TUESDAY

SHOW DAILY

SAE 2003 World Congress

automotive engineering International

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Thrive or Survive

Kwame Kilpatrick, Mayor of Detroit, made introductory remarks at the opening session of SAE 2003 World Congress, held in the new Technology Theatre. Quoting one of his predecessors, Coleman Young, he noted that when America gets a cold, Detroit gets pneumonia, illustrating how dependent the city is on the automotive manufacturing business. The mayor went on to point out some of the investments being made in technology to boost education and training and to help develop a new wave of automotive engineers.

Richard Schaum, Executive Vice President-Product Development and Quality for **DaimlerChrysler**, and Chairperson of SAE 2003, started his presentation with the thought that the SAE World Congress was the premier automotive engineering conference in the world; he encouraged everyone to take full advantage of the exhibition, technical paper sessions, and expert panels. He noted that all the auto companies were planning to thrive, and pointed to the additional capacity being added as evidence. The current price war is going to make the battle for sales even tougher, he said, and the highest value at lowest cost would succeed, with the ability to innovate key.

Schaum then proceeded to review some of the progress made in the auto industry since he began his career in 1966: hydrocarbon emissions reduced by 99% and nitrous oxide by 95%; fuel economy significantly improved for both cars and trucks; from 1975–2001 the number of fatalities per 100 million miles driven has dropped from 5.5 to 1.5 despite only 75% seatbelt usage in the U.S. Affordability of vehicles has also dropped from 30 weeks average pay to 20 weeks comparing 1991 to 2001, getting back to the level of the mid-70s.

Looking forward to 2010, Schaum had a number of predictions: government regulations would continue to grow; the piston engine and hydrocarbon fuel would still be dominant; electronics would continue to be the fastest-growing sector.

Jim Padilla, President, North America and Executive Vice President **Ford** Motor Co, during his presentation explained that you must thrive in order to survive. Today's market is very different from even 10 years ago—now, all manufacturers seem to compete in all markets. And the pace of change is accelerating. 90% of future new vehicle features will be electrical- or software-based, so electrical

Detroit Mayor Kwame Kilpatrick welcomes a capacity crowd to the Technology Theater.

See ***THRIVE,*** *Page* ***3***

A project team from the U.S. Army's ***National Automotive Center*** *Family of Medium Tactical Vehicles (FMT) project management office,* ***Stewart & Stephenson****, and* ***Permo-Drive Technologies*** *Ltd. are evaluating and optimizing the integration of a hydraulic hybrid vehicle (HHV) propulsion system onto an FMTV five-ton cargo truck. Computer simulations and recent trials by Permo-Drive have demonstrated a significant cut in fuel consumption and a significantly increased dash speed, with a 36% improvement in dash capacity to 30 mph (48 km/h). The truck's hydraulic regenerative braking system, called Permo-Drive Regenerative Drive System (RDS), supplements the vehicle's braking capabilities, with up to 60% improved stopping distance from 30 to 5 mph (48 to 8 km/h) compared to a conventional exhaust brake. It also captures wasted braking energy, stores it under high pressure, and delivers it back as a supplemental source of power to be used when needed. This capability is of particular interest to the Army as it tries to reduce fuel consumption by 75% by 2010.*

Drive-by-wire technology advances slowly

The drive-by-wire movement is going to emerge slowly, but many factors will make it a viable technology, according to participants at Monday's Drive-by-Wire panel. No timetable was placed on the adoption rate, but all agreed that fuel economy and emissions improvements will drive an electronics technology that should enhance driver satisfaction.

Moderator Wilfried Achenbach, Director of Chassis Controls and Electrical/Electronic Architectures at the **Chrysler** Group, said the technology is "mainly an enabler for higher value, improving fuel efficiency, and reducing emissions while improving comfort and safety." He noted the various drive-by-wire technologies from throttle-by-wire to steering-, shifting- and braking-by-wire will all be adopted on different timeframes.

While reliability and redundancy are big obstacles, software and architectures will be key design issues for developers. "It's hard for us to realize the amount of software in a vehicle," said Craig Stephens, Manager of Powertrain Control Research and Advanced Engineering at **Ford** Motor Co.

The complexity of writing software for by-wire systems will force automakers to forge even closer links with their suppliers, panelists agreed, and since steer- and brake-by-wire are obviously mission-critical systems, reliability will be a major concern. Standardization will also simplify the hardware side of the design.

Addressing the reliability issue, a **Boeing** spokesman explained that by-wire technologies have been used in the aircraft industry since the 1970s. Though some portions of a plane use only single systems, "Mission critical applications still have double or triple redundancy," said Don Winter, director of Network Centric Operations at Boeing Phantom Works.

Panelists feel that drive-by-wire technologies will probably see initial acceptance in Europe, where some manufacturers have already unveiled the technology. In Japan, there's plenty of interest, but no

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Today's Congress Highlights

- **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?**
  SAE Technology Theater
  8:00-9:30 a.m.
- **A World In Motion Demonstration**
  SAE Contributor Lounge
  8:00.-9:30 a.m.
- **Keynote Address: Ned McClurg, General Motors Corp. Standing on the Brink of Change - The Future of Automotive Powerplants**
  SAE Technology Theater
  10:00-10:30 a.m.
- **Keynote Address: General Paul J. Kern, U.S. Army Materiel Command The Future of Military Ground Propulsion**
  SAE Technology Theater
  10:45-11:15 a.m.
- **Honors Convocation & Luncheon**
  Room W1-52
  11:45 a.m.-2 p.m.
- **Some Aeronautical Experiments: Recreating the Early Flights of the Wright Brothers**
  SAE Technology Theater
  11:45 a.m.
- **The Road to Tomorrow's Gasoline Engines – Avoiding Wrong Turns and Dead Ends**
  SAE Technology Theater
  1:00-2:30 p.m.
- **Career Development Session**
  Rooms O2-35 & 36
  1 p.m.
- **Materials Selection Panel**
  Room 02-33
  1:00 p.m.
- **Fuel-Cell Initiatives: Powering up at State, Regional, or International Levels**
  SAE Technology Theater
  2:30-4:00 p.m.
- **42-Volt Electrical Systems & Fuel Cells: Harmonious Marriage or Incompatible Partners?**
  SAE Technology Theater
  4:00-5:30 p.m.
- **Women Engineers Committee Reception**
  Room W2-60 (Member Lounge)
  4:30-6:30 p.m.

Focus on people

George Perry, President & CEO, Yazaki (left); Neil Dekoker of OESA; and Joseph Begosian of the U.S. Department of Commerce discuss Monday's program with exhibitor Walter Fields (center).

Phil Martens, Vice President of Product Development at Ford, addresses the lunchtime crowd on "Doing the Elephant Dance."

Hans-Georg Frischkorn of BMW gave the keynote on electronics Monday morning.

Tom Chisholm, formerly of Eaton (retired), visits with TRW's Ron Cutler at Monday's breakfast event.

THRIVE...

Continued from Page 1

architectures must become flexible and expandable.

Padilla noted that today's customers want many new features, but don't expect to pay a premium for them. For example, the take-up rate for stability control and side-airbag systems on the Focus is very low. Some customers will pay a premium for a clean powertrain, but how many will pay $3000-5000 extra for a hybrid engine, and will there be enough volume to make it feasible to produce?

Diesel will continue to be popular in Europe, where the average installation rate has gone from 17 to 50% over the last 10 years. Diesel in Europe now gets similar fuel consumption to the hybrid with much lower initial cost, but is unlikely to make the same progress in the U.S.

Most important for the future, Padilla explained, are flexible manufacturing, recycling, and biodegradable materials. Managing fast-paced change within tight financial constraints is the key to success in the future, and SAE can contribute by continuing to lead professional development.

David Alexander

Electronics advances will be evolutionary and revolutionary

Electronics technology now dominates the automotive industry, accounting for a full 90% of innovation, and software is becoming "critically important." As those technologies move forward, they face three revolutionary challenges, according to one of yesterday's Technology Theater keynoters, Hans-Georg Frischkorn.

Frischkorn, Senior Engineering Vice President for Electric/Electronics at **BMW** Group in Munich, predicted that automotive electronics will continue driving a number of evolutionary changes, though he also spotlighted three areas where its impact is revolutionary.

One major shift is that vehicles are becoming nodes on the Internet, receiving data such as GPS and navigation information, telephone numbers, and e-mail. Telematics may also make it possible to improve handling by telling the vehicle about upcoming road conditions so that transmissions can shift or body control systems can adjust for bumps, he explained.

Another change is that by-wire technologies are replacing mechanical technologies. That's already happened with by-wire acceleration. Steer- and brake-by-wire are also starting to see acceptance, he said.

"The third area that I clearly see as revolutionary is personalization," said Frischkorn, citing examples such as setting seat positions and radio stations as well as moving favorite phone numbers to different vehicles automatically when the driver inserts the key into the door lock.

These three revolutionary technologies will be driven by the closely related field of electronics and software. Though 90% of automotive innovation is based on electronics, Frischkorn explained there may be fewer electronic control modules in the vehicles of the future. "In the next five to 10 years, we at BMW have a goal to get to half the current number of ECUs," he said.

Software has played an increasingly important role as the number of ECUs has soared, and it will be equally important as engineers move to put fewer ECUs in a vehicle.

"The amount of software in a car is doubling every two to three years, and we do not see that changing in the next generation of cars," Frischkorn said. "Software is at the point where it will increase to about one-third the cost of a car in the next few years. It may have reached that already in some premium-level cars, and will migrate downward in the future," he said.

If automotive suppliers are to continue bringing new functions into the vehicle at a rapid pace, one of the big steps will be to adopt open architectures.

This architecture may well follow the client-server approach used in the computer industry. It will facilitate a reduction in the ECU count, but will require advances in some components.

A key driver for many of the forthcoming changes is that many customers want the same entertainment and information services in the car as they have in their homes. "Our challenge is that when we integrate these technologies into the vehicle, we improve the quality," Frischkorn said.

Terry Costlow

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Exhibit Directory Addendum

The following is a Directory update, as of March 3, 2003.

New exhibitors

Castellon SA
Industria 14
Ripollet, 08291 Spain
Booth 3209

China Custom Mfg. Ltd.
44843 Fremont Blvd.
Fremont, CA 94538-6318 United States
Booth 968

Chongqing Huafu Industry Co. Ltd.
No. 18 Fengtian Da DaoShapingba District
Chongqing, 400038 China
Booth 2807

The Detroit News
615 W. Lafayette Blvd.
Detroit, MI 48226-3197 United States
Booth 771

Hot Flush LLC / Precision of New Hampton
P.O. Box 324
511 Bailey Ave.
Lawler, IA 52154 United States
www.hotflusher.com
hfsales@iowatelecom.net
Booth 2741

Manufactures automated hot oil transmission cooler flusher with visual verification of completion.

Hyundai Polytech Co. LTD.
3020 N. Water St.
Bay City, MI 48708-5454 United States
Booth 1706.1

Indiana Research Institute
4571 N. Long Rd.
Columbus, IN 47203-9012 United States
Booth 1714

Karl Storz Endoscopy America
600 Corporate Pointe
Culver City, CA 90230-7600 United States
Booth 2119

Polyspace
5840 N. Canton Center Rd., Ste. 270
Canton, MI 48187-2614 United States
Booth 3144

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Booth 1664

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www.ytinc.com
sales@ytinc.com
Booth 3105

Engineered materials, rubber and plastic products, machined parts and tooling divisions serve automotive OEM and aftermarket businesses.

Canceled

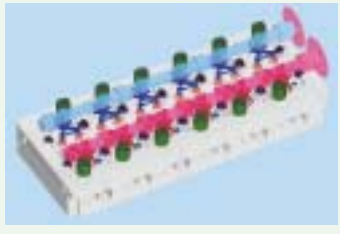
Davey Bickford SNC

Body inspection

The ABIS Interactive (Automatic Body Inspection System) from **Steinbichler** uses fringe projection technology to identify, quantify, and classify surface defects such as bumps, dings, dents, and 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 as little as 30 µm (1.2 mil). It is highly portable with no accuracy tradeoffs 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 vibration 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

Variable valve actuation

Version 2.2 variable valve actuation from **Jacobs Vehicle Systems** is an integrated design using parts contained in the



cylinder head instead of a separate housing. By electro-hydraulically using lost motion to modify valve lift, timing, and rate of opening and/or closing, engines will realize many benefits including increased fuel economy, lower emissions, and higher performance. Just as fuel injection systems have evolved from mechanical to electronic controls, engine valvetrains will follow this trend in the next 5 to 10 years.
Booth 1338

Refrigerant circuit

The Mobile R744 (CO_2) refrigerant circuit from **Imtech Deutschland**'s Environmental Simulation/Test Bed Engineering Division is equipped with safety measures for high-pressure systems. The compact system is built as a mobile, low-noise unit for comfortable operation in laboratory environments. A separate stand-alone brine supply module supplies the gas cooler. The following control loops are integrated: R744 compressor speed control, gas cooler outlet temperature, suction temperature, suction pressure, and expansion valve intake pressure.
Booth 537

Engine design and optimization

Automated Design with Virtual Engines from **Optimum Power Technology** takes the established engine simulation technology of Virtual Engines and combines it with advanced optimization methods and parallel processing to create an expert system for engine design. OEMs, Tier 1s, and motorsports teams using the product will achieve better engine designs faster and increase their competitive advantage, according to the firm. The process begins as a base engine model is created. Then, an engineer selects which parts of the engine can be changed in the search for improved performance. Running simulations in parallel, Automated Design creates new engines and compares the solutions. It uses built-in intelligence to assess which direction to move within the design space to create a better engine. Many engines can be evaluated automatically using the system.
Booth 1618

AEI Tech 2003 Awards

LEDs

The Luxeon LED from **Lumileds Lighting** is available in many colors and three different radiation patterns. It is claimed to offer the highest flux per LED family in the world. It is a reliable, life-of-vehicle light source that is suitable for any automotive lighting application including forward lighting. A white Luxeon 5-W produces 120 lumens; green, cyan, blue, and royal blue Luxeon 5-W packages deliver luminous output ranging from 30 lumens for blue to 120 lumens for green and cyan.
Booth 2268

Air Force Research Labs showcase "a new way to collaborate"

The **U.S. Air Force** Dual Use Science & Technology (DUS&T) Program (Booth 1947) is exhibiting its capabilities as a viable source for leveraging research and development dollars. The DUS&T Program initiates technology projects that have potential for both military and commercial uses.

Implemented in 1997, the Air Force Program has initiated 350 projects with a total value exceeding $1 billion. It was developed to give industry executives, technical managers, engineers, and universities prospects for networking with Air Force scientists and engineers on technologies that meet both military and commercial needs.

The program provides an opportunity for companies in various technological arenas to leverage research dollars and possibly partner in developing new products. The DUS&T process focuses on providing a platform for researchers to have a dialogue with Air Force scientists and engineers, and explore ways to develop technologies that meet their mutual interests.

The process includes pre-solicitation workshops generally scheduled in the September to January time frame. Each workshop offers participants interaction on the final projects that will be open for bid in the Air Force Research Lab's Broad Agency Announcement (BAA), scheduled for publication in March 2003. Simultaneously, it allows participants to assess their potential for competitive proposal submissions for the projects. Further information on the program can be found at www.afrl.af.mil/dualuse.

To further the effort on providing a mechanism for identifying new business opportunities is the development of The Collaborator, a new web-based tool jointly managed by the Air Force Research Laboratory (AFRL) and OAI. "The Collaborator" will enhance the ability to seek out entities with similar technological interests, freeing scientists and engineers from time spent searching through business cards so that they may engage in solving technical problems. The Collaborator is currently in the software-development phase, with prototype release planned for April 2003. The AFRL exhibit on the show floor has more information about this program, with additional information available at www.TheCollaborator.biz.

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.

Shed simulator

The SHED Simulator from **Analytical Process Systems**, Inc. is a computer-controlled device that uses a massflow controller to inject a known quantity of sample gas into a SHED. The timed injections may be performed as a single shot or as multiple shots on an

hourly basis for a 24-, 48-, or 72-h diurnal test. The injections can vary in length from hour to hour and also vary in rate with each injection. The actual injection will be within 0.5% of the intended injection on a massflow basis. The system is housed in a suitcase type enclosure for portability. Features include a 6.4-in TFT LCD display, resistive touchscreen, two serial ports, ECA embedded CPU card, DX4-100MHz CPU with 32 MB RAM, Windows 98 operating system, 4-GB hard drive, Ethernet port, and parallel printer port.
Booth 3001

Wiring analyzer

CableTest Systems Inc.'s Horizon-1500 wiring analyzer allows automotive manufacturers to perform in-process and final testing of electrical wiring

harnesses as part of their manufacturing processes. The unit performs both functional and continuity tests of wiring assemblies. It verifies the correct wiring of all the gauges, radios, engine sensors, and lights.
Booth 1569

Spot-weld testing

Agfa NDT provides a combination of instrumentation, application-based software, and transducer technology to perform ultrasonic testing of spot welds on coated and uncoated steel sheet-metal products. Automatic evaluation and classification of spot welds is accomplished using **Krautkrämer**'s laptop computer-based USLT 2000 ultrasonic flaw detector with the application-based UltraLOG software and specially designed water column transducers. The program stores and manages test results and evaluates spot-weld echo displays, including weld classifications.
Booth 662

What's New
from the exhibitors

Weathering testing

Atlas Weathering Services Group (AWSG), a division of Atlas Material Testing Technology LLC, and **Intertek Testing Services** HK Ltd., Equipment Services Div. (ITS-EQT) have entered into an agreement with

Guangzhou Electric Apparatus Research Institute (GEARI) to be the sole service provider of AWSG-recognized methods of outdoor weathering testing and laboratory accelerated testing services in China. The services will be provided under the name GEARI Weather Testing Center (GWTC). AWSG has trained and authorized GWTC to perform outdoor weathering, laboratory accelerated weathering using xenon and fluorescent devices, and evaluation services as specified in ASTM, ISO, and SAE standards. GWTC operates two atmospheric exposure sites in southern China: a subtropical site in Guangzhou and a tropical site in Hainan.
Booth 217

Weld stud mount

HellermannTyton's weld stud mount is a fastener that enhances productivity by helping to streamline production. The mount, when used with a cable tie, secures wire harnesses and hoses to a frame. It eliminates the need for different sizes of p-clamps; additional nuts, bolts, and washers; as well as the process of drilling holes through

metal frames. Manufactured from heat-stabilized, impact-modified nylon 6/6, the mount will not rust or abrade hoses and harnesses. It is applied with innovative welding equipment that welds through paint, saving labor time as paint does not have to be removed from the welding spot before installation.
Booth 1842

Telemetry solutions

Datatel specializes in the application of telemetry to rotating components. Modern electronic methods make it cost effective to use telemetry in locations that previously would have been considered both prohibitively expensive and too restricted for access. These include torque, temperature, and vibration measurement in air-conditioning compressors, torque in

cooling fans and clutch flexplates, and tooth stress in gearwheels. The firm adopts a turnkey approach to all projects, and it has the capability to design and manufacture everything needed, both electronic and mechanical, to provide a complete telemetry solution to meet test requirements.
Booth 559

Analog/digital pressure transducer

GE Druck's PDCR 3500 high-accuracy analog and digital output pressure transducer provides digitally enhanced, high-accuracy output coupled with high analog bandwidth. The transducer is a 1-in (25-mm) diameter fluid-isolated analog output device similar to the PMP 4000 Series. It achieves a total accuracy performance of better than ±0.1% full scale over -65 to +250°F (-54 to +121°C) with the support of internal digital electronics, which correct for the repeatable errors without affecting the analog bandwidth. Due to internal microprocessor electronics, the unit can also give a digital pressure output in engineering units via RS485. The

RS485 is also used for re-calibration and housekeeping activities such as serial number retrieval and diagnostics.
Booth 636

Silicon nitride

According to **Ceradyne**, silicon nitride has a unique set of tribological and physical properties—low mass combined with high strength and contact fatigue resistance—that make it a candidate for solving galling and

wear problems in the valvetrain and fuel-delivery systems of light- and heavy-duty diesel engines. Ceradyne is in high-volume production of silicon-nitride cam rollers for heavy-duty diesel engines for intake and exhaust valves and unit fuel injectors. Also in high-volume production are rollers or sliding contact parts that are subjected to high stress and low lubrication in common-rail fuel pumps for light- and heavy-duty diesel engines.
Booth 1368

Analyzer tool

Dearborn Group Inc.'s Hercules is a high-performance analyzer tool that supports CAN and LIN proto-

cols, in addition to single-wire CAN (J2411) and CAN (ISO 11898). The latest version features graphical display of signals, ISO 15765 full support, decoding of CAN ID (user specified), CAN remote frame support, and improved database structure. Using this 32-bit Windows-based application in conjunction with the firm's Gryphon hardware interface, users can monitor, receive, filter, transmit, and edit CAN frames over a variety of communication links.
Booth 1747

What's New
from the exhibitors

Data acquisition

The Win600e high-speed streaming data-acquisition system from **Hi-Techniques**, Inc. has features such as streaming to disk, remote monitoring of live data, remote control of the data-acquisition system, and multi-system control.

It combines high-speed, high-resolution digitizing of analog signals with deep buffering memories and complete processing capabilities. Along with the keyboard and mouse, the built-in touch display allows easy control of the system. Sample rates from dc to 20 MS/s are combined with memories of up to 128 Megapoints per channel. Complete data analysis, macro-programming capabilities, and report generation are standard on each system.
Booth 2328

Online information

MarkLines provides an online service built around the ability to gather detailed resources on the automotive industry and the capacity for both automotive suppliers and manufacturers to come together, communicate, and conduct business. Three service plans are offered. The Suppliers Support System combines both information gathering and marketing tools. Under the plan, members have access to a growing Supplier Database presently consisting of over 16,000 companies; at least eight Auto Industry Analysis Reports released every month; and the Global Top 500 Supplier Reports. The Automotive Parts Database Plan is geared for companies seeking information, statistics, and parts data. It does not offer the opportunity to market or seek products of other companies, but it provides current data and trends in the automotive industry. The e-Presentation Plan spotlights marketing tools to disseminate suppliers' product information to buyers.
Booth 2354

Impact test analysis

The FalCon eXtra Mov3D analysis software from **FalCon** performs 3-D impact test analysis using stereovision. The software supports the "5-rings panel" according to ISO/SAE; additional "coded points" allow the automatic identification of markers. After the user takes several images with different tilt and rotation angles as input data for calibration, the software measures the image coordinates of all points automatically and calculates the modeled camera parameters. A CamFolder module provides access to all calibrated camera/lens combinations in a Windows tree view. The system has been proven accurate and fit for practical use in an experiment conducted by German automotive companies in which the length of a moving pendulum could be measured with a standard deviation less than 0.4 mm (0.016 in).
Booth 325

What's New
from the exhibitors

Metal-stamping assemblies

Precision metal stampings and assemblies from **Olson International** Ltd. include chassis, cases, and covers for infotainment systems; brackets and inflator housings for airbags; and small to midsize stamped and assembled parts for electronics OEMs. Presses range from 65 to 400 ton (59 to 363 t), and secondary assembly operations include welding, tapping, staking, and finishing. Recent investments are new coordinate measuring machines; implementation of innovative in-die tapping, welding, and stud insertion processes designed to improve efficiency and lower costs; and expansion of use of the latest sensor technology to increase tool life and improve die protection. Improvement of the SyteLine APS planning and scheduling system allows synchronization of materials and resources to customer orders while minimizing operational overhead.
Booth 2714

Exhaust flowmeter

The 2-in (51-mm) VE502 and 3-in (76-mm) VE503 series exhaust flowmeters from **J-TEC Associates** measure volumetric exhaust flow for emissions testing. The systems join the VF563 inline flowmeter and the VB563 blow-by system that are well established in the engine test industry for blow-by measurement. Features include minimal pressure drop with little effect on engine performance during operation; all-electronic operation with no moving parts; high accuracy, drift-free performance; good repeatability; easy maintenance and cleaning; high durability; a 40:1 turndown ratio; and ability to measure low flows down to 0.14 ft^3/min (3.96 L/min).
Booth 1248

Shaker system

The LDS V9-105 shaker system from **Ling Dynamic Systems** Ltd. is designed to test heavy loads at high stress levels over long continuous periods. For maximum reliability, engineers have developed a design that combines proven coil technology with advanced carbon-fiber armature construction and a new concept in shaker structure. The

shaker has a maximum sine force rating of 105 kN (23,600 lb). Velocity is 3.2 m/s (10.5 ft/s), and displacement capabilities for shock testing can reach 3 in (75 mm), peak-to-peak). The use of composite materials in the armature and the field coil design means that the shaker can be more compact for a given force rating. In place of the usual shaker design—one flux gap with two field coils running in opposition—the V9 has two magnetic gaps driven by one field coil. Two additional coils near the air gap concentrate the magnetic field within the shaker, ensuring a low stray field.
Booth 253

Calibration board

Messring's Type NA33-86-00 calibration board provides static and dynamic calibration of any data-acquisition system. The calibration procedure is freely programmable and fully automatic. It runs with CrashSoft 3 under Windows NT. Eight analog as well as 16 digital channels can be calibrated simultaneously. The system generates arbitrary signal waveforms including sine, triangle, and pulse with 0 to 10 kHz and 0 to ±5 V or 0 to ±0.05 V at 16-bit resolution. It is a plug-in board for the NA33 data-acquisition system.
Booth 445

Exhaust testing

Instron Structural Testing's (IST) exhaust testing system provides accurate simulation of on-road conditions. The system provides better correlation to field failures and more flexibility for input variables than systems based on rigid shaking tables. For the test, an actual engine (or a simulated engine block and exhaust header) is located on a six-DOF vibration table. The exhaust system is mounted on an independently moving clamping plate via open portals for easy installation from the side. Hydraulic actuators apply the loads to the exhaust system. Hot exhaust gas flow can be included by using an engine and dynamometer or a blower. Test rigs adapt to a range of exhaust systems for cars and trucks. Additional modules include IST's Labtronic digital electronic controller and its Windows-based RS-LabSite software.
Booth 233

Near-net-shape components

Piper Impact's design and marketing capabilities enable it to provide strong, lightweight, near-net-shape critical components.

The product offering includes airbag canisters, shock housings, driveline yokes, filter housings, steering yokes, A/C canisters and caps, ordnance cartridge cases and flare cases, and high-pressure cylinders for various markets and industries. Custom solutions are available in addition to the standard product offering.
Booth 2512

What's New
from the exhibitors

Illumination design

LightTools 4.0 3-D illumination design software from **Optical Research Associates** contains a new user interface designed to make both novices and advanced users more productive and efficient. The

Windows-based interface includes functionality such as navigation windows that allow users to locate and edit information quickly, right-click menus that display context-sensitive menu choices, and context-sensitive help for toolbars, dialog boxes, and command buttons. Additionally, all dialog boxes are redesigned to make them easier to read and use. Options are reorganized to help simplify and structure steps for accomplishing complex design tasks. Other improvements to simplify design tasks include direct spreadsheet-style access to analysis results, source apodization, and spline data. Technical improvements include faster converging illumination simulations using a new ray generation scheme and a new module for CATIA data exchange.
Booth 2314

Pressure transducer

Viatran

Corp.'s Model 148/248/348 is a durable, high-accuracy, pressure spike resistant gauge and absolute pressure transducer in a 1.5-in (38-mm) diameter stainless steel machined housing with a NEMA 4X rating. Features include accuracy greater than 0.15%; 3X overpressure rating; vibration and shock resistance; all-welded and water-tight/submersible design; pressure ranges from 3 to 15,000 psi (0.02 to 103 MPa); and 4 to 20 mA, 0-5 V, 2 mV/V output.
Booth 864

Low-temperature cleaning

The low-temperature Recover cleaning process from **Kolene** Corp. operates in the 250 to 300°F (120 to 150°C) temperature range for enhanced cleaning and removal on a broad range of soils and coatings. Processes are formulated to remove cured paints, powders, e-coats, baked-on oils and greases, and coked carbon deposits. Metals that can be safely processed include aluminum, brass, zinc, iron, and steel (galvanized and aluminized). When processed within the operating temperatures, the immersion times range from 30 to 90 min. Highly polished surfaces are virtually unaffected, requiring little or no finessing or repolishing.
Booth 1167

What's New
from the exhibitors

Metal extrusion

Textron Fastening Systems' metal extrusion system combines stamping, deep drawing, and cold forming to produce complex, fully integrated, and durable automotive components. The system integrates all parts into one engineered system that increases joint strength and process efficiency. Fasteners become part of a single component, eliminating the need for weld nuts, stamp-in nuts, and self-piercing nuts. The system more than doubles the thickness of walls of base metals, allowing applications with high stress loads such as suspension, drivetrains, and seatbelt anchors. No heat treatments are required to strengthen the metal. A 2000-ton stamping press is equipped with computerized controls that adjust instantly to 100 different component designs. One component is complete with each stroke of the machine, which has a capacity of five million parts per year.
Booth 2938

In-vehicle data acquisition

The DEWE-600-REC from **Dewetron** Inc. is an in-vehicle data-acquisition instrument. Although it is a full-power computer, the electronics are completely sealed from the environment. The chassis is NEMA4 sealed against moisture and dust,

and the hard drive is shock-mounted. The unit is comprised of a flat mainframe about the size of a notebook computer, and roughly 2 in (50 mm) thick. Inside is a Celeron or PIII processor with 256 MB of RAM on a field-replaceable single-board computer. A 20 GB or larger hard disk drive is installed within a special shock mount, allowing the system to record data to disk continuously, even when subjected to shock and vibration to MIL-STD-810F standards. The mainframe also includes a 16-channel differential voltage front-end circuit connected to an A/D card, which is plugged into the system's PCI slot. The other half of the instrument is a flat TFT display, which can rest on a desktop, be held in an operator's hand, or be mounted to glass or any surface using the threaded mount.
Booth 835.3

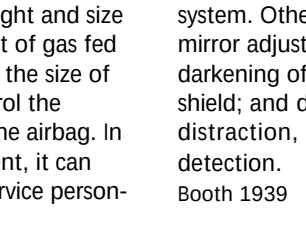
Shaker vibration control

The 8500 shaker vibration control system from **Vibration Research** Corp. has an Ethernet interface, which eliminates the need for installation of boards on the PC. Another advantage of this feature is that it is not necessary to locate the computer close to the 8500 signal processing unit. This eliminates many 50/60-Hz noise problems and removes long accelerometer cable runs between the control room and the shaker amplifier. The system has 24-bit A/D and D/A, which allows separation of input signals 120 dB apart. It eliminates the need for pre-scale circuits on the inputs and outputs and allows 90+ dB of

dynamic range on the China dynamic range random closed-loop test. The device also features the TEDS IEEE standard, and it controls sine and random tests to 20,000 Hz. Random control of 13,000 lines provides fine frequency control.
Booth 659

Optical sensing

Automotive Technologies International Inc.'s optical occupant-sensing system has numerous motor vehicle applications. For "smart" airbag applications, optical sensing, in combination with neural network pattern recognition technology, can estimate occupant height and size and adjust the amount of gas fed into the airbag and/or the size of the vents, which control the outflow of gas from the airbag. In the event of an accident, it can provide emergency service personnel information about accident severity. The distribution of heat and air-conditioning can be controlled automatically if seat occupancy is known, and acoustic engineers can use seat-occupancy information to improve sound quality from the entertainment system. Other applications include mirror adjustment; selective darkening of mirrors and windshield; and drowsy-driver, driver-distraction, and driver-identity detection.



Booth 1939

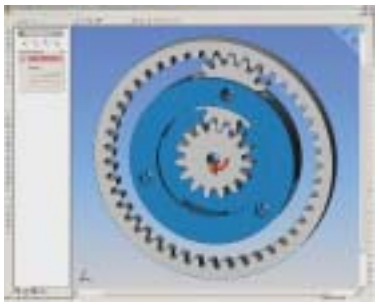
Electronic module testing

The **Thermotron** Automotive Functional and Parametric Test System allows for cost-effective evaluation of electronic modules. It is designed as a generic tester with a product-specific interface adapter, which permits quick changeover from testing one product to another. Applications include hardware and software troubleshooting and debugging. Commercial, off-the-shelf instrumentation using an open hardware platform provides reliability to satisfy the cycle rates and monitoring requirements of single-head testing applications. Operation is possible in either manual or automatic modes. Manual mode allows the user to configure input parameters to the product and to observe the product's outputs. Input signals can then be changed interactively, while measuring product outputs and stepping through a test sequence. Automatic mode allows simple test selection and appropriate pass/fail status indications.
Booth 1445

What's New
from the exhibitors

3-D CAD software

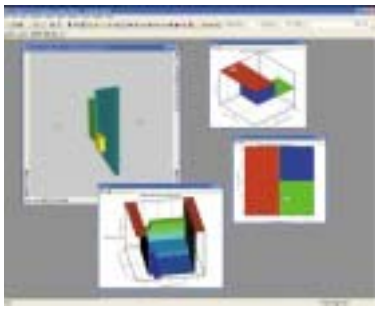
SolidWorks 2003 is the latest version of **SolidWorks** Corp.'s 3-D CAD software that streamlines product design. It features hundreds of new enhancements that will help users analyze their design's structural integrity, easily



communicate design information to others, locate downloadable parts via online supplier catalogs, and accelerate the design process with new modeling features. Users have the flexibility to import and work with various file formats including AutoCAD and CADKEY. This capability helps users embrace 3-D and integrate third-party designs into their CAD files, so they can finish designs quickly. The software lets users simulate realistic motion so they can easily check how gears in an assembly, for example, will function in actual operation and address any design flaws prior to manufacturing.
Booth 2201

Thermal management simulation

Flowmaster2/v6.3 fluid-flow and heat-transfer simulation software from **Flowmaster Group** is focused on meeting the needs of



automotive thermal systems engineers who need to perform complex, integrated fluid and thermal systems simulations at the start of a vehicle's design. Incorporating new underhood airflow technology, advanced cooling pack segmentation, and a 3-D visualizer, the product helps engineers to arrange the positioning of fans, radiators, oil coolers, AC condensers, and other thermal components that make up the vehicle's cooling pack and evaluate performance before 3-D CAD geometry is even available.
Booth 2508

Thermal imager

The TVS-8500 integrates **CMC Cincinnati**'s cutting-edge defense technology and InSb focal plane array architecture to provide a multi-use platform. Five moveable cursors, as well as vertical and horizontal profile lines, are presented on the built-in, 5-in liquid-crystal display. Dynamic digital image enhancement and auto temperature ranging allow users to follow critical temperature over quickly changing scenes. Real-time recording allows for 120, 30, 10, 5, 2, or 1 frame/s recording and playback of the thermal image. The file can be copied to the compact flash card for permanent or temporary off-line storage.
Booth 252

Coach air conditioning

Fortune Thermo Engineering's FBAC-series rooftop air-conditioning systems for coaches or public buses up to 12 m (40 ft) keep the air at a comfortable condition and feature a compact, ultra-low

profile. The systems blend in aesthetically with bus designs and provide flexible installation and weight distribution arrangements. Simple and powerful microprocessor control with self diagnostics makes instant repair possible and minimizes maintenance costs. R134a refrigerant is used to provide environmentally friendly operation.
Booth 2947

Test simulation

When **Jaguar** wanted to simulate the electrical environment of a driver's door control unit, they turned to **add2** to design and build a programmable interface unit that simulated this electrical environment, enabling Jaguar engineers to test the functionality of their control

unit without leaving the lab. Control functions such as those for courtesy lights, rearview mirror adjustment, and window operation could all be exercised through a variety of real-world and what-if scenarios well before an actual prototype vehicle became available. The solution led to Genix, a universal simulation interface for test systems that provides a ready-made and re-programmable method for matching signal levels. As a logical development of Genix, add2 subsequently launched MicroGen (pictured), a universal electronic control unit.
Booth 2028

What's New
from the exhibitors

Air/fuel ratio measurement

ECM's AFM1000 series of air/fuel ratio measurement modules is designed to support in-vehicle powertrain calibration. Key features include wide AFR measurement range, fast response, linear analog output, SMB bus ports, and easy air calibration. All modules use wide-range air/fuel ratio exhaust sensors, are very compact, and offer a variety of cabling options.
Booth 833

Metal forming

In the United States, **Hirschvogel Umformtechnik** GmbH manufactures pinions (warm forged) with an automatic forging line as well as transmission shafts (cold formed) and hollow parts including finished splines. For a U.S. customer, the

firm supplies 2000 ready-for-assembly wheel hubs per day directly from Germany, where the firm also produces aluminum steering knuckles including machining.
Booth 2137

Electroplating

With over 70 years of experience in electroplating technology, **Gramm Technik** is in its fourth year of expansion into the North American market. Whether anodizing pistons or electroplating the finish coatings on virtually any aluminum part, including brake and transmission parts, the firm offers economic advantages to its customers. It is ISO 9001/9002 certified with five production sites worldwide, including the new location in Perrysburg, OH. It offers part processing in the Ohio facility or inline at customer facilities. Customers may choose to purchase fully automatic machines, finding additional cost reductions per piece. The company also provides the aluminum industry with fully automatic and enclosed chemical treatment etching modules, which provide economical and environmentally friendly solutions to die cleaning operations. These units can be modified for phosphating, chromating, and stripping.
Booth 2245

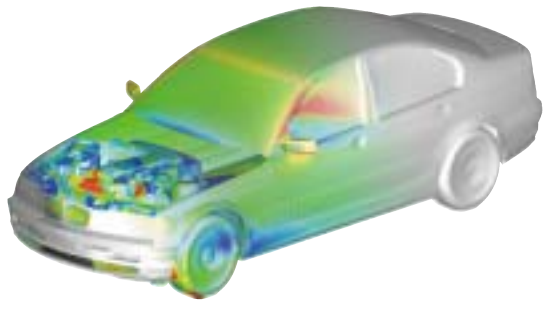
Electric thermostat

INZI Controls' Adjustable Electric Thermostat (AET) provides new ways of optimizing vehicle coolant temperature control systems in all engine operating conditions, reducing engine friction pressures and improving the reaction kinetics in the combustion chambers. The results are seen in benefits including a reduction in fuel consumption of 2-3% based on FTP 75; a reduction of emissions (HC by 15%, and CO by 4%, also based on FTP 75); increased engine horsepower by 8%; improved interior heater performance; and improved engine durability. AET operation is based on an increase in coolant temperature and the use of an integral electric motor in the thermostat, controlled by the engine control unit. By controlling the electric motor, the volume of the wax element is changed, achieving new dilatation functions. In the unit, the wax element is fixed in the thermostat housing. Consequently, the AET does not move and the same thermal dynamic and flow dynamic exist in all engine conditions. This characteristic is important for coolant temperature control accuracy and functional safety. The device needs the same package area as conventional thermostats, can be used in both inlet and outlet temperature control systems, and is suitable for both gasoline and diesel engines.
Booth 2918

Dynamometer and control

Dyne Systems Co. can fulfill all dynamometer and control requirements with the recent acquisition of **Midwest Dynamometer & Engineering** Co., **Maxwell Dynamometer Systems**, Inc., and the former **Dynamatic** Corp.'s eddy current dynamometer product line. The firm manufactures eddy current dynamometers ranging from 5 to 4000 hp, and it is the only authorized remanufacturer (to OEM specifications) of Midwest and Dynamatic eddy current dynamometers. The company also maintains an extensive inventory of used dynamometers. It has released the Companion II data-acquisition hardware system, which is modular from 6 to 120 channels, allowing users to design a system to meet current requirements with expandability for the future.
Booth 501

CAE tools



In addition to its ongoing development of STAR-CD, a widely used CFD code in the automotive industry, the **CD adapco Group** is heavily involved in the development of other CAE tools and capabilities. These range from CAD modeling, data handling, and surface cleaning to automotive-industry-specific methodology, otherwise known as expert system tools (es-tools), for rapid pre-processing, mesh generation, and post-processing of complex applications. Some of the firm's expert systems include es-aero (for external aerodynamic simulation), es-aftertreatment (for IC engine aftertreatment), es-fsi (for fluid structure interaction), es-ice (for IC engine cycle simulation), es-pass (for HVAC and passenger compartment simulations), and es-uhood (for underhood flow and thermal simulation). The firm also provides experienced CFD and FEA consulting services.
Booth 1126

What's New from the exhibitors

Injection molding

GVS produces fuel tank primary and secondary filters for gasoline and diesel engines, fuel injector filters, throttle body plates, ABS filters, power steering and solenoid filters, ventilation valves, waterproof ventilation filters, and air membranes. GVS's technical capabilities include filter technology, insert molding, injection molding, and multi-component automatic assembly.
Booth 2701

Test information management

MTS Systems Corp.'s eTIM Software is designed for test information management across computer-aided-test and -engineering applications. It is focused on information management, archival, and retrieval of test information.

The product buffers the user from the complexity of interfacing directly with a database. It is easy to use with tight integration to data sources, and is engineered for widespread information via the network or Web. The software works with any data, regardless of format.
Booth 617

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

SAE Foundation to auction second Chevy SSR produced on eBay

Every automotive manufacturer seeks a certain buzz when rolling a concept vehicle into production. Thanks to the generosity of General Motors, the SAE Foundation is about to add more buzz to the launch of the Chevy SSR.

At the SAE & ESD Foundations Banquet held in Detroit in May 2002, GM President & CEO Rick Wagoner announced the donation of the second saleable Chevy SSR to the SAE Foundation. The purpose of the donation is to auction the vehicle to create the seed funding for an educational award in memory of Heinz C. Prechter. Prechter, who died tragically last year, was founder of ASC, Inc., and the Chevy SSR was one of the last specialty vehicle programs Prechter was involved with at ASC.

"GM's donation of the Chevy SSR is really a very fitting tribute to Heinz and also to the SAE Foundation and the management of its educational programs," said Daniel M. Hancock, Chairman of the SAE Foundation and CEO, Fiat-GM Powertrain. "The announcement of the donation was the highlight of this year's banquet."

The buzz surrounding the Chevy SSR has been building for several years since the vehicle was introduced as a concept.

"There has been a lot of excitement surrounding the SSR, and folks are lining up at dealers to get their hands on one," said Donald W. Ableson, Chairman of the 2002 SAE & ESD Foundations Banquet and Executive Director of Specialty Vehicle Activity, General Motors (retired). "Our plan now is to be strategic about the auction of the vehicle. We want to build on all of the excitement and leverage our own buzz. Right now, our plan is to conduct our auction on eBay over a 10-day period from April 25-May 4."

The auction will require a great deal of careful planning. In addition to details surrounding auction logistics, the SSR being auctioned is unique. "There are many things about this particular vehicle that distinguish it from any other Chevy SSR that will be produced," Ableson explained. "First of all, SAE is auctioning VIN#2, which is the lowest VIN to be sold. Second, it's one of 25 vehicles in the Chevy SSR Signature Series that will sold with its own unique pedigree. It will be a standout. Whether you can afford to bid on the vehicle or not, you'll definitely want to bookmark www.ebay.com and at least get in as a window shopper."

For additional information about the Chevy SSR auction on eBay, contact the SAE Foundation office at (724) 776-4841.

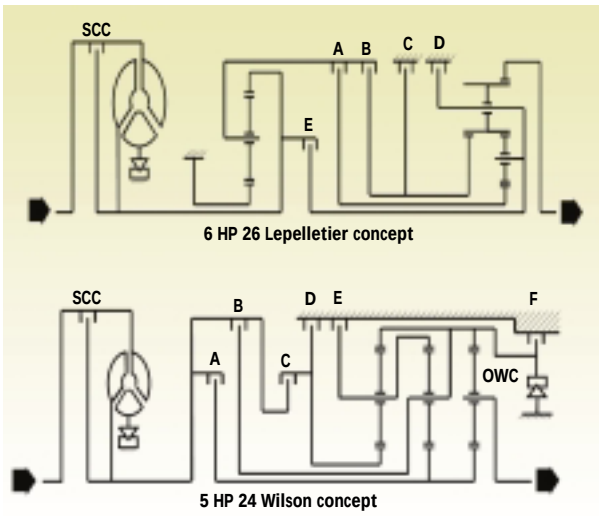
Publish your book with SAE

On Wednesday, March 5, from 8 a.m. to 5 p.m, staff from SAE's book publishing group will be available in Room W1-53 of Cobo Center to meet with prospective authors. SAE staff will be on hand to answer any questions you may have about writing a book, and to talk with you about publishing your book with SAE. Refreshments and snacks will be provided.

ZF transmission design

Today at 9:00 am during the Transmission & Driveline Systems Symposium—New Transmission Systems in room W2-62, a researcher from **ZF** Friedrichshafen will describe the gearset concept, the mechanical design, and specific functions of the company's six-speed stepped automatic transmission for passenger cars, the 6 HP 26.

In the European market, five-speed automatic transmissions have been used in the mid- and upper-class car segments since the early 1990s. In comparison to four-speed transmissions, which have a larger world market, five-speed transmissions offer a higher-quality standard and their contribution to fuel efficiency, noise and emissions reductions, improved performance, and driving comfort has led to a steady increase in market share, according to ZF.



ZF derived its six-speed automatic transmission from a 1990 patent filed by Lepelletier, which, compared to the 5 HP 24 transmission, shows a reduction of one shift element and some gearset parts. In combination with ZF's shift sequence strategy, it was also possible to remove all one-way clutches without negative consequences to shift quality.

The aspect of fuel efficiency is gaining obvious importance in the requirements of future transmission systems, with nearly all transmission manufacturers and suppliers investigating new concepts such as automated manual transmissions, double clutch systems, or different types of continuously variable transmissions. For the stepped transmission types, these requirements need to provide a larger overall ratio spread and improve the efficiency accordingly. In addition, transmission functions need to be developed or improved to support those targets.

During the design phase, ZF engineers determined it would be necessary to develop a transmission with an overall ratio spread of about 6.0, with calculation and simulation results demonstrating that it would be necessary to divide that range by six gears. From previous three-speed-transmission designs to more recent five-speed designs, there was not only an increase in ratio and gears, but also an increase in mass and size due to more components, mainly clutches and gearsets. In addition to the ratio spread and number of gears, engineers designed the transmission to maintain a size similar to the five-speed via the use of fewer components.

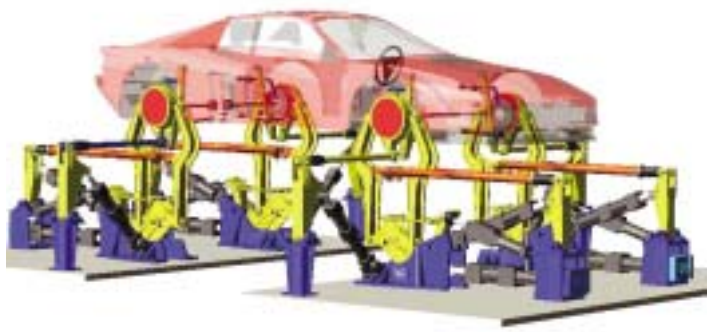
Jean L. Broge

The 6 HP 26 transmission is part of ZF's new six-speed program that comprises three transmission types, covering a range of engines from four to 12 cylinders, including diesel engines.

Validated virtual testing

DaimlerChrysler has validated a computer simulation of a physical test rig that can reduce development time by providing accurate component load histories before prototypes have been built. In the current development process, component load histories are not available until after the first prototypes are tested, which delays the process and creates the need for additional prototype iterations after the component design is finalized.

While multibody simulation can be performed on full vehicles, it does not provide accurate load histories because of the difficulty of accurately modeling the tires. Simulating the test rig overcomes these problems by making it possible to apply load histories from a similar vehicle to the model of the vehicle under development and generate accurate dynamic component loads.



MTS Systems and DaimlerChrysler validated a multibody simulation model of a dynamic test rig with a production vehicle (generic vehicle body shape shown). The modeling technique can now be used with confidence on new vehicle programs.

To validate the virtual tools, **MTS Systems** (Booth 617) modeled an existing vehicle mounted on the test rig, and applied the same load histories to the model and a real vehicle. Relatively minor differences were seen in the responses, which were addressed by refining the model. DaimlerChrysler and MTS will now apply the virtual test lab to a real development program and expect to see substantial time savings.

David Alexander

DaimlerChrysler shows "real-world" technologies

Dodge Ram COMBATT

As official sponsor of the SAE 2003 World Congress, **DaimlerChrysler** Corp. dedicated significant resources in the reshaping and updating of many aspects of the annual event. Part of that effort is its showcase of advanced technology vehicles on the exhibit floor. The company says its display is a real-world statement of its commitment to future technology, with a focus on innovations that the customer can feel and experience, in addition to advanced technology.

Main attractions at the DaimlerChrysler exhibit (Booth 1869) include the **Dodge** Ram Commercially Based Tactical Truck (COMBATT), developed in conjunction with the **U.S. Army**'s **National Automotive Center**. Based on the Dodge Ram HEV Contractor Special, the COMBATT is a multi-mission, multi-role logistics vehicle that combines a new high-output Cummins 5.9-L turbodiesel engine and a four-speed automatic transmission with an optional integrated starter/generator hybrid propulsion system. The hybrid system produces 5 kW or more of auxiliary power for the needs of the armed forces. Other upgrade highlights are a hydropneumatic suspension with five-position ride height for up to 30 in (762 mm) of water fording, a rapid central tire inflation system, and run-flat tire inserts.

The Chrysler Town & Country Natrium and its fuel cell

Also on display is the **Chrysler** Town & Country Natrium minivan—the Chrysler Group's third-generation fuel-cell concept vehicle. The Natrium is fueled by extracting hydrogen from sodium borohydride for a range of 300 mi (482 km) without giving up any interior cargo or passenger volume, according to the company. For the **Jeep** Concierge concept vehicle, DaimlerChrysler cooperated with many suppliers to take a look at how technology can anticipate and accommodate drivers' needs. It demonstrates advancements in safety with blind-spot warning and advanced visual and radar parking aids. The Concierge also improves the interface between driver and vehicle with multiple door check positions, powered lift gate, voice-controlled key fob, and capless fuel-fill valve.

Kevin Jost

DRIVE...*Continued from Page 1*

market visibility, Kallenbach added. U.S. activity mirrors Japan, panelists added.

While there's plenty of development work to be done, companies are already trying to devise marketing strategies. Drivers aren't clamoring for by-wire features, but they might like them once they have driven a vehicle. Reduced emissions and fuel consumption will be attractive features, as will the marketing push that this is jet aircraft technology. Winter noted that pilots originally felt that by-wire technology was taking some of the control functions away from them. But now, "they not only accept it, they request it," Winter said

Terry Costlow

DaimlerChrysler's Zetsche to speak at Annual Banquet

Dieter Zetsche

DaimlerChrysler Corp.'s President and CEO Dieter Zetsche will address attendees of the SAE 2003 World Congress Annual Banquet tonight at 7 p.m. This year, the Banquet will be held in a new location at the Detroit Marriott Renaissance Center, Renaissance Ballroom (located on Level 4).

One hundred of the top OEM and top-tier supplier CEOs will be honored during the Banquet.

Tickets are priced at $125/each or $1250/table. Price per table includes one bottle of red wine and one bottle of white wine. Cash bars will be provided in the foyer beginning at 5 p.m. Dress is business attire. Tickets can be purchased from 8 a.m. to 5 p.m in Congress Central, Room W2-60.

Vibration testing

Though **Unholtz-Dickie** was founded in 1959, it has roots in World War II when one of the founders worked for **Lockheed**. Stringing up a wing in a conference room, Unholtz was able to simulate and capture the noise of the aircraft to prove the military lost as many planes to vibration as it had to dogfights. According to Vince Murray, Regional Manager and Applications Engineer for Unholtz-Dickie, those experiments "gave birth to the very first shaker."

While still having a huge presence in the aerospace industry, the company's work in the automotive industry has increased consistently over the years. "At one time you had [engineers] who provided curves that generalized," said Murray. "And the whole industry for years used that. People want to go closer to what's really happening because they feel it's a better test [of system behavior]."

One of the things that makes it a better test, according to Murray, is the company's T-Series shaker, which uses the Induct-A-Ring (IAR) armature. "The uniqueness of our product is that most conventional products use wire in the armature," he said. Besides electrical windings, other armatures also include high voltage potentials, epoxy bonded mechanical joints between insulated wires, high current leads to bring ac current in and out, and high-pressure water hoses to cool the coil.

By contrast, the IAR is a two-piece metal structure with a solid, forged aluminum ring bolted into a ribbed upper table casting. The electrical connection is inductively coupled so that ac currents are induced without electrical or cooling connections to the moving element. "The performance on the T-Series Induct-A-Rings start at around 15,000 lb (6804 kg), all the way up to 50,000 lb (22,680 kg)," said Murray. "But we have a lot of special versions just for shock and just for shock-response spectrum."

The company's products also include power amplifiers, calibration systems, and stroke thrushers, which reproduce transient waveforms (crash, drop, impact) often required to test airbag sensors, ABS, active suspension components, and other automotive parts.

Jean L. Broge

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.

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?

8:00-9:30 a.m.

Despite their overwhelming success in Europe and Asia, diesel passenger cars are only beginning to gain a foothold in the U.S. market. Diesels offer benefits in fuel economy and CO_2 reduction but face very stiff challenges with new emission regulations. The experts below will debate their future.

***David F. Merrion**, Moderator, Retired Executive Vice President Engineering, Detroit Diesel Corp.*

***Tom Cackette**, Chief Deputy Executive Officer, California Air Resources Board*

***John Wall**, Vice President, Chief Technical Officer, Cummins Inc.*

***Kevin DeHart**, Vice President, Diesel Fuel Systems, Bosch*

***Brian FitzGerald**, Director, Diesel Systems-North America, Siemens VDO Automotive*

Keynote Address: Ned McClurg

Vice President and General Manager for Powertrain Engineering, General Motors Corp.
Standing on the Brink of Change—The Future of Automotive Powerplants

10:00-10:30 a.m.

Keynote Address: Paul J. Kern

Commanding General, U.S. Army Materiel Command
The Future of Military Ground Propulsion

10:45-11:15 a.m.

The Road to Tomorrow's Gasoline Engines—Avoiding Wrong Turns and Dead Ends

1:00-2:30 p.m.

Gasoline-fueled internal combustion engines will continue to be the primary power source for the majority of passenger cars for the next eight to 10 years. With this as a given, engine designers must select from a long list of optional strategies to help these engines run cleaner, more efficiently, and develop more power for their displacement. Making the wrong choices can mean disaster in terms of wasted research and production tooling.

***Craig Marks**, Chairman of the Board of Trustees, Altarum - Moderator*

***Franz Pischinger**, President and CEO, FEV Motorentechnik GmbH*

***Takehisa Yaegashi**, Senior General Manager, Power Train Planning Dept., Toyota Motor Corp.*

***Daniel R. Kapp**, Chief Engineer, Powertrain Operations, Ford Motor Co.*

Fuel Cell Initiatives: Powering Up at State, Regional, or International Levels

2:30-4:00 p.m.

Fuel-cell development initiatives are taking shape in the United States and around the world. Speakers will discuss the various forms these initiatives are taking including funding mechanisms and research and application direction.

***Patrick B. Davis**, Fuel Cell Team Leader, Office of Hydrogen, Fuel Cells and Infrastructure Technologies U.S. Department of Energy - Moderator*

***Murray W. Davis**, Vice President and Chief Technology Officer, DTE Energy Technologies*

***Steve Arwood**, Chief Operating Officer, NextEnergy and Director, National Hydrogen Association*

***Bruce Johnson**, Director of the Ohio Department of Development*

***Tom Cackette**, Chief Deputy Executive Officer, California Air Resources Board*

***Peter Prenninger**, Head of Research & Innovation, AVL List GmbH*

42 Volt Electrical Systems & Fuel Cells: Harmonious Marriage or Incompatible Partners?

4:00-5:30 p.m.

Two key technologies receiving much recent media attention are 42-volt electrical systems and fuel cells. Much has been reported about fuel cells as a means of propulsion (several hundred volts), but almost no attention has been given to the option to use a fuel cell to provide lower voltage to power the myriad of electrical accessories necessary in future vehicles. Will a 42-volt electrical system provide advantages in a vehicle with a fuel cell? How should accessory power be generated in a vehicle powered by a fuel cell? Should a stand-alone auxiliary power unit be used for accessory power? These and other questions will be debated by the panel of industry executives.

***Norman Traub**, Director of 42V Initiatives, SAE International - Moderator*

***Christopher Borroni-Bird**, Director of Design and Technology Fusion, General Motors Corp.*

***Jean Botti**, Chief Technologist - Innovation Center, Delphi Corp.*

***Francis R. Preli Jr.**, Vice President, Engineering, UTC Fuel Cells, a unit of United Technologies Corp.*

***Tom Moore**, Vice President, Liberty and Technical Affairs, DaimlerChrysler Corp.*

Siemens VDO makes case for diesel

*In conjunction with today's Advanced Propulsion/Powertrain Technology Theater presentations, **Siemens VDO** Automotive is making the case for diesels in the U.S. market. It says fuel consumption can be reduced by 25 to 45%, the lower fuel consumption meaning fewer emissions of CO_2. The infrastructure should be in place with ultra-low sulfur diesel fuel in 2006. Advanced diesel vehicles can actually be fun to drive due to their high performance and torque. Diesel vehicles have lower service costs with fewer service intervals. Diesel is considered by the company to be an excellent powertrain choice particularly in the U.S. for SUVs and light trucks.*

Siemens VDO feels it's poised to take advantage of a shift to diesels with its piezo common rail (PCR) systems, which can inject fuel up to five times per cycle. The piezo injector is said to provide excellent accuracy, response time and reproducibility. The company can supply a complete system including pump, rails, pipes, injectors, engine control unit, and software. It has produced over 1.5 million piezo injectors since the start of high-volume production in 2001, and has received high-volume contracts from PSA, Volkswagen, and other European vehicle manufacturers.

Speed is the greatest advantage of the piezo injectors. PCR switching elements are said to operate much faster than conventional solenoid valves, which makes it possible to split the fuel volume into as many as five individual injections. Future engine management strategies could include two pre-injections with very small volumes of fuel, followed by the main and two smaller post injections. Pre-injections serve primarily to build an evenly distributed pressure in the combustion chamber, thereby reducing noise during combustion. Post-injections are provided for the exhaust gas post treatment, which can help reduce engine emissions.