

SHOW THURSDAY DAILY

SAE 2004 World Congress

automotive engineering international

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Specialty car teams debate lighter materials, higher power levels

Panelists discussing "The Team Approach to the Design of High Performance Vehicles" focused on the teams and their goals, but when it came time for questions, the focus shifted to the cars. Power ratings and new materials are among the unresolved issues for high-performance vehicles.



Creating good teams is the key to developing cars that excite consumers and create a lasting impression, according to "High Performance Cars" panelists (left to right) Ford's John Coletti, Dan Knott of DaimlerChrysler, Corvette Chief Engineer Dave Hill, Toyota Racing representatives John Koenig and Peter Spence, and moderator Mark Gillies.

Those cars are designed to cater to fairly limited audiences, and panelists focused on the need to design to consumer's passions. That often means doing things that corporate executives may not fully endorse.

"You don't want to be seen as a corporate weenie," said Dan Knott, SRT Director at DaimlerChrysler Corp. "It's what's in the gut that delivers the outrageous cars people want. Consensus management will not work."

Most audience members in the AVL Technology Theater wanted to learn where the cars were headed, such as whether horsepower ratings will keep rising. Two panelists predicted an increase to 1000 hp (746 kW) and even higher. But they later agreed that a more tempered view held much merit.

See **SPECIALTY**, Page 17

Taking the mystery out of material selection

It may not be as profound as $E=mc^2$, and he may never be confused with Einstein, but John Fillion and the new equation he introduced at a Wednesday panel takes some of the mystery out of material selection, if not out of the known universe. The Senior Manager of Chassis and Powertrain Materials Engineering at



It was noted by moderator Jeff Helms (far right) of Ford Motor Co. at the outset of Wednesday's panel on Material Selection that new active-safety features are adding mass to vehicles, meaning offsetting mass reductions are necessary.

DaimlerChrysler Corp. said the FRF (Fillion Ranking Factor)—nobody else was going to name an equation after him, so he had to do it himself, Fillion joked—divides the product of tensile strength times modulus by cost times density.

Fillion recommended that all suppliers create a database of the properties and cost of various materials so they can be used in

the FRF or any other calculation a company wants to use.

It was the FRF, or at least the thinking behind it, that led the company to use a lot of high-strength steel on the new Chrysler 300, a lot of composites on the Dodge Viper, and a little bit of magnesium on the Viper, he said.

In general, Fillion said, steel will remain the dominant material for

See **MYSTERY**, Page 17

SAE 2004 President begins term

Duane Tiede, the retired Vice President of Functional Engineering for CNH Global and consultant in product development for the off-highway and other industries, will officially begin his role as SAE 2004 President tomorrow at the Board of Directors meeting.

Tiede began his career, after earning his graduate degree in 1966, with a job at Deere and Co. Engineering Research Center in Moline, IL. He worked there until 1988, when he joined Case



Corp. (now CNH Global) as Director of Product Performance and Evaluation. Soon after, he was appointed Vice President of Engineering for Worldwide Components. Later, Tiede was appointed Vice President of Functional Engineering, where he had responsibility for engines, drivetrains, hydraulics, cabs, electronics, advanced technology, engineering process, engineering analysis, industrial design, engineering operations, and product test. In that capacity, he supported product teams by developing and implementing technology on all new and current products.

Each new President brings specific goals to the job. Tiede, a 37-year SAE member, has selected Future Power Systems as one of his Presidential focus areas. He will also continue two of SAE 2003 President Jack Thompson's focuses—Systems Engineering and Digital Product Development—following the tradition carried out by SAE Presidents before him.

Future Power Systems—Tiede explained that the major drivers of future power systems are emissions regulations, fuel economy, energy sources, and cost. Alternative power systems being developed, according to Tiede, include advanced diesels and gasoline engines, hybrids and fuel cells, as well as new drivetrains including electric drives, other continuously variable transmissions (CVTs), and electrically shifted, step mechanical

See **PRESIDENT**, Page 17

Dana innovates, celebrates

It has been one month and just a couple days since Dana Corp. (Booth 2979) announced that Mike Burns would succeed the late Joe Magliochetti as CEO and President. On Monday, just one week after starting his new position, he made his first official appearance at the SAE 2004 World Congress.

While Dana had previously announced at the North American International Auto Show in January 2004 that it was supplying the front differentials for the BMW X5 SAV (sports activity vehicle), Burns got the chance to announce that "as an extension to that program we've begun supplying rear axle differentials for the X5, and that's an important piece of business for us."

That wasn't the only business discussed by Burns, who is the first engineer to lead Dana since Clarence Spicer founded the company on April 1, 1904. He also took the time to officially launch Dana's centennial-year celebration.

"Kicking off our centennial celebration at SAE was a perfect fit



Mike Burns, CEO and President of Dana, officially began his duties just one week before launching Dana's centennial celebration at the SAE World Congress on Monday.

for us," said Burns, adding that three people from Dana, including Spicer, have served as President of SAE, which will celebrate its centennial in 2005. "As we look forward to a second century of innovation, we also look forward to a continued partnership with SAE."

Jean L. Broge

Today's Congress Highlights

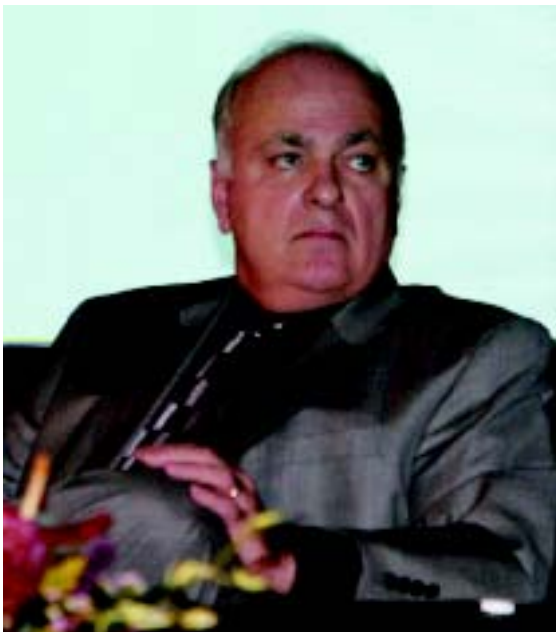
- **High Performance Cars - A Passion for Performance High Performance Engineering from the European Experts**
8:30 a.m.
AVL Technology Theater
- **Six Sigma Panel (Part 1 of 2)**
9:00 a.m.
Dana Technical Innovation Forum
- **High Performance Cars - A Passion for Performance Niche Vehicles and Flexible Manufacturing: Building Consumer Excitement, Showroom Traffic and Profits - Can It Be Done?**
10:30 a.m.
AVL Technology Theater
- **High Performance Cars - A Passion for Performance Keynote Presentation**
John Force, The King of Funny Cars (Twelve-time NHRA Funny Car Champion)
12:30 p.m.
AVL Technology Theater
- **High Performance Cars - A Passion for Performance Design of the Next Corvette and Cadillac XLR - GM Performance Leaders**
1:30 p.m.
AVL Technology Theater
- **Six-Sigma Panel (Part 2 of 2)**
1:30 P.M.
Dana Technical Innovation Forum
- **SAE 2004 Annual Banquet: Driven to Dream**
Principal Speaker: *Nick Scheele, President & COO, Ford Motor Co.*
7:00 p.m.
Renaissance Ballroom
Detroit Marriott Renaissance Center

**Focus
on people**



AVL-List Chairman Helmut List chats with Herbert Paierl, Minister of Economic Affairs, and Gudrun Hager, Austrian Trade Commissioner, after the panel on Austrian Business at the SAE 2004 World Congress.

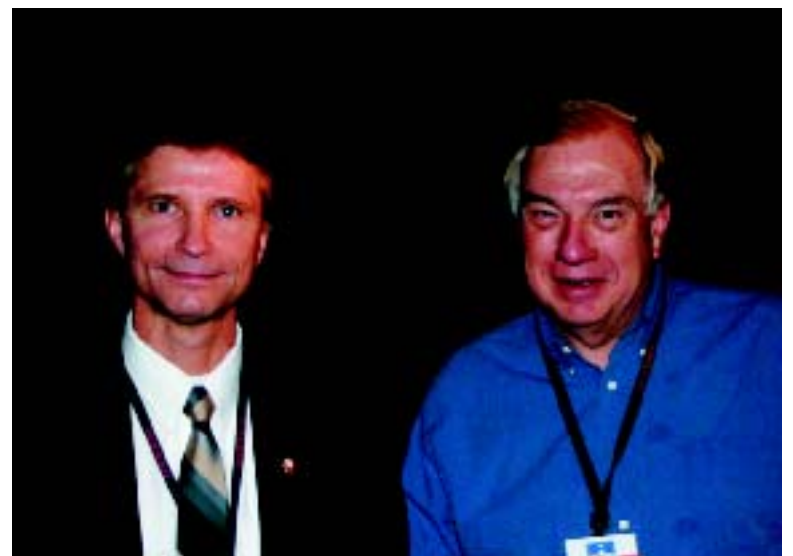
Building an exciting car requires not only finding out what customers say they want, but also "finding out who they are and where their passions lie," Dave Hill, General Motors' Chief Engineer for Corvettes, told attendees of the panel on high-performance cars.



Special vehicles like Ford's GT have a broader corporate payoff by refining knowledge on topics such as aerodynamics, said John Coletti, Director of SVT programs at Ford during the panel on high performance cars.



Mark Verbrugge, Director of the Materials and Processes Lab at General Motor Corp.'s R&D Center, said at Wednesday's panel on material selection that his company is seeking help from the supply base to resolve outstanding issues related to various types of materials and materials processes.



Ford Engineers Thomas Reichenbach and John Valentine meet before the Ford GT - New Vehicle Engineering panel in the Dana Technical Innovation Forum. Reichenbach worked on the improved aerodynamics on the Ford GT.

Yazaki supplies high voltage

The development of hybrid and fuel-cell cars is driving the need for advanced electrical distribution systems and components that can handle their associated higher voltages and currents while still meeting stringent cost targets.

Yazaki is at the forefront in this arena, supplying a range of products for environmentally friendly vehicles such as *Automotive Engineering International's* Best Engineered Vehicle for 2004, the **Toyota Prius**. According to Myron Trenne, Vice President of R&D for Yazaki North America, the company's experience and capability in power and data components and networks in the previous-generation Prius positioned the company for future generations of both hybrids and fuel-cell vehicles.

For the new Prius, Yazaki-supplied components include a two-pole inverter connection system, service plug, and virtual instrument cluster. The inverter system—which



A number of current and near-term products from Yazaki for hybrid-electric vehicles are on display in Booth 2009.

includes two wire-harness connectors, two electromagnetic interference (EMI) shielded aluminum cables, and header connectors—connects the vehicle's battery pack to the inverter that converts battery direct current to alternating current for the electric motor that drives the front wheels. The

harness saves weight and cost compared to the previous version Yazaki supplied for the first-generation Prius.

The instrument panel configuration posed space and light-reflection challenges for engineers. Yazaki's solution is a compact structure that incorporates two

See **YAZAKI**, Page 17

AVL offers multimedia walk-through of services

The **AVL** exhibit provides a multimedia overview of the company's capabilities, the enclosed booth giving showgoers an update on the company as well as a bit of a break from the bustle of the show.

The walk-through booth provides details of a variety of vehicle testing capabilities. AVL can provide accurate information on factors such as fuel consumption, mechanical development testing, acoustic analysis, and combustion analysis. Advanced simulation capabilities are also described. Simulation offerings range from individual software products to complete engineering solutions.

Responding to the changing international demand for

See **AVL**, Page 17

Editorial staff

AEI editorial staff for the Show Daily can be reached during show hours at Booth 1859.

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AEI Tech 2004 Awards

Each day, Show Daily editors highlight some of the top products and technologies on display at the SAE 2004 World Congress.

Measurement technique

The Doppler Global Velocimetry (DGV) from **IAV Automotive Engineering, Inc.** is a 3-D velocity measurement technique designed to develop new combustion concepts, reducing fuel consumption and emissions. DGV uses an optical laser to measure three-component velocity vector fields in a measurement plane. By forming several measurement planes, a volumetric presentation is generated that can be compared directly with computational fluid dynamics simulation results. The technique is suited for the time-averaged measurement of steady-state flows and the phase-averaged measurement of periodic flows. Features of DGV include high spatial resolution of more than 20,000 data points per plane, short measuring time, and immediate presentation of results.
 Booth 1701



Data acquisition

National Instruments' PXI-4204 and PXI-4220 are the first two products in the SC series of data-acquisition devices with integrated signal conditioning. Each device integrates measurement-specific signal conditioning onto a 16-bit PXI data-acquisition module and provides simultaneous sampling rates up to 200 kS/s. The PXI-4220 module is designed for structural test applications, including high-speed strain, load, and pressure measurements such as automotive crash tests, while the 100-V input range of the PXI-4204 module makes it suitable for high-voltage applications such as 14- and 42-V automotive measurements. Both modules use the PXI bus for synchronizing timing and triggering signals between multiple devices.
 Booth 935



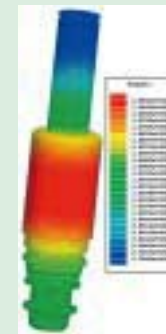
Bearing alternative

Igus Inc. provides high-performance plastic bearing alternatives for the automotive industry. The company's materials and solutions provide longer-life bearings for convertible tops, door hinges, chassis, seats, windshield wipers, steering systems, foot pedals, gearboxes, and engine compartments. The iglide suite of plastic plain bearings offers more than 6000 imperial and metric bearings and is a cost-effective alternative to bronze, metal-backed, and custom injection-molded bearings. All iglide bearings are self-lubricating and maintenance-free, while the plastic-based construction eliminates corrosion and delivers improved vibration damping. The iglide H2 and H4 plain bearings are suitable for the extreme temperatures and harsh chemicals of under-the-hood applications.
 Booth 853



Simulation software

Ansoft's ePhysics allows users to couple thermal and stress simulation to the electromagnetic solution generated by Maxwell 3D and HFSS and is offered as an add-on to these products. A multiple analysis environment created for the electrical engineer, ePhysics performs a complete virtual simulation of a design. Its thermal feature provides a steady-state thermal and transient analysis capability, including convection and radiation and one-way coupling between ac magnetic and thermal, while a static stress capability offers one-way coupling between electrostatic, magnetostatic, ac, and thermal solvers.
 Booth 2214



CFD code upgrade

CD adapco Group has released the latest version of its computational fluid dynamics code STAR-CD. It offers enhanced capability for simulating a wider range of flow processes in and around vehicles including external dynamics,



underhood thermal management, engine and aftertreatment processes, and climate control. There is also a STAR-Design default plug-in available that provides a built-in solid modeler for STAR-CD users without a CAD seat.
 Booth 921

Praxis air suspension gives adaptability to consumers

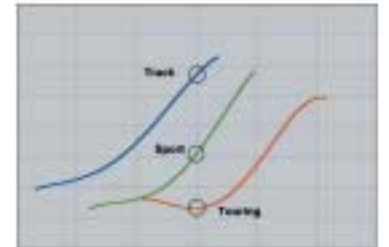
Automobile and truck suspension systems using steel coils, leaves, or torsion elements are tuned to one specific performance target. A suspension system may be optimized for handling performance,

or to isolate the occupants from road disturbances, but it cannot excel at both. In practice, the performance of conventional vehicle suspensions is a compromise between ride and handling.

A paper presented at the Vehicle Dynamics & Simulation – Suspension and Steering session in Room M2-29 this afternoon by Dean Tener, **Praxis** Advanced Suspensions, **Bridgestone/**

Firestone Vehicle Systems, describes a cockpit-adjustable air suspension system. Ride height can be lowered to improve handling, or increased for ground clearance. Spring rate may be reduced to

improve isolation, or increased for handling performance. Because of the wide range of user adjustability, the vehicle can exhibit good handling, or a comfortable ride, as required by the driver.



The Praxis Advanced Suspensions technology allows the driver to choose between ride comfort and handling performance.

Air suspension offers easy adjustment of vehicle ride height. A lesser-known property of air suspension is the ability to adjust spring rate, either with, or independent of height. These adjustments can be rapidly made by the vehicle occupant, avoiding requirements for sophisticated active controls.

When the driver senses rough road conditions, a dashboard switch can be used to select a soft suspension calibration. Conversely, the driver may select an aggressive suspension calibration when good handling performance is desired, and ride comfort is less important. The goal of this particular project was to achieve original equipment-quality ride in touring mode, better handling in sport mode, and highly aggressive handling suitable for autocross or other motorsport competition in track mode.

The paper will describe how road-vehicle handling performance may be improved by lowering the vehicle's center of gravity, increasing suspension spring rate, and shifting the roll-stiffness distribution rearward.

David Alexander

Arup uses CAE to meet GT timing

Development times for the **Ford GT** are said by UK consultancy **Arup Automotive** to have been significantly shortened thanks to application of what it describes as new technologies for the analysis of aluminum vehicle structures. Exhibiting in the **UK Trade & Investment**-sponsored Performance Engineering Pavilion, Arup (Booth 1945) was responsible for all crash, vibration, and durability CAE (computer-aided engineering) work on the car. The simulation techniques minimized the need for prototype testing. Development time for the GT from initial design concept to production was around 24 months.



Achieving satisfactory stiffness for the Ford GT structure with up-and-over doors proved a particular challenge for Arup Automotive, which tackled it by developing new techniques.

A majority of the GT's body panels are manufactured from aluminum, and Arup had the task of developing new techniques to maximize stiffness and durability. The car's up-and-over door openings were a particular challenge in terms of overall stiffness of the vehicle, according to Arup's Ford GT Project Manager, Tim Keer, a participant in yesterday's "Design and Analysis of the Ford GT Spaceframe" session.

"Ford wanted performance above and beyond anything else comparable on the market, so we had to look at alternative ways to put stiffness back into the vehicle. We formed a dedicated task force with Ford and **Mayflower Vehicle Systems**," said Keer. "The team considered options including additional structural components, extrusions of various sizes, and alternative welding techniques before we found the optimum solution. To be certain, Ford validated some of the modeling tools that our

engineers developed against a small number of prototypes."

Keer said that because the simulations proved to be accurate, Ford reduced its dependency on prototyping, which helped cut

the development time to two years. Ford had only one build level of prototype for structural testing of the GT instead of the two that would normally be required. Arup used LS-DYNA

(from **Livermore Software Technology Corp.**) and NASTRAN (from **MSC Software Corp.**) analysis software programs together with its own software modules, D3Plot, T/HIS, and

Primer. Arup's recent involvement with other programs has included the new aluminum-bodied **Jaguar XK** sedan.

Stuart Birch

Chief Engineer Hill discusses C6 Corvette

The storied history of the Corvette is approaching its next chapter with the introduction of the sixth-generation C6 for the 2005 model year. First comes the new coupe, which was introduced at the North American International Auto Show in Detroit in January, with production slated to begin in the third quarter. A convertible will be unveiled in the first half of 2004, with production beginning in fall, 2004.

The new model replaces the outgoing 1997-2004 C5 Corvette, but retains much of that model's formula. The C6 is 5 in (130 mm) shorter and 1 in (25 mm) narrower than the 2004 model, but aerodynamic efficiencies are improved with a 0.28 coefficient of drag and anti-lift characteristics that enhance high-speed stability. Aerodynamic development combined digital simulations, Corvette Racing experience, and more than 400 h of wind tunnel testing.

"Our goal was a performance car at home in virtually any

environment," said Dave Hill, Chief Engineer of the Corvette and Vehicle Line Executive for **GM** Performance Cars. "That means more than just raw performance. It calls for improved ride comfort, a precisely-built and technically sophisticated interior, and a sleek new body that is fresh and contemporary, while still instantly recognized as the new Corvette." As part of the **SAE 2004** World Congress "A Passion for Performance" program, at 1:30 p.m. this afternoon in the **AVL** Technology Theater, Hill will explain how extensive racetrack and road testing resulted in a C6 Corvette equipped with the Z51 suspension that nearly equals the lap time of a C5 Z06. He will be joined by David Leone, Chief Engineer of the **Cadillac** XLR, to talk about the new GM sports car platform.

One significant reason for this is the greater power provided by a new LS2 6.0-L small-block V8 based on GM's new Gen IV small-block family of engines. Delivering estimated peak output levels of 400 hp (298

kW) and 400 lb•ft (542 N•m), it is the most powerful standard small-block engine ever offered in the Corvette and delivers 22.6 mpg economy in combined city/highway testing according to the **EPA**.

Major revisions to the manual and automatic transmissions provide significant performance improvements. The Tremec six-speed manual is available with two sets of ratios, the more aggressive reserved for a Z51 Performance Package that emulates the performance of the C5's Z06 model. Shifting characteristics are improved with a shorter shifter and new synchronizers that reduce travel by 10%. The C6 replaces the 4L60-E Hydra-Matic for a 4L65-E automatic transmission strengthened to accommodate the LS2's torque.

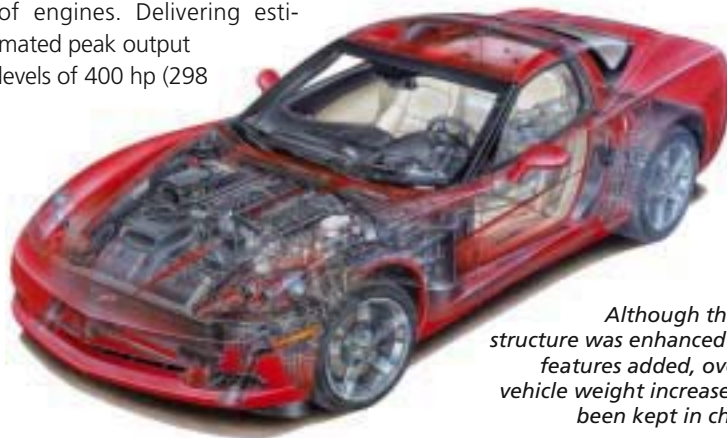
A central element of the 2005 Corvette is an all-new interior that includes greatly improved materials, craftsmanship, and functionality. The instrument panel and door trim

make extensive use of cast skin with improved softness, low gloss, and reduced glare. New electronic technologies for the interior include keyless access with push-button start along with optional features such as a reconfigurable headup display, DVD navigation system with voice activation, **XM** Satellite Radio, and **OnStar**.

Key features of the structure—low weight, high strength, cored composite floors, enclosed center tunnel, rear axle-mounted transmission, and aluminum cockpit structure—have been extensively revised to enhance structural integrity, feel, refinement and quietness. Overall vehicle weight remains similar to the C5 despite mass-increasing features such as larger wheels and tires, more robust brakes, and increased body acoustics and interior features.

The short/long arm and transverse leaf-spring independent suspension configuration remains, but the cradles, control arms, knuckles, springs, dampers, bushings, stabilizer bars, and steering gear are all redesigned. The extended mobility tires also are new, taking advantage of the latest run-flat sidewall design and compound technology for better handling and ride. Optional magnetic selective ride control returns, featuring magnetorheological dampers to optimize ride and body control.

Kevin Jost



Although the C6 structure was enhanced and features added, overall vehicle weight increase has been kept in check.



Dave Hill and his baby: the new 2005 Chevrolet Corvette.

SwRI focuses on gasoline

The Southwest Research Institute (**SwRI**, Booth 1827) has launched a four-year cooperative research consortium known as HEDGE (High-Efficiency, Durable Gasoline Engine) to identify new technologies that will enable the development of a high-efficiency, durable gasoline engine. SwRI believes it is possible that the **EPA** post-2010 emissions goals will severely restrict the efficiency and cost advantages currently enjoyed by current and near future diesel engines. With improved combustion technology, the gasoline engine will be able to better compete in the heavy-duty market.

The program will focus on one main integration engine and will work on three to four projects aimed at developing enabling technology for the engine. The projects will focus on development of knock-resistant combustion chambers, high-energy ignition approaches, and strategies for high brake mean effective pressure (BMEP) operation. Engine control will be a key element in the development of an aggressive knock mitigation strategy.

Consortium participants select work from a number of projects, according to Thomas W. Ryan, Program Manager and an Institute engineer in the SwRI Engine, Emissions, and Vehicle Research Division. Institute engineers and scientists recommend areas of interest based on SwRI's extensive automotive-related experience and on work initiated in the Institute's internal research program.

The advantage of the consortium is that the impact of the yearly contribution is multiplied by the number of participants, providing more pre-competitive research than would be possible by funding from a single member. In addition, SwRI's internal research programs involving control algorithms and modified ignition combustion concepts will be shared with consortium members.

SwRI offered the program to a range of companies in Europe, Asia, and the U.S., including light- and heavy-duty engine manufacturers, component suppliers, and oil and fuel companies.

SwRI initiated the fourth in a series of clean-diesel consortia in late 2003, which involves research in low-emissions diesel engines and in ultra-clean homogeneous charge, compression ignition technology.

Jean L. Broge

Nylon recycling technology nets award for DuPont, Denso

DuPont (Booth 1643) and **Denso** Corp. (Booth 1716) are winners of an award for a closed-loop nylon recycling process.

Distributed by the **Society of Plastics Engineers** (SPE). The 2004 Environmental Award for New Technology in Materials and Processes from the Environmental Division of SPE recognized DuPont for developing the technology, and both Denso and DuPont for the program to test the technology's viability.

With DuPont Composite Recycle Technology, parts made of glass- or mineral-filled nylon 6 or 66 can be converted into material of first-use quality in an economically-viable and environmentally-responsible way. In addition to employing breakthrough technology, the program is unique in that it inspires collaboration along the value chain to help promote the long-term economic viability for recycling, according to the companies.



Radiator end tanks were the subject of recycling tests conducted by Denso.

Composite Recycle dissolves used polyamide then filters away contaminants and fillers. The molecular weight of the recovered polyamide is increased to whatever level is desired for the final application. This process generates resin that is essentially equivalent to virgin nylon.

The testing of the technology's viability involved the recycling of used radiator end tanks into new radiator end tanks. When DENSO completed material and in-use component testing, the results indicated they have found "one of the most effective recycling technologies for increasing the recycle ratio of end of life vehicles (ELV) in the future."

The European Union ELV directive requires that 85% of a vehicle, measured by mass, be capable of recovery and re-use by the end of 2005 (the current figure for recycling is about 75%, which primarily relates to the metal content).

"The promise of value grows greater with each development activity," said William Hsu, Vice President and Chief Technical Officer of DuPont Performance Materials. "The ability to reclaim large glass- and mineral-filled nylon

components such as radiator end tanks or potentially other components made of nylon can help automakers meet new regulations, but the benefit to society is that the landfill waste is reduced."

"This technology enables automakers to proceed with more practical recycle programs for many plastics parts," said Hiroyuki Wakabayashi, General Manager of DENSO material engineering department.

There is no silver bullet for recycling nylon and engineering plastics, according to Hsu. "Our vision is to collaborate with our partners along the value chain to understand what needs to be done

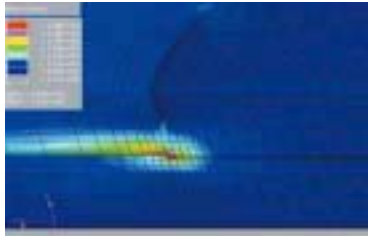
and then employ technology and lifecycle tools to develop materials solutions that are safe, economically sustainable and reduce overall environmental footprint." *Patrick Ponticel*

What's New
from the exhibitors

Ispat Inland, Ford examine spot weld fatigue strength of steels

Fatigue performance of spot welds is of great interest because a majority of fatigue failures in automotive body structures is initiated from spot welds, according to a paper by **Ispat Inland Inc.** and **Ford Motor Co.** that was presented Tuesday as part of the Innovations in Steel Sheet Products and Processes session.

In general, according to the authors of the paper, testing results on mild steel and conventional high-strength steels have shown that the fatigue resistance of spot welds depends very little on steel strength at the high cycle region since the failure is mainly a crack growth process. Only in the low-cycle region (below 10^4 cycles) do high-strength



During testing, an FEA model for a TS specimen produced an eyebrow crack.

steels improve fatigue life. Development of new advanced high-strength steels, such as dual phase and transformation induced plasticity steels, along with increased applications of these steels for automotive body structures, has sparked renewed interest in the spot weld fatigue performance of steels.

Spot-weld fatigue tests were conducted for two dual-phase steels and specimens with and without weld-surface cracks. Researchers questioned if the fatigue strength of advanced high-strength steels would be worse than mild steels or conventional high-strength steels, due to higher hardenability, higher hardness, and notch-sensitivity of the welds.

Among the paper's conclusions is that for all three types of steel, fatigue strength of spot welds is not sensitive to the strength of the steel in the long-life region. In the low-life region (fewer than 1000 cycles), high-strength steels exhibit higher fatigue strengths.

Another conclusion is that weld surface cracking owing to high welding current and/or electrode misalignment, generally does not degrade the fatigue performance of spot welds. A note from the authors: The die-penetration method is a good technique to provide indications of the existence of weld surface cracks.

Patrick Ponticel

Thursday, March 11, 2004

Height sensor

A-DAT Corp. expanded its line of OPTIma laser ride height sensors with Model LC-H and MICRO. Model LC-H is a dual range, rugged sensor suitable for demanding terrain and weather conditions. It offers high offset as well as tighter distance ranges in a class 3A visible laser unaffected by bright sunlight. The sensor can be mounted on the front, rear, or sides of sedans, SUVs, and light trucks and can be connected to any display, laptop, or data-acquisition system. The MICRO has a mass of 93 g (3.3 oz) and measures 50 x 65 x 20 mm (2 x 2.6 x 0.8 in). It also features a class 3A visible laser and is powered by a standard vehicle battery. Its small size and mass make it suitable for measuring shock and spring displacement.

Booth 653



Transceiver board

The NI PXI-8464 software-selectable interface from **National Instruments** is suited for multiple transceiver access. A universal CAN board communicates to high-speed, low-speed/fault-tolerant, and single-wire networks through a single port, enabling the use of a single interface for several types of tests. Connectivity to single-wire CAN networks is available through the PXI-8463 single-wire CAN board. All NI CAN hardware includes expanded synchronization, increased functionality, and improved performance, according to the company. The interfaces ship with NI-CAN 2.1, driver software that includes configuration tools to provide access to Vector database files that easily convert raw CAN data into engineering units.

Booth 935



Motor generator system

TM4's motor generator system is an on-board generator and a power-train equipped with an integral differential. The system uses a magnetic clutch to transform vehicles into a series hybrid, parallel hybrid, or an electric vehicle equipped with a range extender. It also features a smart controller, an onboard battery charger, and a bi-directional 12-V dc/dc converter to supply vehicle auxiliaries.

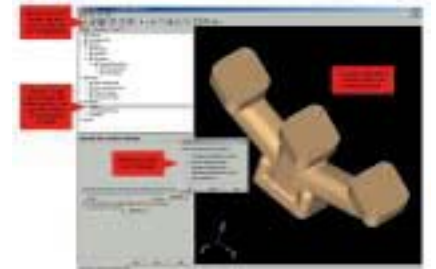
Booth 2653



CFD design software

Fluent's FloWizard is computational fluid dynamics (CFD) software that employs the use of a wizard to guide users through the design decision process step-by-step with basic terminology. It can simulate laminar or tubular flow, with or without heat transfer, and features special options such as moving belts and conducting walls. It is suitable for first-pass analyses early in the product development cycle and potentially eliminates designs that do not meet basic performance guidelines early on. All geometry, case, data, and mesh files are fully compatible. FloWizard automatically detects erroneous or questionable inputs and outputs and will notify users. In addition, multiple users can view the same information from different locations.

Booth 1642



Calibration tool

TTP-Calibrate from **TTTech Computertechnik AG** works directly in The **MathWorks' Simulink** environment to calibrate and monitor distributed real-time electronic control systems that are based on time-triggered protocol (TTP). By executing on several control units in a network, TTP-Calibrate reduces development time and the costs associated with distributed model-based systems. It can run on any

time-triggered architecture and allows developers to monitor internal parameters of TTP nodes and TTP messages within Simulink. The system automatically generates tunable program code and selects all tunable parameters. Modification can occur via Simulink blocks.

Booth 1327

Test chamber

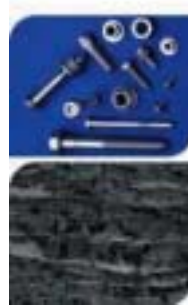
Cincinnati Sub-Zero has launched the enhanced Z-plus product line of temperature/humidity chambers for R&D testing of automotive parts and assemblies. Intuitive control with built-in safety features protect the chamber, and slide-out shelving allows for additional



capacity for large testing loads. The standard workspace volume ranges from 8 to 32 ft³ (0.09 to 0.9 m³). The product also features the CSZ-EZT-550 touch screen controller that reduces chamber programming and setup, with drop-down menu navigation and online help screens. Data log files may be accessed and imported into **Microsoft** Windows-based programs.
Booth 827

Chromium-free coating

Metal Coatings International Inc.'s GEOMET coating is water-based, chromium-free and protects against corrosion. It is comprised of overlapping zinc and aluminum flake, and contains no hexavalent or trivalent chromium and no other heavy metals that are considered hazardous to health. It can be applied by dip-spin, spray, or dip-drain methods and is used on parts ranging from fasteners to disc brake rotors. The coating system provides consistent lubricity, solvent resistance, and bimetallic compatibility. The process is hydrogen-embrittlement free.
Booth 936



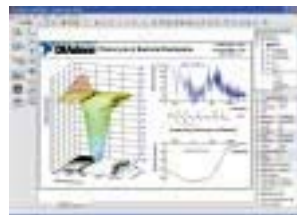
Closed wave springs

Closed wave springs from **Christian Bauer GmbH + Co.**, have a higher spring rate than regular wave and waved springs, and are tailor-made. The springs are manufactured for small tolerances in spring force and dimensions, combined with high life-cycle fatigue. Applications include automotive gear boxes for cars and sport utility vehicles to improve comfort.
Booth 2246



Data analysis

National Instruments' DIAdem 9.0 is an interactive tool for mathematical and visual data analysis, report generation, task automation, and data management. It provides a unified environment for rapid transformation of test data into the result needed to drive engineering decisions. The package imports data from files and industry-standard databases, and can handle datasets with more than 1 billion points.
Booth 935



Controller software

Amplifier controller software from **LDS-Dactron** allows users to turn on, set up, and monitor amplifiers from the same PC used with the control system. Amplifiers power up in a saved preset configuration for each individual test needed. System integrity checks and interlock settings help ensure safe operation, and password access prevents unauthorized changes to the settings. If an interlock trips, a status message identifies the source of the trip condition, enabling quick problem resolution. Other features include numerical displays and text messages, field voltage and current readings, and amplifier output voltage and current readings. The amplifier software is optional with the LASER shaker control system.
Booth 647

Multimedia fiber-optic network

MOST (Media Oriented Systems Transport) from **MOST Corp.**, is a multimedia fiber-optic network optimized for automobile applications. It is a standard that enables communication between electronic systems inside a vehicle. MOST supports low-end applications such as digital/analog converters for speakers, and asynchronous and isynchronous transfer mechanisms for more complex requirements. Features include plug-n-play with remote operation and flow control, and a wide range of real-time channel sizes. Devices can be dynamically attached and reconfigured.
Booth 2916



Blow-molded cooling

ABA Automotive and **DuPont** offer plastic blow-molded cooling hoses with integrated quick connectors. Both the connectors and hoses are made of a glass fiber-filled polyamide provided by DuPont. The connectors can be used with cooling systems and air distribution, and function as a thermal insulator. Applications include the hot and cold sides of a turbo charger, where temperatures range from 200 to 230°C (392 to 446°F). The end-fitting of the turbo charger is equipped with an injection-molded connector in temperature-proof plastic material.
Booth 2459



Design analysis

SolidWorks Corp. has upgraded its COSMOS finite-element analysis (FEA) applications, COSMOSWorks, COSMOSFloWorks, and COSMOSMotion, making the suite 10 to 15 times faster than comparable applications and enabling solvers to use processor cycles more efficiently. Users can test assembly behavior without fully modeling component connectors, such as pins and springs, up front. Analysis is simplified with the addition of usability features that simulate processes such as heat regulation using a thermostat with simple menu-driven commands that replace manual computations. Additional visual and reporting features enable users to extract more precise results from their analyses. Improved integration with SolidWorks 3D mechanical design software enables COMOS users to analyze designs without re-entering data and switching between applications.
Booth 2306

What's New
from the exhibitors**Painted fastener**

The painted FAS-NER from **AKH** Inc. inserts directly into pre-painted metal and is color-matched to the painted assembly, eliminating post-paint operations. The system eliminates the need for spot-welding and riveting, and joins similar or dissimilar metals and thicknesses. A punch-and-die



operation automatically feeds, punches, inserts, and locks the FAS-NER to produce a solid joint in one high-cycle operation. Systems range from a single-hit machine to an automated turnkey-system that includes insertion into main production lines with the assistance of machine integrators.
Booth 2349

Dispensing technology

The Ultra TT automation series from **EFD**, Inc. is an automated tabletop assembly process that combines programming with closed-loop dc servo control and drive motors for quick positioning of the dispensing tip. Benefits include improved productivity, process consistency, and reduced scrap and rework. Benchtop bonding, gasketing, and filling operations can all be programmed using a **Palm** handheld. Graphic user interface software provides improved control of positioning and dispensing parameters and improves setup times. The systems are offered with either 325 x 325 mm (13 x 13 in) or 525 x 525 mm (21 x 21 in) work envelopes and are fully compatible with a wide range of dispensing valves and syringe reservoirs. Mounting brackets are also available.
Booth 1245

**Triaxial accelerometer**

The 8765A250 is a miniature 6.4-g (0.23-oz) triaxial accelerometer from **Kistler Instrument** Corp. offers a ± 250 -g measurement range and 20-mV/g sensitivity. The triaxial design permits simultaneous shock and vibration measurements in three perpendicular axes: x, y, and z. The accelerometer operates from -65 to +330°F (-54 to +165°C) using a welded hermetic and ground-isolated housing with a miniature four-pin ceramic insulated connector. The use of a Kistler PiezoStar crystals and high-gain integral hybrid microelectronics provide low sensitivity variation over the operating temperature range of -54 to +165°C (-65 to 329°F). Applications include automotive under-the-hood and under-the-vehicle testing.
Booth 407

**Design software**

The damper design suite software program from **EaglePicher Automotive's** Hillsdale Div. is a PC-based, portable software program that can be used to consistently design and optimize linear and torsional dampers. It allows users to share design and test results on projects, then receive recommendations in a virtual display that is easily recognizable across all technical levels. Redesigned dampers feature reduced NVH, lighter mass, and lower costs.
Booth 1527

**Thermal imager**

The TVS-8500 from **CMC Electronics** is a radiometric infrared thermal imager that features a platform for the development and non-destructive evaluation of materials and processes in the automotive industry. Users receive integral real-time data acquisition and extended storage supported by an intuitive on-screen user interface. Up to five moveable cursors as well as horizontal and vertical profile lines can be displayed in real-time on the LCD display. Features include digital image enhancement, automatic temperature ranging, and information-capture on a removable flashcard for offline storage. Pre-event recording and real-time image analysis are available for advanced applications, and an optional software suite provides the ability to trigger recordings at selectable process thresholds.
Booth 1239



Check valves

The **Lee Co.**'s CCPI Series Press-In Chek is a miniature, cartridge-style check-valve designed for installation into plastics. Available in 2.5-, 5.5-, and 8.0-mm (0.1-, 0.2-, and 0.3-in) diameters, the Chek features a barbed design that allows improved installation, provides retention, and prevents by-pass leakage around the valve. It is offered in a range of cracking pressures from 0 to 72.5 psi (0 to 5 bar) and is compatible with most fluids. Each valve is extensively performance-tested for flow, leakage, and cracking pressure to ensure consistent long-term performance.

Booth 1618



Driving simulator

The National Advanced Driving Simulator (NADS), developed by the **National Highway Traffic Safety Administration** and operated by the **University of Iowa**, contains several complex sub-systems that provide the driver with a realistic representation of the driving environment to evaluate driver behavior in situations too difficult, costly, or unsafe to produce. The NADS employs a large motion-base capable of moving 64 ft (20 m) in two directions and offering realistic motion experience for accelerating, turning, and braking. The motion subsystem duplicates vehicle motion kinematics and dynamics within 6° of freedom. The visual subsystem combines detailed terrain and driving databases with high-resolution imagery, incorporating a 24-ft (7-m) diameter dome with a high screen and 3D images. The vehicle cab subsystem offers five vehicle cabs and a full range of vehicle instrumentation interfaces. The control feel subsystem for steering, brakes, clutch, transmission, and throttle provides realistic feedback in response to driver inputs, vehicle motions, and road/tire interactions.

Booth 1536



Strain gage application

HITEC Corp. features an application technique for installing fiber-optic strain gages for static strain measurements at 750°F (400°C) and above. After testing various epoxies and ceramic adhesives, two adhesives were chosen and tested using live fiber-optic strain gages at temperature intervals to determine performance of the bond- and strain-transfer to the gage. Subsequent testing for mechanical loading resulted in the gage installations being taken to above 600°F (315°C) and performing as expected. The company plans to implement higher temperature static-testing to determine the limits of the technology in its current state, then prove out the technology and installation techniques and add the sensor type to its line of services.

Booth 439



Thermoplastic microspheres

Expancel, Inc.'s microspheres are used in extruded and molded plastic and rubber parts, underbodies, adhesives, coatings, and gaskets. The heat-expandable thermoplastic particles lower density, and increase the impact resistance of most materials. The inside diameter of these hollow spheres ranges from 10 to 17 μm (394 to 669 μin), and typical expansion temperatures are from 80 to 190°C (176 to 374°F). The microspheres create consistent closed cells within the finished part without surface blemishes or splay marks. They can be added in pre-expanded form, alone, in combination with other fillers, or as unexpanded microspheres. Applied in small amounts, the microspheres will eliminate shrinkage and sink, or in higher doses can create low-density foams. When used unexpanded as a foaming agent, they produce three-dimensional prints, polyester films, and other substrates with a velvety, non-glossy surface.

Booth 1169



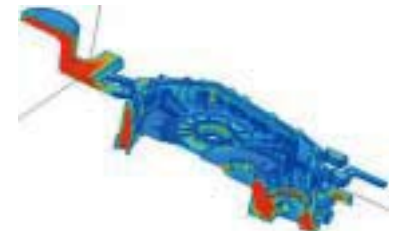
Infrared imaging

The compact A20M infrared imaging and temperature measurement camera from **Flir Systems** is suitable for applications where remote monitoring in the infrared spectrum is critical to ensure performance, safety, and security. The camera line includes temperature measuring and imaging models, plug-and-play Ethernet or FireWire connectivity, flexible I/O functionality, and built-in logic capabilities. The camera reveals temperature variations as small as 0.12°C (32°F), and real-time image acquisition at standard video rates of 60 Hz offers clear images of moving objects. It is suitable for industrial process-monitoring, product verification, and security applications.

Booth 1429

Simulation software

Hitachi offers ADSTEFAN (advanced solidification technology for foundry-aided by numerical simulation) software to optimize casting process-design and help decrease lead times and associated costs. Automotive applications include engine blocks, heads, and other powertrain components. ADSTEFAN features four modules: die temperature prediction via cyclic steady state heat balance method; filling; solidification; and



thermal stress and deformation. It can be used to analyze casting techniques such as pressure die-casting, sand mold, shell mold, and investment casting. The software can visualize the filling and solidification process of cast parts, identify component defects and porosity information, and can predict cavity shrinkage by considering the thermal aspect as well as the kinematic interaction of molten metal. A preprocessor, solver, and postprocessor are included.

Booth 351

Lithium batteries

Under the GAIA brand name, **Lithium Technology Corp.** offers a 47-V/60 Ah lithium ion stationary battery for use in automotive applications. It can store braking-current with as little loss as possible and are potential energy storage devices for hybrid systems



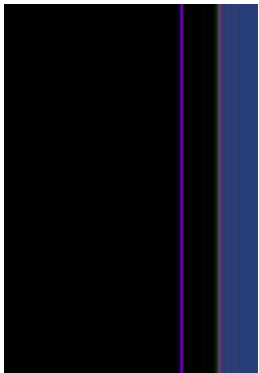
that combine conventional internal-combustion engines with one or more electric motors. The battery's operating temperature is -25 to +60°C (-13 TO 140°F), and measures 250 x 470 mm (10 x 18 in). Safety features include a battery management system, a 90 psi (6 bar) rupture disc, and a shut-down separator.

Booth 1572

What's New
from the exhibitors

Rate indicator

The **Sponsler** IT400 rate indicator/totalizer features separate unit displays offering rate-indication and totalization, temperature compensation, and 20-point linearization. An RS-232 port with



128 mb smart card for PC interfacing provides easy data logging and accessibility. The IT400 accepts signal input via modulated carrier or a 50 mV-36 V sine/sq wave. The unit will alert maintenance needs, notify when the range of rate is over or under limit indications, and inhibit totalization during alarms when activated. Push-button menus, a rotary switch to control numerical displays, and a refresh rate of 0.25/s are also featured.
Booth 2339

Selective plating

SIFCO's selective plating is an out-of-tank plating process that can be used to apply high-quality electroplated deposits and anodized coatings onto localized areas of parts to improve the



section's performance. A customized system can be designed to electroplate or anodize localized areas on most conductive components from pin-size to an automotive crankshaft. More than 20 engineered deposits and coatings can be applied to provide corrosion protection, improve lubricity and wear resistance, increase hardness, decrease electrical contact resistance, prevent galling, and improve solderability or brazing characteristics.
Booth 1926

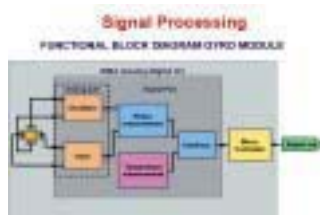
Wireless sensors

MicroStrain's wireless sensor networks include EmbedSense systems and SG-Link digital-wireless strain gauge modules. These compact, micropower wireless-sensing systems can be installed on drive shafts, engine pistons, crank arms, and valves to measure torque, strain, displacement, and temperature. The sensors can be powered and interrogated using electromagnetic fields, eliminating batteries from the moving parts and making them suitable for next-generation automobiles that promise improved fuel efficiencies, performance, and safety. EmbedSense systems measure temperatures to 500°C (932°F) and operate at 150°C (302°F) and 60,000 gs. SG-Link modules feature a rechargeable Li-Ion battery, 2 Mb onboard memory, 16-bit address, and a bi-directional wireless communications link.
Booth 838



Rate sensor

The Switec Gyro Module X09 from **Microcomponents** Ltd. is a complete angular-rate sensor that includes integrated electronics and temperature compensation. The unit consists of a micromachined tuning-fork sensing-element, a microcontroller, and an application-specific integrated circuit with a resolution of less than 0.3%/s. The drift over the temperature range of -40 to +85°C (-40 to +185°F) is less than ±1.5%/s. The Switec module was designed specifically for demanding automotive and industrial applications with an adjustable range for dynamic stability systems, rollover detection, active suspension, and GPS navigation systems.
Booth 748



Crash data on Internet

PowerPlay.NET from **Microsys** allows engineers to view and distribute crash test results using the Internet. It provides secure access to crash test results across the Internet or customer intranet. Users can search through test results, view video images, AVI files, meta data, still images, and sensor graphs. Video and crash sensor data can be downloaded to the desktop for further analysis. The client software is **Microsoft** Internet Explorer.
Booth 339

Thermal cycling

Temptronic Corp. adds Model TP04300B to its line of mobile TP04300 Series ThermoStream systems for thermal cycling and testing of small-to-large devices, samples, subassemblies, printed circuit boards, and other parts from -80 to +225°C (-112 to +437°F). It offers a new level of flexibility in thermal test systems in a modular design with the ability to deliver temperature directly to the test site at any stage of production. Other features include locking wheels for stability and test repeatability, quick temperature change rates, a touch screen and intuitive menus, and two modes of operation for production and engineering environments. Dual-loop temperature control uses sensors to provide temperature control directly at the device or sample under test.
Booth 848



Coin cell battery

The TPMS battery from **Renata Batteries** is a coin-cell battery comprised of CR lithium manganese dioxide chemistry and features a double-separator system that reduces the self-discharge and provides improved performance for long-life, embedded applications. The 24.5 x 5 mm (1.0 x 0.2 in) was developed from a custom solution for the tire pressure monitoring system (TPMS). It offers a nominal capacity of 540 mAh and a maximum continuous discharge current of 3 mA. It has been proven in-vehicle on the **Corvette** since 1997.
Booth 2901



Acrylic tape

A very high-bond, paint-bake acrylic tape is available from **ADCO Products, Inc.** The tape was designed for use in paint bake systems, eliminating the need for masking the substrate prior to the paint bake cycle and the need for removal of the masking tape and creating a labor and material savings of up to 30%. Solid core technology offers improved wet-out on the substrate because it does not absorb paint on the tape edges.

Booth 1535

Seals

OmniLip XT and OmniSeal XT high-performance seals from **Saint-Gobain Performance Plastics** use polytetrafluoroethylene compounds and stainless steel spring and case material. They provide chemical resistance, and reduced friction



over elastomer seals. The seals are available in sizes from 12 to 65 mm (0.47 to 2.5 in), can handle temperatures up to 200°C (392°F). High-volume applications include power-steering pumps and engine accessories, shock absorbers, transmissions, fuel pumps, and various other automotive and industrial applications.

Booth 1112

Servo throttle valve

The proportional servo throttle valve from **Thomas Magnete** assists in controllability of parametric power-steering applications. The valve meets market demands for lightweight, compact design, small volume, proportional control, and lower overall system costs. It operates via magnetic force, while the valve spool is displaced against a return-spring in the valve-housing until the magnetic force and the spring resistance are in balance. The proportional relationship between the electrical desired-value and the valve spool-displacement results from the linear force/current characteristic of the solenoid, and the linear force/stroke characteristic of the return spring.

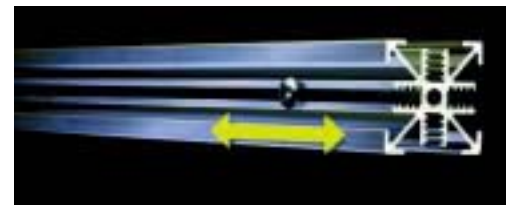
Booth 2041



Framework system

The gatorjaw framework system from **Simplex Isolation Systems** provides a way to build with industrial-strength aluminum. A continuous groove-thread runs the length of the gatorjaw frame-rail on all four sides, making attachments possible at any point. The rails are made from anodized 6063 T-5 aluminum alloy for light weight and strength. The fastener is slid into position and tightened. Any panel material may be inserted for sides, backs, or doors, including aluminum, plastic, and wood. The building system includes brackets, hinges, casters, doors, levelers, bench tops, insert panels, shelving, grid drawers, and hardware bins. Kits are available for items such as workbenches, or utility benches.

Booth 654



Propulsion system

WaveCrest Lab. displays its prototype automobile powered by an in-wheel electric propulsion system. The vehicle demonstrates the WaveCrest system's high efficiency, torque, and degree of control, according to the company, and shows how it can improve performance for a range of vehicles, including hybrid and fuel cell. The system consists of an electric-adaptive motor system, customizable controls, and advanced battery technology that delivers power and energy in a single design by manufacturing the cells in a spiral-wound stack rather than a cylindrical structure. Electrical energy can be transformed into mechanical motion using the in-wheel electric propulsion system. The technology also delivers both accelerative and regenerative power at each drive wheel on demand. System software monitors vehicle stability and regulates each wheel to provide safety and control.

Booth 1759



Measurement system

Tekscan, Inc.'s I-Scan software captures and records data in real-time, providing a precise picture of fatigue and geometry-related information. Features include system ruggedness and sensors that are



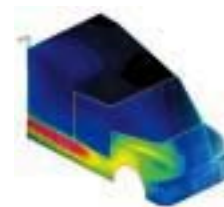
0.1-mm (0.004-in) thick. I-Scan is able to verify estimates in strenuous testing environments and is currently being used for a railroad track study. A sensor is positioned underneath the rail while a train runs over the track, and the information provided is leading to improved safety design of track elevation on curves.

Booth 821

Thermal analysis

ThermoAnalytics' RadTherm 7.1 is an advanced thermal analysis software program that provides engineers with expert tools for fast and accurate heat transfer simulations of complex thermal problems. A complete thermal modeling program, RadTherm features a radiation module for modeling results of multi-mode heat-transfer such as radiation, conduction, and convection, and fluid flow. A computational fluid dynamics (CFD) integration wizard allows users to easily import CFD results into the software, and analyze thermal systems. The software can be used for various automotive applications including thermal-modeling of underhood and underbody thermal-management, thermal-comfort and climate-control systems, brakes, lighting, and electronics.

Booth 1607



Working in tandem

Collaboration once might have been a taboo notion, but the c-word is no longer a dreaded endeavor between two or more otherwise competitive entities.

"Maybe part of the problem is we're trying to approach collabora-

tion from a simple point-of-view," Lawrence Denton, President and CEO of **Dura** Automotive Systems, Inc., said during Tuesday afternoon's collaboration and competition panel discussion in the **AVL** Technology Theater. Denton

believes collaboration is a more complex undertaking.

He illustrated that point by comparing two suppliers who offer the same part. Supplier 1, dubbed a proven supplier, sells a part for \$19, while supplier 2 sells the part

for \$15. At first glance, the \$5 million savings gleaned from using the cheaper part on 250,000 vehicles annually for five years looks like the proper buying route.

But what happens if the cheaper part is recalled. Denton



From left to right are Larry Johnson with Argonne National Laboratory, Mike Schwarz with Ford, Thierry Morin with Valeo, Lawrence Denton with Dura, and moderator Robert Culver with the University of Michigan's Tauber Manufacturing Institute.

said the fallout would be a hearty loss of cash, "but the biggest cost of all is probably a negative brand image." Communication—considered one component of collaboration—is a key requirement to achieving good results. "It's what this week is all about," said Denton.

Thierry Morin, Chairman and CEO of **Valeo**, said there are definitely times when collaboration merits implementation. For instance, Valeo and a specific partner company might work together to develop a product that essentially enables a faster to market timetable.

Morin also cited collaborations done to realize the strengths of the individual players. For example, **Bosch** and Valeo share ownership in **Zexel**, a joint venture focused on HVAC in the Japanese market. Outside of collaborative times, "Bosch is a fierce competitor of Valeo."

Mike Schwarz, Director of Sustainable Mobility Technologies at **Ford** Motor Co., said the reasons to pursue collaboration boil down to what is done for the common good of all, and what is done for the common good of one. For all, the collaborative approach is useful as it relates to aspects such as long-term, high-risk, pre-competitive research, and the development of common codes and standards. The self-serving side of collaboration typically is done to gain a competitive edge, according to Schwarz.

Whether partnering in a business-to-business or a government-to-business scenario, there are certain things to keep in mind, according to Larry Johnson, Director of Transportation Technology at the **Argonne National Laboratory**. "Select your partners carefully," said Johnson. The to-do list also includes spending time together and having mutual confidence in each other. As Valeo's Morin pointed out, "Not everything is easy with this [collaborative] way." *Kami Buchholz*

MYSTERY...Continued from Page 1

use in vehicles, but the steel will be of all-new grades with various levels of strength. He also foresees increasing use of aluminum at Chrysler, mainly for castings and forgings (for items such as knuckles and cradles) as opposed to body panels. Magnesium probably will experience the fastest rate of growth of all materials, but will never see much greater penetration than 200-300 lb (90-140 kg) per vehicle. Composites will grow in use, but will be limited to niche vehicles. Iron use will decrease.

Mark Verbrugge, Director of the Materials and Processes Lab at **General Motor Corp.**'s R&D Center, said he liked Fillion's idea of an index of material properties and cost. With a proliferation of materials in the marketplace, it's important to get a good handle on the capabilities and cost of each, he said.

There are so many materials, Verbrugge said, that it is difficult for one company to address all issues related to each of them. He called on suppliers to do research on specific issues that are of importance to GM. Those areas include corrosion and creep resistance of magnesium; formability and tool coatings for sheet metal forming; design for metal joining; exfoliation associated with composites; and modeling of composite structures.

Patrick Ponticel

YAZAKI...Continued from Page 3

mirrors to prevent ambient reflections from being visible to the driver. The compact "virtual" cluster provides a high-contrast screen that displays key driver information such as the speedometer, fuel level, battery information, and turn-signal indication.

A number of current and near-term products from Yazaki are on display in a hybrid-electric vehicle wireframe mockup in Booth 2009. One of these is a shielded cable that can handle the high-voltage and high-current requirements of hybrids and fuel cells, but at a low cost. Eyelet-connector technology for direct linking of the inverter to the electric motor lowers cost because of smaller size, fewer parts, and avoidance of a more complex plastic housing. A two-pole inverter system similar to the Prius' connects the vehicle's battery pack and inverter. A service plug disconnects the vehicle from the high-voltage battery power supply to enable safe servicing of the engine, electric motor, and other components. The mockup includes other parts and systems such as an adapter terminal, three-pole inverter connector, battery controller, hybrid-electric vehicle bus bar module, and high-voltage junction box.

Kevin Jost

PRESIDENT...Continued from Page 1

transmissions. Power systems are the key to the mobility industry, he believes, and these future power system drivers will determine which products succeed and which fail.

Systems Engineering—Future powertrains and vehicles, Tiede believes, will be highly complex systems requiring sophisticated evaluation of different alternatives and tradeoffs between subsystems. A systems engineering approach will be required to determine the appropriate functionality of each subsystem and requirements at each interface. Tiede explained that meeting future emissions regulations is a good example of where system tradeoffs must be analyzed to select the optimum combination of fuel economy, heat rejection, packaging, cost, reliability, and emissions.

Digital Product Development—Tiede acknowledged that "the use of computer modeling to improve quality while reducing costs and time to market will be very important to the heavy-duty industry as entire product lines must be revised several times in the next 10 years just to meet emissions requirements. These programs will have to include other product improvements to remain competitive, so there is a very significant engineering task required."

Beyond his primary focus areas, Tiede has several other goals he intends to pursue during his tenure as President, among them what he sees as the overall challenge for the organization: figuring out how to deliver value to all of SAE's constituents (members, companies, academia, and government).

Tiede is also working, along with other members and staff, on the new Commercial Vehicle Engineering Congress & Exhibition, slated for October 26-28, 2004. This event will be for all of the heavy-duty industry, both on and off road.

Tiede's final major goal is to work with the 100th Year Anniversary Committee in preparing for the celebration of SAE's centennial year and also prepare SAE for the next 10 to 20 years.

Also at tomorrow's Board meeting, **WaveCrest Laboratories'** Richard Schaum will begin his three-year term as the newly designated Automotive Vice President. This Vice President position was created in 2000 by a Blue Ribbon Panel of 10 individuals comprising SAE members and nonmembers. The panel concluded that to improve its services to all the industries it serves, SAE needed to get closer to them. The resolution to this challenge was to add three Vice President positions in the aerospace, automotive, and heavy-duty sectors. Aerospace Vice President Bob Spitzer began his term last year; the VP of Heavy-Duty takes office in '05. Each Vice President will serve a three-year term on the Board of Directors.

Jennifer Newton

AVL...Continued from Page 3

these services, AVL has significantly expanded its global presence this year. A technical center was opened in Shanghai in January 2004 to address the burgeoning automotive market in China. AVL's founder, Hans List, taught in China for six years.

Last month, AVL opened an application center in Graz, Austria, a site that houses all of AVL's vehicle application operations. The Graz Center has a layered floor plan in which test beds and a vehicle assembly unit are vertically stacked and connected by a car lift. This saves time by using automatic vehicle handling and climactic test preparation.

Terry Costlow

SPECIALTY...

Continued from Page 1

"I think we're getting to the point that increases in horsepower will taper off. Going to 1000 hp and above could bring regulations and insurance issues. I'd hate to see that happen," said John Coletti, Director of SVT programs at **Ford**. Such regulations could return the industry to "the dark ages," as he called the period after the oil embargo that prompted an increase in government regulations in the 1970s.

Using lighter materials offers a way to improve performance without increasing horsepower. Carbon composites and lightweight steel are among the materials being considered.

"You have to be clever about mass reduction. You need designers and manufacturing personnel who are skilled in a portfolio of materials," said Dave Hill, Chief Engineer for Corvettes at **General Motors**.

Carbon composites could see increased use in both high-performance cars and mainstream vehicles. "If it can be cost effective, it may see broader use in the roof and hood," said Peter Spence, **Toyota** Racing Development's Vice President and Technical Director.

Another key question surrounding these composites is their durability over time, which includes both paint retention and the possibility of cracks and chipping. Those are major issues in low-volume cars and they become more vexing as volumes rise.

Terry Costlow

Emitec gets super thin

Emitec Inc. (Salon C, Wayne Hall) announced Monday that its newest-generation Metalit substrate will debut on a 2005 North American vehicle platform. The company claims it is the first substrate on the market with a cell-wall thickness of 1 mil, or 0.001 in (0.025 mm), with competitive products averaging a wall thickness of about 2.5 mil, or 0.0025 in (0.064 mm). The use of such thin foil minimizes the impact of backpressure and allows most engine applications to achieve fast light-off and therefore more efficient emissions conversion.

When an engine is first engaged, the catalyst must draw heat from the engine before it can convert emissions to its full potential. Emitec's substrates provide more surface area by unit volume at constant cell density, allowing catalysts to be smaller and facilitate heat-up. Thinner cell walls allow catalysts to more efficiently convert engine exhaust gases, enabling OEMs to install smaller volume catalysts into areas close to the engine where packaging space is a premium.

Jean L. Broge

Domains rule at Valeo

On Tuesday, Thierry Morin, **Valeo** Chairman and CEO, gave an overview of how technologies are developed and marketed through three key domains, an approach designed by Valeo (Booth 1659) to offer automakers global solutions to meet fundamental needs.



The Valeo blind-spot-detection system alerts the driver of potential danger if a lane change is signaled.

Each domain has a specific mission. Driving Assistance monitors the vehicle's perimeter, informs or alerts the driver and other road-users of potential danger, and initiates corrective actions. Powertrain Efficiency provides improved performance and driving pleasure with reduced fuel consumption and emissions. Comfort Enhancement increases the convenience of vehicle use and the passenger's well-being.

Examples of the Driving Assistance domain include a joint venture with **Raytheon** on blind-spot detection. A lane-departure warning system is under joint development with **Iteris**, and is expected to be introduced in North America on a Japanese vehicle in the near future. Assisted parallel parking is projected to be ready for production by 2007.

The Powertrain Efficiency domain has in production for 2004 an engine start-stop system for **PSA**. The belt-driven starter-alternator delivers a noiseless start and a 10 to 15% efficiency improvement over a conventional system with separate starter and alternator. To meet concerns for such a system in hotter climates, Valeo also offers a stop-stay-cool system that uses an evaporator to store cooling power for use when the engine is stopped.

The Valeo domains create synergies by drawing from technologies developed in the 10 organizational groups throughout the company.

David Alexander

Racing in production vehicles

Automakers can gain the most from the racing world in terms of process and people development, not technology transfer, according to panelists in Tuesday's Impact of Race Development on Production Vehicles session. Currently, there is "very little technology crossover because of different market forces and design cultures," said Peter Spence, Vice President and Technical Director, **Toyota** Racing Development.

"It's certainly a very good environment for training personnel," said Gil de Ferran, recently retired racing champion and winner of the 2003 Indianapolis 500. "Racing creates a unique, competitive environment where you have to become used to the expectations and the pressure of delivering on time," he continued, noting that delaying the launch of a product is not an option for racing engineers.

"Not all of the developments that result from racing are either appropriate for—or immediately beneficial to—other high-performance applications," said Jeff Carter, Marketing Director-Europe, **Dana** Glacier Vandervell Bearings. "However, the pace of development does create an environment where a large number of ideas [are] generated; some are implemented, and a few continue into more mainstream products."

Lightweight aluminum castings for cylinder heads and cylinder blocks, most of which were once cast iron in production engines, is



Participants in Tuesday's Impact of Race Development on Production Vehicles panel session agreed that the transfer of technology goes both ways.

one example of mechanical technology transfer from motorsports to production vehicles, noted Spence.

But the flow of technology is not one-sided, agreed the panelists. "There is a two-way transfer," said Carter. "Particularly from demanding passenger-car diesel applications, where we are seeing some of the technology required for our applications in Europe finding [its] way into racing."

"When you consider electronic systems, one thing we should ask is, 'Who leads who?'" said Spence. He mentioned the use of a production traction-control system on a Formula One car as one example.

Safety is the main area where future crossover is likely to occur, according to Spence, because "there is no such thing as too much safety." Steering wheel controls that allow simple and safe operation of cruise control, the radio, and even gear selection changes is an example of racing-originated technology already used in production vehicles.

Ryan Gehm

Exhibit Directory Addendum

The following is a Directory update as of March 10, 2004.

New exhibitor

Automation Alley
 1200 N Telegraph Rd., Ste 205, Bldg. 34
 Pontiac, MI 48341-1032 United States
www.automationalley.com
 Booth 126

The vision of the Automation Alley Consortium is to continue to expand Southeast Michigan's burgeoning technology cluster and guide the future of Michigan by attracting world-class, high-tech industries and professionals to Southeast Michigan. The Consortium collaborates with government agencies and educators to raise awareness of the region, attract world-class talent to Southeast Michigan's companies, and develop programs to support Automation Alley members. Together, members infuse the region with exceptional business ventures and unrivaled career opportunities.

GMAC Mortgage
 2600 Troy Center Dr., Ste 100
 Troy, MI 48084-4771 United States
 Booth 2938

Matthews Rotary Engine Co.
 88 Broadway Ste. 1
 Perth, WA 6009 Australia
 Booth 2473

Matthews Rotary Engine Company has invented and developed prototype engines based on existing reciprocating parts and technology, but used in revolutionary ways. This promises to lead to more compact engines with greatly reduced costs of manufacture, operation and maintenance; as well as countering current fuel inefficiencies and pollution. The technology also promises to double engine-wear life, and overcome engine failure from parts failure. The engine's potential performance, fuel efficiencies and reliability extend to a level well beyond the reach of current and proposed improvements to conventional engines. Applications range from the smallest to the largest engines (0.5 HP to 20,000 HP) whether for hybrid, electric or alternative fuel engines; and even power generation.

Name changes
Hong Kong Auto Parts Industry Assoc.
 Booth 1261
Magne Shock Div. of Arre Industries Inc.
 Booth 1546