets to the detection limit so that the measuring error can grow over 100% of the measured value. Different approaches have been made to find a measure for the accuracy of analyzers and test benches. Some are too simple, not taking the whole spectrum of possible errors into account, while others are so complicated that a measurement seems impractical.

During the Emission Measurement & Testing technical session scheduled yesterday, researchers from **Pierburg Instruments** and **BMW** discussed their use of a flame ionization detector (FID) to detect organic hydrocarbons (HC). In automotive applications, the FID is used to generate an electrical signal out of an HC concentration. This outcome is possible because the measuring signal is nearly proportional to the number of carbon atoms bound in a wide variety of HC molecules (response factors close to unity). CO, CO_2, and other substances normally found in automotive exhaust gas do not produce a signal. Other molecules, specifically HCs containing halogenides and alcohols (with a response factor far from unity), produce a signal as well, but they are normally not significantly present in the sample.

Jean L. Broge

From registration to membership

Individuals paying the nonmember registrant or nonmember student fee for SAE 2003 may apply it toward SAE membership payment. Applications are available in various locations on-site. Complete and submit a membership application with your pre-registration form or drop it off at the registration desk when you pay the nonmember registration fee on-site.

Mahle studies groove wear

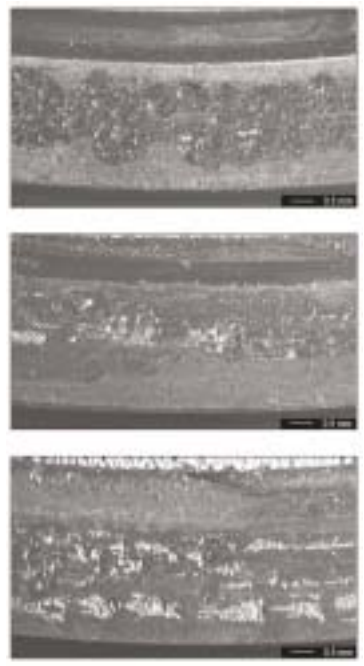
With increases in thermal and mechanical loads, some spark-ignition (SI) engines suffer excessive wear on the piston top groove. During the CI & SI Power Cylinder Systems technical session today at 1:00 pm in Room D3-22/23, engineers from **Mahle** Metal Leve discuss several parameters that were found to influence groove wear (*e.g.*, ring side face roughness and hardness). The main influence found, however, was the relative attitude between groove flank and ring side face.

Due to assembly and operational clearances, the piston ring of internal combustion engines moves relative to the groove. Such relative movement—associated with the load imparted to the ring, mainly by the combustion gases—causes wear to the lateral faces of both the ring and the groove. In SI engines that operate under severe conditions, designers commonly hard anodize the top groove, creating a wear-resistant hard flank and acceptable wear values. However, this process contributes to increased piston costs.

Pistons under less severe operating conditions often suffer from "microwelding," or the process where aluminum particles, detached from the groove flanks by the ring interaction, become trapped in the clearance between piston and ring side flanks, undergoing repeated plastic deformation and oxidation. These hardened particles may or may not adhere to the ring side face, but they do act as abrasives to the groove. Some microwelding normally occurs during the break-in stage of the engine and disappears without detrimental effects to the engine's performance.

Less severe microwelding can be addressed by protective ring side coatings that are usually MoS_2-based. In more severe cases, the process is accelerated due to the fact that the groove wear increases ring/groove clearances, which worsen the situation and in some cases lead to excessive blow-by and possibly ring or piston land breakage caused by the excessive side clearance.

The Mahle engineers will address abnormal groove wear not solved by common microwelding counter-measures, but via optimized design of the groove tilt angle.



According to Mahle, the interaction between the ring side face and the piston groove flank is the main contributor to excessive wear on the groove, with the damage shown from light (top) or severe (bottom).

Jean L. Broge

Acoustic treatments from OC Automotive

Owens Corning Automotive has developed two different technologies to provide vehicle interiors with a means for suppressing noise transmission and a means of dispersing other sounds. In its exhibit (Booth 1352), the Toledo, OH-headquartered company is promoting the production-available VersaMat technology and an integrated speaker technology that is under technical evaluation.

"VersaMat was developed as a custom acoustic management material," said Andrew Hopkins, General Manager of OC Automotive's Composite Solutions Business. The insulating material can be acoustically tuned by modifying the fiber formulation and the density of the finished mat.

Unlike cotton shoddy, VersaMat does not absorb water and isn't dusty. "VersaMat combines excellent acoustics with temperature resistance, weatherability, and low weight," noted Hopkins.

Already in use by various automakers in North American-sold vehicles (including the **Ford** Ranger, **Jeep** Liberty, and **Honda** Civic), the thermal and acoustic insulating materials product line—based on a proprietary formula using thermoplastic fibers—is forecast to become a substantial money maker for OC Automotive. "We expect this (product line) to grow to be a $50 million business in the next couple of years," said Hopkins.

The cutaway (white portion of image) shows OC Automotive's VersaMat acoustic insulation material on a door application.

VersaMat is available in off-the-shelf commercial grades, and "we can customize if there is a need," said Hopkins.

OC Automotive is also putting the spotlight on integrated speaker technology, an initiative that involves a partner company. "We've developed a unique composite material that matches the sound quality of the cone speaker it will replace," said Prakash Kolluri, Interior Applications Manager for OC Automotive.

The technology—shown at the booth via a working prototype—replaces a cone speaker with an exciter attached on the inner side of a flat panel, which has a proprietary coating on the exterior side. Rather than a 3- to 4-in (76- to 102-mm) cone speaker, the combination exciter and panel is less than 1 in (25 mm) deep. The additional packaging space could provide for a larger map pocket or storage zone in an inner door panel application.

OC Automotive demonstrated a 2.2-lb (1-kg) mass savings by replacing six cone speakers in a 2000 **Chevrolet** Silverado with the integrated speaker technology. "In addition, we were able to match the audio performance of the factory-installed speakers," said Kolluri.

Kami Buchholz

Tenneco comes clean

According to a study published by **J.D. Power-LMC Automotive Forecasting Services**, diesel-powered light vehicles now account for 40% of new vehicle sales in Europe, with France in the lead at more than 60%. It is just a matter of time before the market share of diesels in North America starts to climb as well. **Tenneco Automotive** (Booth 2361) is poised to make the transition smoother. Its diesel particulate filters (DPF), which basically trap and then incinerate particulate matter, are already in several European vehicles from **Citroën**, **Peugeot**, and **Fiat**. And with the recent announcement that **DaimlerChrysler** has awarded the company the diesel aftertreatment business for a future platform in North America, it looks like they will be here soon, too.

According to Tenneco, tests showed that the Peugeot 607 HDi equipped with its diesel particulate filters emitted on average 10,000 times fewer particles than a comparable vehicle without a particulate filter.

"The regulations for 'green' and emissions control are a bit stronger in Europe," said Lois Boyd, Vice President, Global OE Program Management, Tenneco Automotive, during a press conference Monday. "You'll see companies like **Ford**, *etc.*, trying to stay a step ahead of the regulations here, but European governments have really been pushing these [regulations]. And there's more of a green movement among the people there as well, so that's really why the [diesel engine] development has occurred [there]. PSA didn't need to have a DPF; they wanted it because they wanted to market a green vehicle."

Other than the engines here being somewhat bigger than those in Europe, the technology transfer from Europe to North America, and between the company's five engineering centers, is not expected to be a problem. "It's just a matter of what the OEMs are going to want as far as their own philosophy on their vehicles," said Boyd.

Jean L. Broge

Yazaki's new architecture

Scalable modular architecture from **Yazaki** is a design methodology used to address the increasing content in today's vehicles by strategically distributing modules in the vehicle to balance the power requirements and minimize the wire bundle size. The underhood module is designed with a combination of conventional bus-bar technology for high current, complemented with printed circuit boards for low current. The interior nodes are completely solid state and can be quickly adapted to support vehicle content changes.

The increase in vehicle electronics and infotainment has created the need for a subsystem that can handle large amounts of data at high speeds. Polymer-clad silica optical fiber can deliver the necessary performance, and can be routed through the engine compartment if required. Yazaki designs and manufactures the connectors that house the optical fiber and provide the conversion from electrical to optical signals.

The Yazaki data network architecture buggy demonstrates streaming audio and video over a vehicle optical fiber network.

Yazaki's data network architecture buggy demonstrates an implementation of an optical network. The network devices provide command and control as well as streaming audio and video data over the vehicle network. Various gateway devices provide the seamless integration between the vehicle networks and consumer devices.

David Alexander

SAE and CTEA announce joint program office

SAE International and the Convergence Transportation Electronics Association (**CTEA**) have agreed to form a Convergence Transportation Electronics Program Office with the goal of providing leadership and guidance for the future success of automotive electronics industry. Joint operation of the biennial Convergence conference and exhibition, beginning in 2006, will be just one component of the joint agreement.

"We share a fundamental belief that our organizations can achieve quicker and greater success by working together," said Raymond A. Morris, SAE Executive Vice President. CTEA Chairman Dennis Wilkie added, "This agreement will allow us to jointly assure that the CTEA and SAE remain the premier entities in transportation electronics for many years."

Myron Trenne, Vice President for **Yazaki** North America will serve as Chairman of the Program Office.

Other confirmed Program Office members are Jacqui Dedo, Vice President and General Manager, Worldwide Market Operations Automotive, Communications and Electronic Systems at **Motorola**; Robert Rivard, Vice President for **Robert Bosch** Corp.; Leonard Tedesco from **Visteon**; and Cary Wilson, Director Electrical/Electronic Systems for **Ford** Motor Co. Additional members will be announced later.

Kevin Jost

ENGINE

...Continued from Page 1

fuel cells. GM has been working on this technology for decades, but over the past four years, the rate of progress throughout the industry has picked up dramatically. Without putting a timetable on commercialization, he noted that GM and others "are committed to moving it along quickly," McClurg said.

One of the key enablers for fuel cells will be material science, while improvements in microprocessors, sensors, and actuators will also play a critical role. Other necessary advances include manufacturing processes and analytical tools.

The success of the fuel cell will require four winners. The customer and society/governments must come out ahead, while automotive and energy companies must make a profit, he said.

Terry Costlow

DENSO...

Continued from Page 1

New injectors developed by Denso can inject fuel at an interval of 0.4 ms in very small quantity—1 mm^3 (0.06 in^3) per injection. The injectors allow the system to perform five injections during each combustion stroke:

- Pilot injection, well before ignition, provides time for fuel and air to mix
- Pre injection shortens ignition delay in the main injection and thereby reduces the generation of NOx, noise, and vibration
- Main injection
- After injection happens very soon after pre injection and re-burns any remaining PM
- Post injection helps manage the temperature of the exhaust gas, which makes the exhaust processing in the after-treatment system more effective.

Components of Denso's 1800-bar common-rail system include a lightweight fuel supply pump, solenoid injectors, and common rail.

Compared with Denso's conventional model, the 1800-bar system results in engine torque increased by 35%, engine power increased by 24%, and low-idle noise decreased by 6.5 dB with a 2.0-L diesel engine.

Patrick Ponticel

Today at the SAE Technology Theater

The SAE Technology Theater is an important new component of the SAE World Congress. Its sessions, featuring industry leaders from around the world, will be open to all SAE World Congress attendees including those registered for the exhibit only. The SAE Technology Theater will be located on the exhibit floor adjacent to special technology displays from major Original Equipment Manufacturers. If you have a question for a speaker, send it via e-mail to theater@sae.org.

Keynote Address: Helmut List

Chairman & CEO, AVL GmbH
The Car at the Center of Sustainable Mobility – Can It Be Done?
9:00-9:30 a.m.

Steering the Auto Industry Toward Sustainable Development – A Challenge We All Need to Understand

10:00-11:30 a.m.

Senior executives have recently combined forces to understand sustainability—the idea that current generations should meet their needs in a way that does not impact the ability of future generations to meet their own needs. This "Sustainability Mobility Project" seeks to "…envision mobility systems for people, goods and services that are sustainable on a world-wide basis." What will this mean for the future of the auto industry? What changes are on the horizon?

***David E. Cole**, President, Altarum, Moderator,*
***Susan M. Cischke**, Vice President Environmental and Safety Engineering, Ford Motor Co.,*
***Thomas A. Gottschalk**, Executive Vice President and General Counsel, General Motors Corp.*
***Gary Mayo**, Global Director of Environmental Affairs, Visteon,*
***Bernard I. Robertson**, Senior Vice President - Engineering Technologies & Regulatory Affairs, DaimlerChrysler Corp.*
***William Y. Hsu**, Vice President of Global Technology and Americas Region, Dupont Automotive.*

Keynote Address: George Hamilton

Vice President of Automotive Materials, Dow Automotive
The Challenge of Managing Sustainable Development
11:30 a.m.-Noon

Institution of Mechanical Engineers/Society of Automotive Engineers Exchange Lecture: Ian Milburn

Chairman of the Automotive Division of the Institution of Mechanical Engineers
The Two Henrys - Henry Ford and Henry Royce
12:15-1:00 p.m.

Ford at one end of the spectrum, pioneering affordable transport for the masses; Royce at the other, cultivating the pursuit of excellence for the few.

Business Panel on Mexico

1:00-2:30 p.m.

***Eduardo Paredes**, Vice President for Sales, Gleason S.A. de CV - Moderator*
***Miguel Angel Leaman**, Trade Commissioner, Foreign Trade Bank of Mexico – BANCOMEXT*
***Humberto Jasso-Torres**, Director General for Heavy Industries & High Technology, Secretariat of the Economy*
***Ricardo Vidal**, President, Clevite de Mexico S.A. de C.V.*
***Luis Alvarez**, Chief Executive Officer, Aloymex Group*

Business Panel on Canada

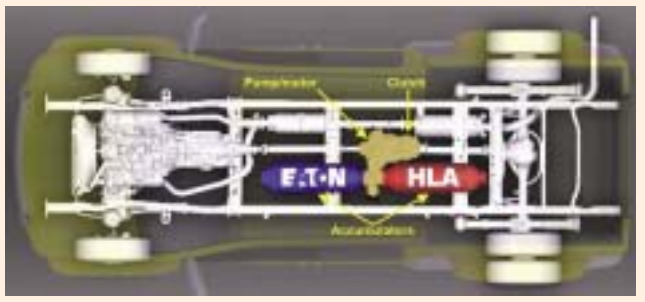
2:30-4:00 p.m.

***Erech Morrison**, Senior Automotive Development Officer, Industry Canada - Moderator*
***Gerald Fedchun**, President (Canadian) Automotive Parts Manufacturers' Association (APMA)*
***John L. Mann**, Director of Engineering, DaimlerChrysler Canada*
***John Tennant**, CEO, Canada's Technology Triangle and Former Consul General of Canada*
***Karl Richter**, CEO, Schukra Group, Leggett & Platte Automotive*
***James Miller**, Senior Vice President Corporate Affairs, Honda Canada, Inc.*

Spotlight Panel on Russia

Russia's automotive industry is the focus of this year's Spotlight Panel.
4:00-5:30 p.m.

***Christopher (Kit) Green**, M.D., Ph.D., Detroit Medical Center, Wayne State School of Medicine, and Med: For, Inc.; Former Chief Technology Officer for Asia Pacific, General Motors - Moderator:*
***Albert T. Warner**, International Trade Administration Director, Motor Vehicle Division, U.S. Department of Commerce*
***Simonetta Verdi**, Manager, International Strategy and Trade, International Governmental Relations, Ford Motor Co.*
***David J. Herman**, Vice President (retired), GM Russia*
***Iouri Mikheev**, General Director, Volga Department, Russian Engineering Academy*
***Lova Khoram**, Consultant, Retired GM Vice President for Trade*



***Eaton**, today's Technology Theater sponsor, is showcasing its Hydraulic Launch Assist (HLA), a hydraulic hybrid powertrain that captures vehicle kinetic energy during braking and releases the recovered energy to supplement an engine's power during acceleration. The company says that HLA—which was first unveiled at the 2002 North American International Auto Show on Ford's F-350 Mighty Tonka concept (shown here)—is best suited for commercial vans and trucks operating in stop-and-go duty cycles. It employs a reversible hydraulic pump/motor and accumulators in parallel with a conventional internal combustion engine and transmission. Eaton says that a hydraulic system provides high power density, allowing large amounts of braking energy to be captured; HLA can be over 70% efficient in turning braking energy into driving energy. The system takes the load from the engine when emissions would be worst—during launch; in light trucks, it is said to reduce emissions by 25-75%. In addition, tests have shown that HLA provides a 30-35% fuel economy improvement in light-duty trucks in stop-and-go driving. Downsizing a base powertrain in a heavier vehicle with HLA could result in 50-80% fuel economy improvement, while maintaining 0-30 mph (0-48 km/h) acceleration.*

Exhibit Directory Addendum

The following is a Directory update, as of March 4, 2003.

New exhibitor

Kimpara & Co. Ltd.
209 Inomiya-choShizuoka Pref
Shizuoka City, 420-0001 Japan
Booth 3035

Manufactures and sells flexible veneer for car interior parts and remodels steering wheels, with our flexible veneer. Also supplies wood blocks for knobs for shifts, blinkers and lights of cars