

What's New
from the exhibitors

Microcamera accessories

InterTest's accessories and custom modifications from iShot Imaging enable 7-mm, 12-mm, 17-mm, (0.28-, 0.47-, and 0.67-mm) and C-mount remote-head micro cameras to survive in submerged, extreme



temperature, high pressure, caustic, vacuum environments, and in confined areas. The firm's accessories include specialty filters, lenses, cable cladding, camera head multiplexers, fiber-optic shadow-less illumination systems, high-temperature housings, directional viewing prisms, bulkhead feed-through fittings, and custom reticules.

Booth 1005

Panel meter

Promess Panel Meters (PPM) from Promess provide full signature monitoring capabilities along with user-definable windows, which permit monitoring of specific portions of the process signature rather than the entire operation. The PPM monitors force, torque,



pressure, and flow rates for air or liquids. The Promess lower-cost panel meter is for single-station applications that do not require full capabilities of the more advanced monitoring systems. It provides for monitoring of in-production assembly processes and off-line testing systems. Standard features include an LCD graphics display, flexible sensor inputs, press-force limits, menu-driven programming, multiple part capabilities, and complete diagnostics and setup/troubleshooting software.

Booth 820

Manual transmission

Aisin's AI-SP6 six-speed manual transmission for sports cars is a high-capacity device for front-engine/rear-wheel-drive applications for **Toyota, GM, and Holden**. It features reduced shifting force and shorter shift strokes due to a carbon synchronizer ring at the first gear, second gear (multi type), and third gear (double type). Precise shifting with no lever play is accomplished via a guide plate and direct detent construction at the outer shift lever. High efficiency is gained via an oil separator and low-friction tapered roller bearings. Minimal gear noise is realized through the use of ground gears.

Booth 1461



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AHSS tube hydroforming

AUTO21 researchers are addressing the formability issues required to introduce advanced high strength steel (AHSS) tubes—such as dual phase DP600—into lightweight automotive structures. AHSS tube is much stronger than conventional and mild steel tube, allowing for thinner walls and lower weight. However, its formability is lower, requiring more care in processing. In particular, the study examines the impact of tube pre-forming operations, such as tube bending, on the subsequent hydroformability of AHSS tube. A collaborative effort is under way with researchers from **McMaster University, Queen's University, and University of Sherbrooke** to study the fundamentals of damage, formability, and texture evolution in DP600, while large-scale testing is done using an instrumented rotary draw-mandrel tube bender and 1000-t hydroforming press at the **University of Waterloo**.
Booth 1020

Paint shop

The Virtual Paint Shop from **CADFEM** allows for early evaluation of car body design during the development process of a new body in white. As with crash, NVH, or fatigue, checking a new body in white with respect to painting and corrosion protection can be done without need of a physical prototype. This will likely reduce cost and risk in development and manufacture and will ensure that a higher level of maturation can be achieved early in the design phase. Additionally, higher flexibility and short response times can be gained by fast assessment of design alternatives. The VPS/DIP module allows for the simulation of dipping of structures in basins filled with lacquer, cleaning agents, or other fluids. Additional modules include VPS/DRY, for simulation of the drying process for electro-, base-, and top/clear coat including curing simulation of paint/adhesives and structural analysis; VPS/EDC, for simulation of electrocoating; VPS/CP, for design and evaluation of spray nozzles supported by simulation CATIA vs. integrated; and CATIA-Toolkit, for creating models for VPS/EDC and VPS/DIP based on CATIA geometry data.
Booth 1641

ECU software testing

RT-LAB TestDrive from **Opal-RT Technologies** is a software-configurable simulator designed and optimized for today's electronic control unit (ECU) software developers. A replacement for static and programmable simulators, the system achieves low unit cost via off-the-shelf hardware technologies and a common field-programmable gate array based I/O module design. It comes with sufficient I/O to interface with demanding engine and transmission control ECUs, with further expansion through plug-and-play I/O modules. All I/O channels come with an integrated, configurable conditioning and protection stage. The software allows selection of output stage type, channel configuration, signal range, and scaling. For testing higher levels of integration, such as chassis/powertrain combination, multiple TestDrives can be brought together through an IEEE 1394 Firewire link. In addition to being a stand-alone simulator, RT-LAB TestDrive can serve as an I/O processor in a multi-processor RT-LAB Engineering Simulator for real-time closed-loop simulation using high-fidelity plant models.
Booth 2313



Signal conditioners

Battery-powered signal conditioners from **PCB Piezotronics** power ICP pressure, force, and vibration sensors. The devices provide constant-current sensor excitation and offer additional features such as gain,



integration, sensor bias monitoring, battery status indication, and input fault detection. They also provide portability, low-noise operation, and reduction of ground-loop problems when compared to units that use line power. Applications include in-vehicle and remote-location testing.
Booth 827

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What's New
from the exhibitors

Vest inspection system

The iShot PowerVest inspection system from **InterTest** provides ultimate inspection mobility by putting everything necessary to perform quick and thorough borescope or micro camera inspections—all neatly integrated into a tactical style vest. The kit is suited for performing inspections virtually anywhere because it is completely self-contained. The comfortable,



lightweight system includes a C-Mount color video camera, light source, combination monitor/recorder, external display option, and rechargeable Lithium Ion battery system. All cables are internally wired to eliminate the hazard of loose cables and bulky equipment. A durable shipping case is included. External display options include either a high-resolution heads-up display or a small, handheld pocket LCD display depending upon the inspection environment.

Booth 1005

Crack tester

The Zetec InSite CT eddy current crack tester from **Uson** provides



nondestructive detection of cracks or imperfections in critical components at production line speeds. The tester enables 100% online inspection, supporting up to eight dual-frequency probes working from 5 Hz to 10 MHz and providing a sampling rate of up to 10,000 samples per second. The device can communicate with other machinery via its built-in industrial I/O, which can be used to link the testing process to part sorters, marking devices, and material-handling equipment.

Booth 746

Pressure transmitter

The Type MH-2 pressure transmitter from **WIKA Instrument Corporation** provides pressure ranges from 400 to 8000 psi (2.8 to 55 MPa) for all standard mobile hydraulic applications. The device offers shock and vibration resistance per IEC 68-2 and ingress protection from IP 67 to IP 69K (steam jet protection). Additional features include a hermetically welded thin-film-measuring cell



to ensure long-term leak tightness and eliminate the need for additional sealing elements. Made of stainless steel using sputtering technology, the measuring cell provides long-term stability under dynamic load changes. Reliability is high even under critical electromagnetic interference conditions up to 100 V/m. Booth 1713



A Passion

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Integrated Child Booster Seat

In its normal position, the integrated child booster seat serves as a seat for adults. It can adjust to securely hold and protect children from nine months to 12 years of age. Separate five-point safety belts for smaller children and lateral head supports provide outstanding safety.



Active Head Restraint

The active head restraint uses either a pyrotechnic device or a spring mechanism. In the event of a rear collision, it launches the head restraint forward in milliseconds – before the seat occupant's head and body are impacted, arriving in a position to meet the occupant's head and prevent whiplash injury.



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RF/microwave design

The **Applied Wave Research** (AWR) Microwave Office 2004 design suite facilitates next-genera-



tion radio frequency and microwave circuit designs. The package integrates 3-D planar electromagnetic (EM) simulation with circuit simulation and layout tools, permitting arbitrary physical structures to be embedded within linear and nonlinear circuit simulations. AWR has increased capacity of its EMSight EM simulator by more than five times. A dynamic EM-extraction capability provides the ability to select schematic elements and target them for simulation using various EM solvers supported through the EM socket interface. Other enhancements are included for harmonic balance simulation, layout, and user interface, and additional models are provided. The layout tool supports more than 1 million elements and includes an edit-in-place feature.
Booth 2415

Component leak detection

INFICON's LDS2000 component leak-detection system incorporates the latest advances in helium leak detection to offer high durability as well as a three-year ion source warranty. Control and data acquisition are available via analog, RS232, and RS485 communication ports with converters for common Fieldbus protocols. System calibration is possible through internal and external test leaks, and a dynamic calibration enables system calibration under test cycle and pressure conditions. True leak-rate readings are provided in any test system design, including split-flow types. A rack-mountable electronics module with a detachable display/user interface allows optimized system configuration.
Booth 627



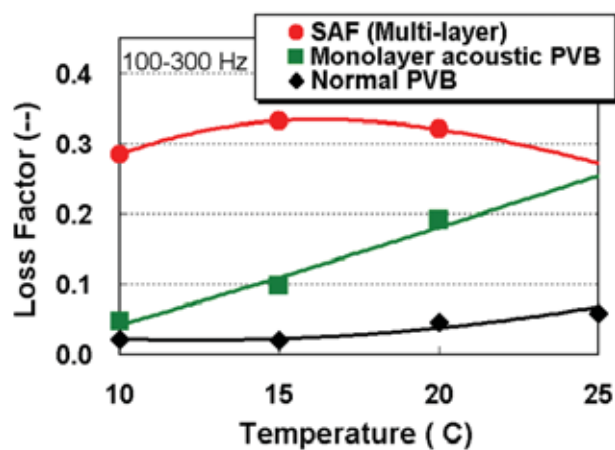
Signal conditioning and power drivers

dSPACE has streamlined control prototyping with RapidPro, a modular, off-the-shelf, configurable solution for signal conditioning and power drivers/stages to interface with



automotive sensors and actuators. A control unit provides an intelligent I/O extension to the firm's rapid control prototyping systems. The compact and robust mechanical design is suited for in-vehicle use, on test benches, or in laboratories. The components can be used individually or connected to build a stack for use as one physical system. The signal-conditioning and power-stage components each house multiple modules, with each module managing multiple channels. Customer-specific module designs can be incorporated to meet new sensor and actuator technology.
Booth 1701

Glass sound and solar protection



Sekisui is applying multilayer extrusion technology and S-Lec "function-by-layer" concepts (where more functions are added than a normal interlayer) to create the S-Lec acoustic film, which can increase the comfort level inside a vehicle cabin. By combining both multilayer and nano-dispersion technology, an infrared cut-off function for solar control performance is added to the PVB interlayer product to enable both sound and solar protection. Use of laminated glazing with this technology will enable not only windshields but also side, rear, and roof glazing to offer sound and solar protection.
Booth 2269

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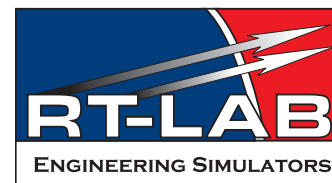


RT-LAB Hilbox

- ◆ For Hardware-in-the-Loop applications such as ECU development and testing
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What's New
from the exhibitors

Expander plugs

Koenig MB 850 series CR 6+ free expander plugs from **Sherex** satisfy the EU Directive 2000/53/EG, slated for implementation in July 2007. They use the DSP (thick coat passivation) process containing Cr 3+. This process allows coat-

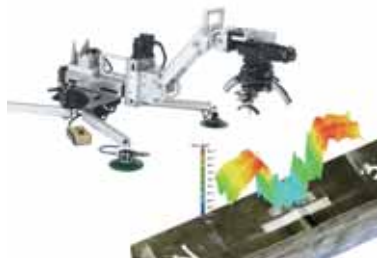


ing thicknesses up to about 1000 nm (39 µin). The device exceeds salt-spray testing results for the current MB 800 series expander plug zinc chromate (Cr 6+) plating. No degradation to blow-out pressure and pressure/temperature cycling performance is experienced. Both standard and E versions are available.

Booth 1501

Residual stress measurement

A residual stress measurement X-ray diffractometer from **Proto Manufacturing** incorporates the MGR40 goniometer. Originally designed for **NASA**, it has an integrated Phi rotation axis that allows for easy triaxial measurements. The FS5 field stand provides a stable,



lightweight platform with automated X, Y, and Z axes and suction-cup feet; these features enable the stand to be used on any surface in any position. Coupled with the firm's automated stress mapping technology and residual stress measurement software, the unit can generate a comprehensive picture of the stress state of any sample. Even curved surfaces such as welds can be mapped automatically.

Booth 326

Thermal analysis

RadTherm 7.1 thermal-analysis software from **ThermoAnalytics** is a tool for comprehensive heat management design and analysis. The C++ software is equipped with pre-processing for conductivity and mesh normals, boundary condition

setup, an optimized thermal solver, and post-processor/results viewer. With minimal effort, engineers can analyze conduction, multibounce radiation, and convection. All functions are integrated into a graphical user interface for ease and accuracy

of analysis. A voxel-based ray tracer computes radiation view factors and solar projected areas. Features include thermal links, which allow designers to connect any two element faces thermally; user routines, which provide support for user-

defined scripts and routines; and CFD import, which lets users set all relevant import parameters. Either a single CFD dataset or multiple datasets may be imported and applied to different transient solution times. Booth 1500

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Automotive Suppliers

Environmental test chambers

Atlas Material Testing Technology's

340-40 and 340-70 environmental chambers for climatic testing from

Weiss Technik enable durability testing of materials exposed to extreme temperature and humidity conditions.

The chambers are suited for 3-D components and assemblies. A dehumidifier coil prevents condensation on test specimens. A psychrometric humidity measurement system enables precise levels of heat and humidity to be maintained while tests are in operation. A height-adjustable touch-screen controller and four voltage-free switching inputs and outputs are included.

The system features port holes of 50 mm (1.97 in) and 125 mm (4.9 in) and a window for sample viewing.

The chambers contain a 340-L (12-ft³) exposure zone, with a temperature range of -40 to +180°C (-40° to +356°F).

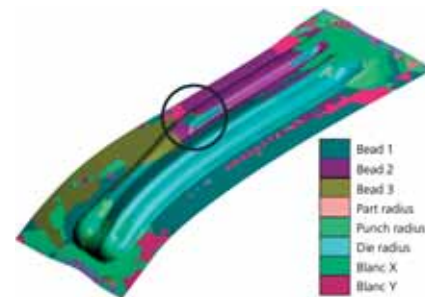
Booth 615



Sheet-metal forming

AutoForm-Sigma from **AutoForm Engineering** helps determine the most robust forming process via three innovations. The software combines statistical process control techniques with sheet metal-forming simulation. Noise and variability that are inherent in forming process factors such as coefficient of friction, tool forces, material characteristics, and tool wear are considered, thereby better reflecting manufacturing reality. The statistical algorithms have been adapted and integrated so they can be used directly by designers and stamping engineers, instead of requiring a separate statistical analysis department. Version 4.0's enhancements and new concepts include die design, CAD integration, springback, surface quality, data management, and report generation.

Booth 2206



Crash simulation

CAD-FEM and **Jacob Composite** developed test specimens of modular crash boxes made from advanced thermoplastic composites. Researchers tested the boxes with various impact velocities and triggering forms. Comparison of pre-test simulation reveals good correlation in terms of load displacement response. The calibration of material and model parameters for the post-test simulation further increases the correlation, especially in the pre-peak region of the impact force. For both tests, engineers used two material models of LS-DYNA. Although numerical results are promising with respect to experimental agreement, further work will be conducted.

Booth 1641



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Nickel-plated zinc coupling

A nickel-plated zinc die cast coupling (ZLC) from **CPC** (Colder Products Company) is streamlined and lightweight in relation to comparable machined brass couplings. Applications for the unit include engine systems, analytical instrumentation, and pneumatic power tools. The durable device is suited for high-volume requirements. It is interchangeable with many of CPC's existing coupling lines, including the acetal PLC Series, the polypropylene PLC-12 Series, and the chrome-plated brass LC Series.

Booth 742

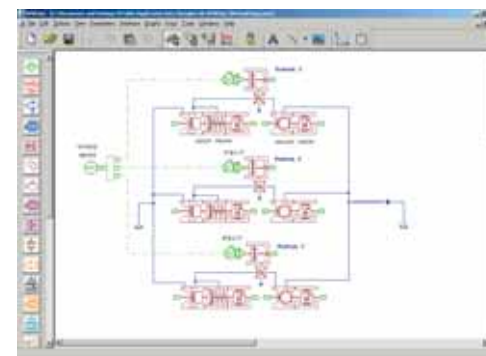


Virtual system simulation

Imagine's AMESim is a virtual system simulation platform designed for cross-functional use—currently offering 23 application-specific libraries. Several of the libraries were released last year, such as the Two-Phase Flow and Air Conditioning libraries, the IFP Drive library, and the Planar Mechanical library. Imagine began

2005 with the launch of its Engine library, which allows 1-D simulation of internal-combustion-engine assembly. The library, which was developed in collaboration with IFP, allows continuous modeling from engine design to definition of control strategies through testing with HiL/SiL. All of these features are bringing simulation closer to the testing world, allowing virtual analysis of all the major systems in the common car

Booth 2526



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What's New
from the exhibitors

Engineering simulator

Opal-RT's ECU (electronic control unit) In-The-Loop system can be used for high-fidelity vehicle dynamics simulation. The RT-LAB Engineering Simulator combines the company's parallel real-time simulation technologies, a bridge to established vehicle dynamics



simulation tools, and its expertise in sensor and actuator simulation to provide a laboratory-based test bed for chassis controls such as anti-lock brake units, traction-control systems, and vehicle-stability ECUs. Reusing analysis models for controls testing reduces model development and correlation effort, and enables a consistent model-based development process.

Booth 2313

Software quality

The **Carnegie Mellon Software Engineering Institute** (SEI) Predictable Assembly from Certifiable Components (PACC) Initiative is developing technology and methods that enable software engineers to integrate software components into a collection of parts where critical run-time properties, such as performance and safety, are reliably predicted. For commercial sectors such as the automotive industry, PACC is focused on obtaining predictable software quality by construction. Its work reflects clear industry trends toward greater use of software component technology and increasing concern over the quality of software systems. The technology being advanced by the initiative aims to increase the level of automation in the assembly, prediction, and composition of systems, and provide an objective and quantified basis for trusting component properties and the predictions that they are based upon.

Booth 2312

Fluid manager

The **KOBO** Fluid Manager—a super-fine filtration unit—is a fully automated, compact system with an integrated device used for sludge briquetting. It is used for the cleansing of cutting, honing, and grinding oils as well as water-based synthetic coolants. On demand, the system is ready to operate, set up, connect, and filter. The integrated filtration pump supplies the filters, and the system pumps provide cleaned coolant for the machine tools. Together with the pumps and the optionally available immersing cooler, the compact filter KCF has enough space on the combined clean/dirt tank. The compact system fits in a normal lorry or container and can be moved using a fork lift.



Booth 1645

Data acquisition/recording

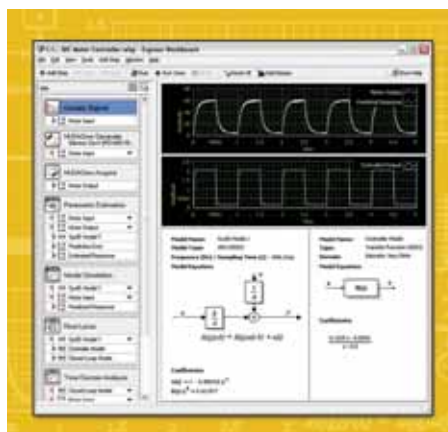
The DL750P Scope-Corder from **Yokogawa of America** combines recorder-like measurement with digital storage oscilloscope triggering and analysis capabilities. The system can measure temperature, pressure, logic, and relatively high-speed analog signals in a single box. It is used for critical data gathering applications where hard-copy record keeping is necessary or convenient while still retaining electronic storage of acquired signals. The modular instrument can capture up to 16 analog inputs as fast as 10 MS/s plus 16 logic inputs simultaneously. It offers up to 1 billion data points of acquisition memory in addition to an optional 20 GB internal hard disk drive. It works with nine different module types: high speed, high resolution, high voltage, non-isolated, thermocouple, NDIS-Type strain, DSUB-Type strain, acceleration, and frequency.



Booth 706

Control design and simulation

The NI LabVIEW System Identification Toolkit 2.0 and NI LabVIEW Control Design Toolkit 2.0 from **National Instruments** feature interactive assistants that give control design and simulation engineers a drag-and-drop, configuration-based environment for plant modeling and control-system design. The assistants allow engineers to use real-world stimulus and response to identify dynamic models and analyze and synthesize control systems. The Control Design Toolkit contains graphical tools such as root-locus and Bode plots for designing dynamic control systems for applications ranging from adaptive cruise control systems to high-precision machines. Other tools, including the Simulation Module and State Diagram Toolkit, are used to verify controller performance and simulate their dynamic systems offline or to implement them in real-time hardware.



Booth 1107

AFR measurement

ECM's AFM1540 Lambda Module measures air/fuel ratio (AFR) using a wideband exhaust sensor. Analog and serial outputs make the AFM compatible with all data-acquisition systems, including **ETAS' INCA**. **Bosch** LSU 4.9, LSU 4.2, and NTK UEGO sensors are supported by the compact device.



Booth 706

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Water-pump seals

EKasic silicon carbide water pump seal faces from **ESK Ceramics**, which was recently acquired by **Ceradyne**, are a critical component in heavy-duty diesel engines. Damage to diesel engines is typically caused by cooling-system breakdown, so the water pump and its components must operate properly. The seal ring is located where the pump shaft passes through the pump casing. It must be resistant to coolant wear and corrosion, and be extremely rigid and able to withstand high temperatures. The material is a good thermal conductor and is resistant to corrosion by hot water. It improves hydrodynamics even under strong frictional stress.

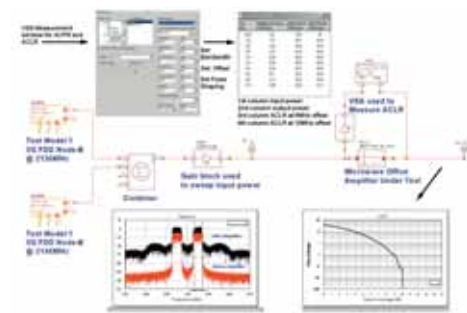
Booth 2047



Communication system simulator

Visual System Simulator 2004 software from **Applied Wave Research** aids in the design of complete, end-to-end communication systems. Enhancements to the product provide support for the Linux platform, RF (radio frequency) budget analysis for calculating cascaded performance of the RF link, and phase lock loop simulation blocks for interactive investigation of frequency synthesizer dynamics and frequency and phase modulators. Also included are core enhancements such as tighter integration with the firm's Microwave Office and Analog Office design suites, the addition of adaptive behavioral models, and enhanced measurement capability. The system contains a simulation engine coupled with a circuit simulation tool integrated into the design environment. This technology enables designers to establish the ideal system architecture and formulate suitable specifications for each of the underlying components, thus reducing time-to-market by eliminating iterations and reducing system costs by ensuring that components are not over-specified.

Booth 2415



Thin satellite antenna

StealthRay from **RaySat** is an ultra-low-profile, 2-in (51-mm) antenna that can be embedded into the



vehicle's roofline as an in-roof or on-roof mount application. It provides a live satellite television feed to vehicles while in motion. Using phased-array technology, the StealthRay antenna continually moves in relationship with the vehicle, providing continuous reception of live satellite television and music and is compatible with all direct-to-home broadcast satellite providers in the U.S., Canada, and worldwide.

Booth 2101

Stamping process

OKAY Industries provides a "production-proven prototyping" process to create sophisticated components as cost-effective stampings. For example, a traditional roller finger follower (RFF) manufacturing method includes casting and secondary operations such as boring, grinding, and lapping. The company's method is to stamp and forward-extrude an RFF with the same configuration as a cast part. The parts are net-shape-stamped, heat-treated, and shipped to the customer without adding additional components or secondary operations. The company faced and overcame a series of challenges during the development, including maintaining positional tolerances between closely related features, creating a new process to produce a tiny hole in thick material, and ensuring that the RFF socket and pallet areas were free of remnant material chips and surface marks. The company is in volume production of stamped RFFs and is exploring additional RFF applications.

Booth 1708



Clamping and braking

Zimmer's clamping and braking units are used with linear guides. They are precision manufactured for



most guide rail types and brands, and are mounted between the bearing blocks. When energized, contact is made only to prescribed areas located on the guide. Clamps are designed and used for STATIC holding applications only. Hardened contact surfaces are matched perfectly to each individual manufacturer's guide profile. Brakes are used exclusively for dynamic applications. Contact surfaces are made from a specially formulated brake material.

Booth 1513

Diesel emission control

The Diesel Future II emissions control system from **FEV Engine Technology** helps to maintain satisfactory vehicle performance, provide economical transportation, and demonstrate the potential to meet future U.S. Tier 2 Bin 5 emission levels. Test results for a test vehicle indicate that Tier 2 Bin 5 levels could be met using a de-greened emissions control system with a fuel economy penalty of less than 5%. Long-term testing on the system's aging performance is under way.

Booth 1815



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Focus
on people



Chatting outside the AVL Technology Theater on Wednesday afternoon were Neil De Koker (left), President of the Original Equipment Suppliers Association; David Cole (center), Chairman of the Center for Automotive Research; and Raymond Morris, SAE Executive Vice President.



"Major players in the auto industry today are looking to stand out from the crowd with styling and technology," said Phil Martens, Group Vice President, Product Creation, North America, Ford, during his keynote address Wednesday. "But sometimes complexity slows us down." Martens summarized that the company's Global Product Development System is focused on cost, time, and flexible manufacturing, and will deliver a 100% increase in products delivered.



Hartmut Tresp (left), CEO of MBtech, and Harald Grübel, Vice President of MBtech's Electrical/Electronics Division in North America, address members of the media during a press conference Wednesday. They announced a new PROVEtech product line focusing on development and testing of vehicle electronic control units, as well as an agreement with the Chrysler Group to provide hardware-in-the-loop technology.

"There's an opportunity for a state like Michigan with a trained workforce to attract new jobs. Toyota yesterday announced that it's investing \$250 million for an R&D facility. That's a great signal that we're the place where the 21st-century vehicles will be developed," Michigan Governor Jennifer Granholm said during a tour of the SAE show floor.



Smarter dummies are more sensitive

The growing emphasis on safety is increasing the need for more data on how collisions impact drivers and passengers of all sizes. Test engineers are responding with techniques that make it possible to put more sensors in crash test dummies while putting in a bit more intelligence than most dummies have.

One avenue for increasing the number of sensors is to reduce wiring complexity. **Messring Systembau** has developed a technique that uses a single wire for up to 32 sensors, providing a dramatic simplification over previous techniques that required one wire per sensor.

"We're using coaxial cable, but it's not a standard like Firewire or USB," said Dierk Arp, Managing Director of Messring. "They require four connectors to provide power

and transfer data. We are able to do carry power and data using only one connector." The scheme moves data at rates up to 1 Mbit per second.

Messring also developed a data-acquisition unit that is small enough to be located at various locations inside the dummy. That marks a significant improvement over previous techniques that used large data-acquisition boxes housed remotely from the crash site, receiving data through wires connected to each sensor.

Another benefit of the compact acquisition units is that sensors can be mounted on the unit, which stores data before sending it back to the host CPU. "We can hold up to 40 seconds of data if the unit



Data acquisition modules from Messring are small enough to fit inside the robot, sending data out via a single wire.

See **SMARTER DUMMIES**, Page 17

Electronics improve F1 racers, slash support staffs



During Wednesday's "Electronic Technology Applied to Formula One" panel, industry experts discussed how the increasing use of electronics in racing design affects both the racecar and the team.

Formula One racing is gaining substantial benefits from ever-increasing computer power, particularly in the area of simulation. But as electronic systems gain usage in the vehicle, there will be dramatic changes in the teams around the racers.

At the "Electronic Technology Applied to Formula One" discussion at the **FEV** Innovation Forum on Wednesday, panelists explained that the electronics inside the vehicle and the modeling system used to develop the entire vehicle are both changing the face of racing. As cars are developed, computer

modeling and simulation are being used to tweak spoilers, front-end shapes, and other aspects of the vehicle to decrease drag and increase downforce. Today's high-end computers are powerful enough to view the entire vehicle as a single entity, instead of only a model of the windshield or spoiler.

"Models are getting larger, some companies are actually modeling the whole vehicle with 70-80 million cells," said Mark Landon, President of **Optimal Solutions Software**. "The future is bright. There are bigger computers, bigger clusters, and more parallelism coming."

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