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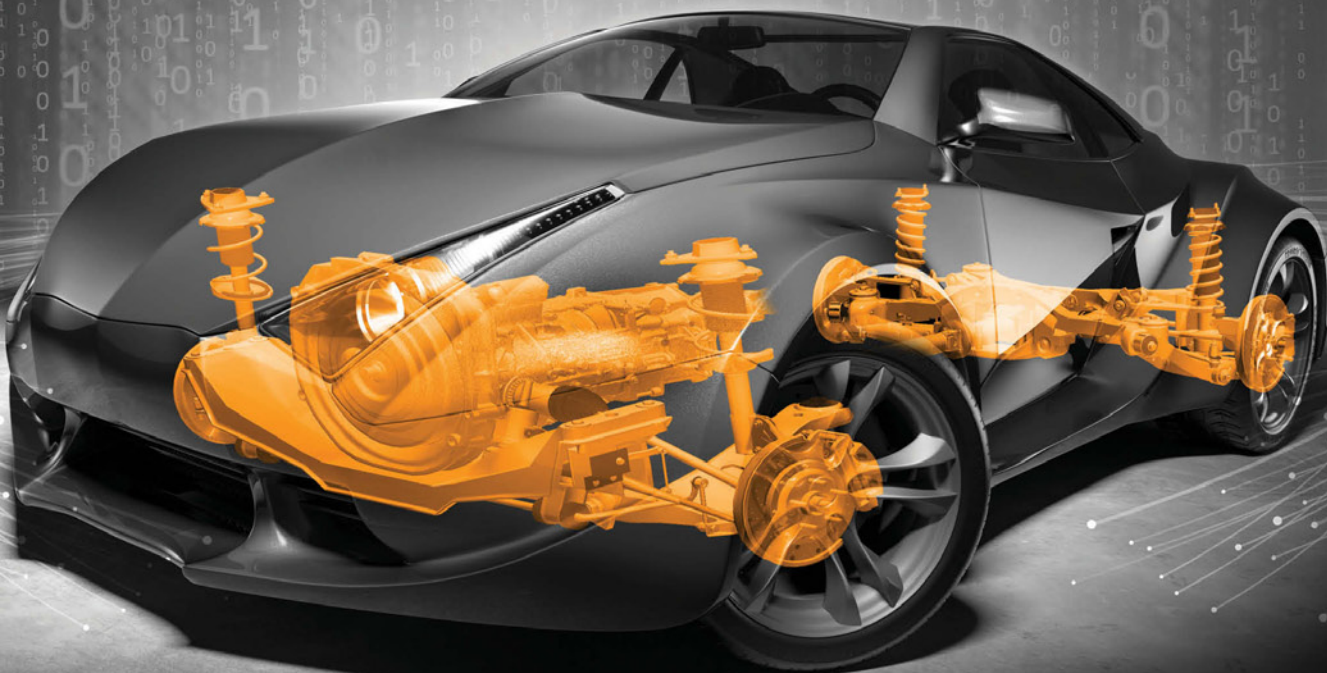
November 17, 2011

OFF HIGHWAY ENGINEERING

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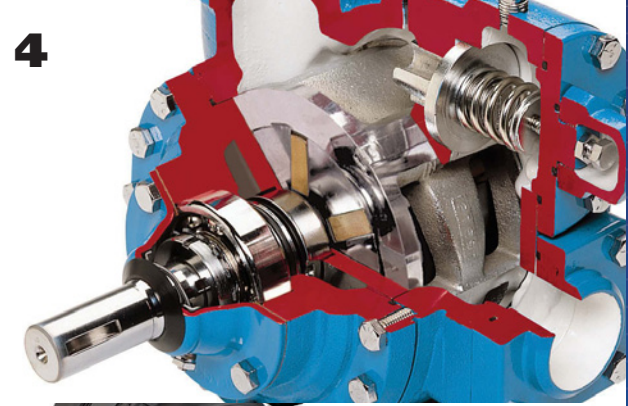
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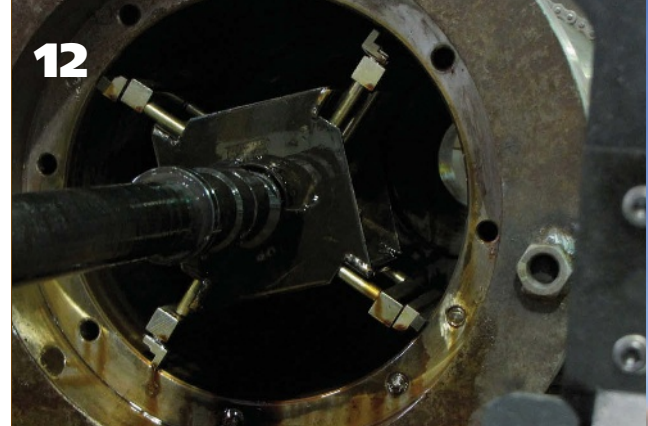
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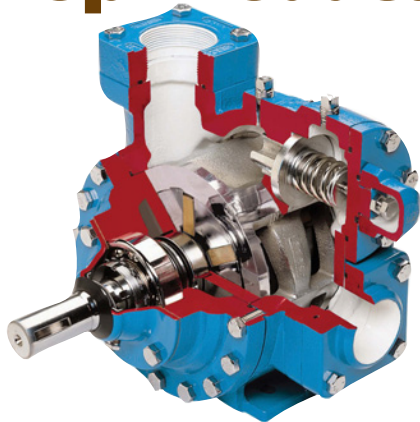
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Top Products



Vane pumps

SGL Series sliding vane pumps from **Blackmer** are available with optional neoprene mechanical seals and O-rings. Pumps are available in five sizes with capacities of 4 to 300 gal/min (15 to 1135 L/min). More detail at www.sae.org/mags/sohe/10341.

Dome lamp kit

Grote Industries' dome lamp kit, designed for use in U.S. military HMMWVs, uses Grote's flexible LightForm LED lighting film to create a thin, low-profile LED dome lamp that does not project into the cabin. More detail at www.sae.org/mags/sohe/10340.

Measuring machine

An end-of-line camshaft inspection gauge from **Adcole** provides upgraded submicron accuracy and high-speed production monitoring of up to 200 parts/h. More detail at www.sae.org/mags/sohe/10367.

Piezoelectric accelerometer

Meggitt Sensing Systems offers the Endevco model 2226C, a compact adhesive-mounted piezoelectric accelerometer designed for the general-purpose vibration testing of smaller structures and objects. More detail at www.sae.org/mags/sohe/10368.

Retaining rings

A line of spiral retaining rings from **Rotor Clip** are designed to withstand the rigors and functional stresses placed on turbine components. More detail at www.sae.org/mags/sohe/9945.

Top News



Tests on front-end loaders with the new HVT powersplit system (shown) demonstrate a **20% fuel savings compared to a conventional torque converter transmission.**

Dana Holding Corp. and **Bosch Rexroth AG** have completed their 50:50 joint venture to develop and manufacture advanced powersplit drive transmissions for global off-highway markets. Known as **Dana Rexroth Transmission Systems**, the JV will engineer, manufacture, and market hydromechanical variable powersplit transmission (HVT) systems. More



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The system sends a signal from an electronic brake pedal to an electronic control unit. Based on the given software setup, the unit passes the appropriate electrical current to an electrohydraulic pressure-modulating valve to decelerate the vehicle in a completely controlled fashion.

"Safety, productivity and reliability are the key points we design to," said Fletcher project engineer Craig Collins. "The MICO system provides some excellent safety advantages and it gives mining companies the confidence to let less experienced operators run the vehicle. We've found it to be cutting edge technology."

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Top News, continued

detail at www.sae.org/mags/sohe/10348.

Cummins Inc. and **Guangxi LiuGong Machinery Co. Ltd.** have formed a joint-venture partnership to manufacture engines at a new facility to be built in Liuzhou City, Guangxi Province, in southern China. The JV operation is expected to commence engine production in 2013, with initial operations beginning as early as 2012 to include engine-kit assembly. More detail at www.sae.org/mags/sohe/10347.

Dow Kokam says its multifaceted new R&D center in Lee's Summit, MO, will help it to bring next-generation lithium-ion battery solutions to market faster while identifying breakthrough

technologies. More detail at www.sae.org/mags/sohe/10350.



Dow Kokam's pilot lab is capable of cell assembly from electrode to final cell in 2 and 8 A·h sizes, providing data enabling large-format battery scale-up and new cell designs.

A report released by the **National Academies** concludes that without continued R&D and the construction of pioneering commercial-scale biorefineries to reduce the cost of cellulosic biofuels, the U.S. Renewable Fuel Standard mandates for that type of biofuel are unlikely to be met. More detail at www.sae.org/mags/sohe/10332.

Webcasts: www.sae.org/webcasts

Nov. 29: Automotive Batteries

"Physical Models of Automotive Batteries for EV and HEV Applications" is a free, 1-h webcast Nov. 29, at 10 a.m. EDT. It covers new approaches to modeling and simulation for hybrid electric vehicle (HEV) and fully electric vehicle (EV) applications with particular

emphasis on the development of high-fidelity physical models of automotive batteries. Speakers are Dr. John McPhee, NSERC/**Toyota/Maplesoft** Chair for Mathematics-based Modeling, **University of Waterloo**, and Dr. Sam Dao, Application Engineer, Maplesoft.

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Webcasts: www.sae.org/webcasts, continued

Dec. 7: Virtual Summit

The following three webcasts will be featured as part of the 2011 Global Drivetrain Virtual Summit, a free online event that provides the opportunity for you to explore global advancements in drivetrain technology.

In "Adjusting Drivetrain Design for EVs and Hybrids," experts will examine the impact of next-generation passenger cars on drivetrain design; how to adapt and extend traditional transmissions to offer degrees of hybrid drive capability; how transmissions, axles, and lubricants will change; and what goes into creating a unique hybrid drive transmission.

"Conversation with the Experts: Understanding the Complexity of

Environmental Performance" will explore the different types of environmental performance that are or will be addressed by governmental regulation; how you can disentangle the strands of environmental performance to understand what each represents in terms of threats and opportunities to business performance; and life cycle analysis tools to help understand the degree and relationship of different environmental impacts.

In "CVT Visionaries: Innovation, Change & Case Studies," a panel of experts will examine the evolution of continuously variable transmissions (CVTs), their benefits, challenges, and future.

Dec. 13: Accurate 3-D Surface Metrology

Surface characteristics play an integral role in the function of large machined or moving parts, including bearing surfaces, shafts, and dynamic seals. Accurately quantifying and reporting on surface roughness, texture, and functional surface parameters during early stages of production enables defect identification at the earliest

possible process point. This minimizes production failures, reduces costs, and contributes to just-in-time manufacturing success. "Accurate 3-D Surface Metrology: Key to Manufacturing and Production Success" is a free 1-h webcast Dec. 13, at 11:30 a.m. EST. Experts will discuss a key measurement technology that provides

easy operator interface for fast, accurate measurement of 3-D topographical parameters, which are critical to functional surface performance. Case studies from the industry will be described. Speakers are Javier Vera, Product Marketing Manager, and Matt Novak, Ph.D., Marketing Applications Manager, **Bruker Nano Surfaces** Division.

Dec. 15: Technology Transfer
SAE's Technical Editorial Webcast Series continues Dec. 15 with "Technology

Transfer: Sharing Knowledge between Commercial and Military Vehicle Sectors." Panelists in this webcast will present key cross-industry trends, including vehicle electrification, alternative fuels, and intelligent vehicle systems, and will provide real-world success stories of technology transfer. Speakers are Gary Hunter, **AVL** Powertrain Engineering; Rod Heiple, **Alcoa Defense**; and Peter J. King, **ROUSH CleanTech**. Sponsor: **Integrity Business Unit, PTC**.



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Problem Solved.

Powertrain

Kawasaki first among small-engine makers to get 'certified-by-SAE' engine power ratings

Kawasaki Motor Corp. is the first company to use a new combination of **SAE International** standards in certifying the power ratings of small engines, potentially spurring competitors to do likewise.

"Kawasaki has released more than 20 new engine models since 2006," Greg Knott, Application Engineering and Government Relations Manager at Kawasaki, told *SAE Off-highway Engineering*. "Keeping that in mind, and after review of the current power rating options, Kawasaki feels that [SAE J1995 and J2723] more appropriately reflect the recent advances in engine design and manufacturing technologies versus the previously applied SAE J1940 when rating engine horsepower."

"J2723: Engine Power Test Code - Engine Power and Torque Certification" is part of SAE's Certified Power Program and establishes the terms and procedures under which a company may claim that an engine's power and torque ratings are "certified by SAE." One of

Among the engines for which Kawasaki received "certified-by-SAE" designation is the FX751V.



those terms is that a company applying for a certification must subject the engine in question to one of two SAE testing regimes for an accurate (to within 2%) determination of power and torque ratings.

One testing regime, embodied in SAE J1349, addresses net power (the engine's power rating including loads such as air-conditioning and power steering) and is the one favored by automakers. The other, J1995, addresses gross power (no auxiliary loads on the engine) and is more suitable for smaller engines used in off-road applications. (The J1940 standard referred to by Kawasaki above is an older power rating

standard that is more open to interpretation than J1995 and cannot be used to receive official SAE certification.)

Certification under the SAE standards assures consumers that the engines they purchase will produce at least 98% of the power and torque ratings claimed. J1995 and J1349 engine testing is witnessed and verified by an SAE-qualified observer.

Kawasaki received SAE certification for 32 four-stroke engine models of up to 999-cc displacement—nearly its entire range of general-purpose engines,

according to the company. Each certified engine has a unique combination of features (e.g., air- or liquid-cooled, vertical or horizontal crankshaft) and power. Applications for the certified Kawasaki engines are mainly residential and commercial tractors, walk-behind mowers, and zero-turn riders (not motorcycles or ATVs).

“Kawasaki has met the required standards to use the SAE International reference in its advertising and promotional materials for specified engines,” said Gary Pollak, who in his

Resource Center

The SAE website is the gateway to the world's largest collection of technology resources for engineering professionals.

SAE's Resource Center offers a variety of resources from industry's top companies ranging from videos to white papers:

[MSC Software Corp](#)

Inside you will find a white paper outlining the many benefits and usages of Adams multibody dynamics simulation software from MSC Software Corp. Also included are case studies of real world Adams successes from the truck, robotics and automotive industries.

[Concepts NREC](#)

Developments in Turbocharger Simulation - Turbocharged engine simulation tools are highly developed, but the accuracy and reliability of the results are constrained by the turbocharger modeling. View this webinar to learn: How the compressor installation impacts the modeling of the compressor surge point and more!

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capacity as SAE Program Manager of Ground Vehicle Standards administers the organization's Certified Power Program. "The certification entailed a battery of engine tests operated and witnessed by independent, experienced engineers familiar with the requirements of SAE J1995."

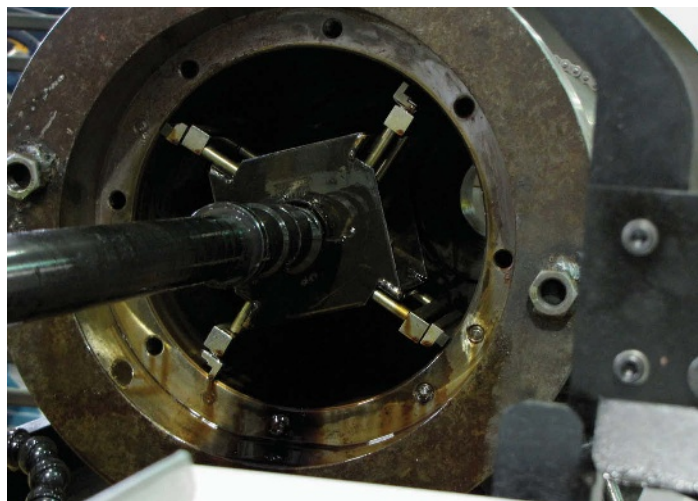
Companies interested in having their engines certified by SAE may contact Pollak at gary@sae.org.

A listing of all engines that have received the official designation of "SAE Certified" can be found in the SAE database at www.sae.org/certifiedpower.

Patrick Ponticel

Hydraulics|Maintenance **Honing in on hydraulic cylinders**

Air Hydro Power started in 1961 in its founder's basement, and by 1965 it was the third Vickers distributor in the U.S. Its Repair division services and repairs all brands of industrial and mobile hydraulic pumps, motors, valves, and cylinders. Work in its repair shop primarily focuses on refurbishing steel hydraulic cylinders used in construction equipment; material handling equipment; and other equipment such as cranes, oil rigs, and



The Sunnen HTA tube honing system used by Air Hydro Power handles parts with a mass up to 8000 lb (3629 kg) with ID ranges from 2.5 to 21 in (63.5 to 533 mm), and is available for 6- and 12-ft (2- and 4-m) part lengths.

off-highway vehicles.

In 2007, its in-house honing capability consisted of hand honing with a half-inch chuck Milwaukee drill.

"Hand honing was physically demanding and a little tricky," said Perry Goldstein, Air Hydro's Director of Value Added Services. "If someone accidentally hit the reverse switch while adjusting the hone, the stones would bite the tube and rotate the drill, which is not good if you're the one standing next to it."

Other factors, such as inability to maintain stone pressure and having to

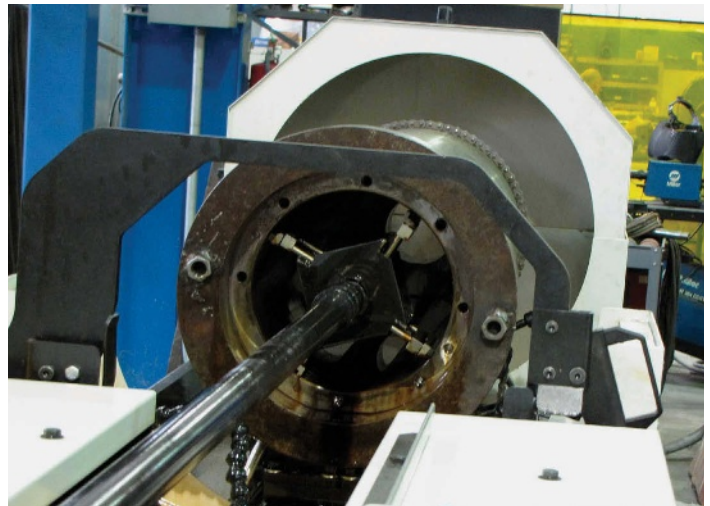
deal with blind bores, relegated Air Hydro's in-house honing to low-end tasks such as taking out light scratches, deglazing, or polishing.

"Correctly honing a tube, maintaining accurate diameter, and keeping all the taper out, is really difficult to do by hand," said Goldstein. Therefore, parts requiring more significant material removal had to be sent out at significant cost. Outsourcing also took out some control of meeting delivery dates.

"There were times when subcontracting came back to bite us," said Goldstein. "A third party may not have the same sense of urgency we do."

Ultimately, Air Hydro acquired a **Sunnen** HTA horizontal tube hone to repair and recondition hydraulic cylinders, allowing it to bring previously farmed-out honing work back in-house, helping it regain control of job turnaround times and save the company in outsourcing costs.

Approximately 80% of Air Hydro's repair work is done on cylinders 8 in (203 mm) or smaller in diameter; however, it has honing stone sets and holders that handle bores up to 18 in (457 mm). "Our largest lathe has a 3-ft swing and 15-ft bed," said Goldstein. "But, most of our work is done on our 22-in swing lathe. The HTA fits perfectly



Adding the HTA to its repair shop machine tool lineup allowed Air Hydro to bring previously farmed honing work back in-house, helping it to regain control of job turnaround times and save money on outsourcing.



The Air Hydro power repair division services and repairs all brands of industrial and mobile hydraulic pumps, motors, valves, and cylinders, including steel cylinders used in construction, material handling, and heavy industry equipment.

with our other equipment.”

The Sunnen HTA tube honing system handles parts with a mass up to 8000 lb (3629 kg) with ID ranges from 2.5 to 21 in (63.5 to 533 mm). The HTA machine is available for 6- and 12-ft (2- and 4-m) part lengths. Air Hydro has the 12-ft (4-m) model designed for resurfacing and repair work where light-duty stock removal up to 0.030 in (0.76 mm) is required.

“Having the hone in-house allows us to look at the size and complexity of each job and determine if it’s a repair or a replacement,” said Goldstein. “Prior to the HTA, we’d rub a finger over the tube and determine the material removal to be 0.005 in, which means 0.01 in off the diameter. That would require us to make a new piston, new seals, etc., and we were better off just making a new tube.”

What Air Hydro discovered, however, is the grooves felt larger than they actually were due to the “finger test” reflecting raised material as well as missing material. “Now, we put that tube on the HTA, make a few passes and find that, once honed, the tube may be only 0.001 or 0.002 in over tolerance and the seals can easily absorb 0.002 in, so we save the tube.”

The HTA also comes in handy when building a cylinder from scratch, which



A touch-screen-controlled hone provides a safer working environment and reduces operator fatigue, as well as providing better quality parts by producing a controlled crosshatch pattern, which allows the honed surface to retain oil or grease and ensure proper lubrication.

requires the tube to have a trunnion mounted. When the trunnion is welded on, the cylinder will distort and cause a tight spot. Air Hydro hones the tube to eliminate the tight spot and allow the piston to pass. The shop also hones across all ports on the tube, which improves the life of the seals and wear bands.

The HTA includes a **Siemens** drive and PLC-control with touch-screen HMI for setting machine parameters such as stroke reversal point, spindle/stroking speed, and crosshatch angle calculation. The control features a load meter to determine areas of bore tightness, and provides the ability to dwell the tool in

multiple areas to correct part geometry.

A touch-screen-controlled hone provides a safer working environment and reduces operator fatigue. It also provides better quality parts by producing a controlled crosshatch pattern, which allows the honed surface to retain oil or grease, ensuring proper lubrication and ring seal of pistons in cylinders.

Transition to the HTA was easy, as the machine uses the same Sunnen ANR tooling the shop was using to hand hone.

"Generally, it takes us longer to set the machine up than to run it," said

Goldstein. "We know how much material is removed for every minute the machine runs, so we calculate the surface area and set the time. Once we get it set, we can hit the go button, walk away for a few minutes, come back and measure, and we're done."

The shop will run anywhere from two to 15 parts per day through the hone. "We've got it down to where we will stage the tubes by grouping like sizes, so we can run it without changing the setup," he said.

Jean L. Broge

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Chair for Mathematics-
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Dr. Sam Dao, Application
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TECHNOLOGY CROSSES INDUSTRY BORDERS

Between the commercial- and military-vehicle markets, knowledge sharing and tech transfer benefit both in areas such as vehicle electrification and alternative fuels.

by Terry Costlow

Collaboration has become a watchword for the many aspects of vehicle development projects over the past years as cost-strapped vehicle makers added complex electronic features and functions to vehicles. Military developers also are planning to use even more of these linkups as military budget cuts loom.

Military design teams have been increasing their use of commercial-off-the-shelf products and modules for years, often working closely with vehicle providers and their suppliers. These efforts are expected to increase as rising debt curtails investments by the U.S. **Department of**

Defense. As the funding climate has changed throughout this year, military speakers have increasingly begun presentations with a mention of reduced resources.

This trend was evident at the **SAE** Commercial Vehicle Engineering Congress in Rosemont, IL, in September. Budget cuts were mentioned twice before all the introductions were finished during a Blue Ribbon Panel titled "Commercial Vehicle Integration for Military & Homeland Defense Applications."

Collaboration is key

Collaboration is one of the strategies that military leaders plan to use to help make sure



Many challenges must be overcome before hybrid vehicles such as the U.S. Army's Clandestine Extended Range Vehicle see broad usage in the field.

U.S. forces have access to well-equipped vehicles that help them complete missions safely. These leaders are keenly interested in working closely with commercial-vehicle suppliers and the companies that make equipment used on military vehicles.

"We want to interact with as many industry partners as we can," said Lieutenant Colonel Graham Compton, the **U.S.**

Army's Product Director for Non-Standard Vehicles. Non-standard vehicles are typically those that are designed primarily for commercial markets but are altered to fit military environments.

The focus on teamwork is taking several different tracks. While they turn outward to commercial suppliers, military agencies are also forging alliances with fellow members of the military.

In past periods of belt tightening such as the one that came as the Cold War faded out, military commanders often battled each other

for a share of the remaining funds. That seems to have changed in the current environment as members of the armed forces join forces to make better use of the available funding.

"What happened during the drawdown of the 1990s is that everything was siloed and one group would fight another for resources," said Brigadier General Michael A. Stone, Assistant Adjutant General, Department of Military and Veteran Affairs, Joint Force Headquarter. "In the current environment, there's much more collaboration."

Stone, who is an officer in the Michigan National Guard along with his role in Joint Forces, noted that this spirit of cooperation extends beyond the military and its suppliers. He added that universities and a range of government agencies are also being tapped.

He cited a project that uses National Guard facilities that have seen less usage since the military cutbacks of the 1990s. These buildings are being used for the test and development of unmanned vehicles that are seeing increased usage in modern warfare.

"We're working towards getting a robotics test lab," Stone said. "I would never have dreamt five years ago that we'd be partnering with universities, but now I do a lot of conference calls to set up our program. We're even collaborating in the public sector, working with the governor of Michigan and the mayor of Detroit."

University partnerships are also becoming more common for the businesses that provide military vehicles. Collegiate research teams are often tasked

with long-term research projects, and they are also being used to develop improved manufacturing and test processes. "Our university partnerships also continue to expand," said Lennart Jonsson, CTO for **Eaton** Corp.

Working together not always easy

Though partnerships and joint projects can provide big benefits, panelists noted that those gains don't come without considerable effort. Tight relationships require some work up front to set guidelines.

Once the programs are in place, team members must balance needs between the shared project's goals and the larger goals of the company or agency they work for. That's especially true for companies that are providing innovative technology.

"It's a big challenge to collaborate on things and be successful," said Gary Schmiedel, Executive Vice President of Technology at **Oshkosh** Corp. "You need to

balance the pressure to collaborate and still manage your intellectual property.”

As companies in all slices of transportation increase collaboration, they are looking at related ways to trim costs. One of these is by using common hardware and software interfaces such as AUTOSAR that make it easier for design engineers to use existing modules rather than create their own solutions.

“Interoperability is extremely important,” Jonsson said. “We as manufacturers have to do more to create open standards.”

While many issues associated with partnerships are universal, some of these considerations are specific to linkups with military organizations. One of these aspects is the time frame for military vehicles, which can be in development for years and have very long lifetimes once they move into production. Another is the need to protect the technical secrets that keep America’s armed forces ahead of their adversaries.

“Program times are much



“We want to interact with as many industry partners as we can,” said Lieutenant Colonel Graham Compton.

longer and military operations are regulated by International Traffic in Arms Regulations (ITAR),” said Robert F. Combs, Director of Military Applications at **Allison Transmission**.

Another is the amount of paperwork and bureaucracy that can be involved with publicly funded programs. The regulations that govern government expenditures have been growing for years as legislators have attempted to avoid all sorts of financial issues such as bribery and overcharging.

At large companies, teams typically include at least a member or two who have worked with these regulations. But many innovations come from small companies that don’t have much experience with government requirements. Military agencies that encourage these small companies to bid on government contracts find that they must often help them maneuver through

the paperwork and other requirements that come when taxpayer money is spent.

"It's a real challenge to get together with small businesses that don't know the processes and checks and balances developed," Compton said. "When we bring in small businesses we need to provide mentorships so they can succeed."

Hybrids face challenges in military usage

Hybrid and electric vehicles are being eyed by the military, which has often found it difficult to supply fuel when many vehicles are on the move. But a number of challenges must be overcome before warfighters see electrified vehicles in the field.

The U.S. military has developed demonstrator vehicles and many transportation companies have produced vehicles that augment internal-combustion engines (ICEs) with electric or hydraulic power. But broader adoption appears to be a fair ways out in the future. When the topic of hybrid and electric vehicles came up during the Blue Ribbon Panel at SAE's Commercial Vehicle Engineering Congress, panelists cited a number of issues that must be resolved before electrified powertrains see use in most military environments.

Military and commercial representatives said there's definitely interest, since delivering fuel is an expensive and sometimes hazardous aspect of military operations. Panelists from the commercial side noted that as interest in electrification increases, they are forging

partnerships to help develop electric subsystems.

"We're refocusing our effort on power management, partnering with companies that give us complementary technologies," said Eaton's Jonsson.

Designing components and subsystems for military vehicles always requires more ruggedness, but other parameters are also far more demanding. Most vehicles now carry many different antennas for communications and they have a wealth of other electronic equipment that drives up the overall power consumption, boosting the demand for battery power.

"For military missions, vehicles require a lot of onboard power, from 40 to 90 kW to run all the accessories," said Allison's Combs.

Providing that much power while also moving a vehicle along its route takes a lot of battery power. Most vehicle and battery suppliers feel that major improvements in battery technologies need to occur

before plug-in electric vehicles can begin to compete at the same level as ICEs.

"Lithium-ion batteries aren't yet completely ready for things like plug-in hybrids where you really utilize the battery's full capabilities," Jonsson said.

"Developments in the commercial space can really help build up a knowledge base before we go into more demanding military markets."

A key obstacle for hybrids and electric vehicles is their complexity. Most military technicians are unfamiliar with the many components added for electric powertrains, so significant amounts of training must occur before they can move into the

Tech transfer is focus of December webcast

Off-Highway Engineering will hold the fourth in a series of special topical webcasts on Dec. 15, 2011. The title of the webcast is "Technology Transfer: Sharing Knowledge between Commercial and Military Vehicle Sectors."

The panelists are Rod Heiple, Associate Director, **Alcoa Defense**; Gary Hunter, Director of Research and Development, **AVL Powertrain Engineering** Inc.; and Peter King, Executive Director of Business Development for **Roush CleanTech**.

Among the topics to be addressed are the trends of improving fuel efficiency and moving away from such a large dependence on traditional petroleum-based fuels, namely diesel—issues affecting not only on-road commercial vehicles but military vehicles employed in theater as well.

A variety of technology paths are being pursued to accomplish these goals, and they are not exclusive to just one segment.



Rod Heiple



Gary Hunter



Peter King

For example, lightweighting strategies increasingly employed in on-road commercial and passenger vehicles should interest engineers—and end customers—in defense because of the potential savings in fuel costs and the capability for higher payloads.

Panelists will present key cross-industry trends such as these and more—including the move toward vehicle electrification and other advanced powertrain solutions, and the increasing use of alternative fuels. They will also provide real-world success stories of technology transfer.

Attendees are invited to interact with the experts during the Q&A portion of the webcast.

Ryan Gehm

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In addition to electrified powertrains, military vehicle developers are pursuing alternative fuels. Hydrogen-based fuels are one possibility; propane autogas (the Roush CleanTech system for the 2012 Ford E-450 is shown) is another.



mainstream for military vehicles.

Deploying hybrids in war zones also underscores the need to stockpile spare parts in addition to increasing training. That's especially true as the U.S. exit strategy for Afghanistan proceeds and locals take over vehicle maintenance.

"We do our own maintenance, so adding a new technology can be very, very expensive in areas like Afghanistan," said Lieutenant Colonel Compton. "The literacy rate for Afghanis is around 20%; something as simple as filling out a requisition form won't work there.

While very few other environments will have that limitation, product developers are always striving to simplify maintenance. In most military theaters, reducing downtime and the amount of training needed for each vehicle are important factors. That's driving a trend toward plug-in componentry.

"Certainly a large degree of training needs to take place with hybrids," said Oshkosh's Schmiedel. "It's well within our capability to build products based on removing and replacing modules."

At the same time, design teams are

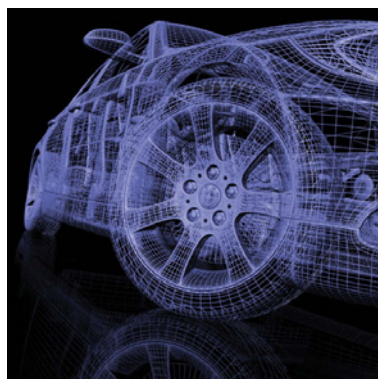
working to add features that help users and technicians understand what's broken and how to fix it. They're also working on prognostics, which will predict when failures may occur so preventive action can reduce overall downtime.

"Diagnostics and prognostics are becoming increasingly important," Jonsson said. "Modularity is also very important."

While electrified powertrains inch into military markets, developers are already

looking at other alternative fuels. Some vendors feel that the shift to electric vehicles will help clear the pathway for a transition to hydrogen-based fuels.

"Fuel cells remain elusive," Schmiedel said. "As we start embracing electrification, we can set the infrastructure for moving to fuel cells when the time is right." **SOHE**



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P111324

Caterpillar releases feller bunchers



Caterpillar Forest Products' new, completely redesigned wheel feller buncher family features advances in performance, reliability, and serviceability. Customer feedback at every stage of development drove the design of the new models, the Cat 563C and 573C.

Caterpillar says customer feedback at every stage of development drove the design of its new feller buncher models, the 563C and 573C.

In terms of power, the new C7.1 ACERT engine is said to deliver more power and burn less fuel than previous models. Power is delivered where and when it is needed as a result of PowerDirect Plus, a new technology that optimizes machine efficiency and productivity.

"Operators will have better performance in all functions on both steep and flat ground," said Matt McDonald, Caterpillar Forest Products, Product Performance Engineer.

"Simultaneous lift-tilt and lift-steer functions are significantly faster than major competitive machines. Saw

recovery time is also significantly faster."

New technology was incorporated into the C7.1 to ensure that changes to meet Tier 4 emissions requirements would not reduce uptime or shorten service life. Cat says productivity was not affected by the Cat Clean Emissions Module and its active regeneration process. The system can regenerate during operation with no impact on machine performance.

The engine was placed at the back of the machine for better weight distribution and balance between the front and rear axles, providing the C Series with "unprecedented stability—even when carrying big timber on steep or uneven terrain," said McDonald.

The center articulation joint is positioned between the front and rear

axles to facilitate tire tracking. That, combined with the benefits of the rear engine position, offers an advantage in agility. According to Cat, the C Series is the first wheel feller buncher that can be serviced standing on the ground, including fueling. "No more climbing up on the machine, dragging a fueling hose to fill the tank," McDonald said.

Hydraulic oil also is added at ground level with a standard electric hydraulic oil-fill pump and a quick coupler hose stored on the machine. Oil is pumped through the filtration system before it

enters the tank, safeguarding the hydraulic system. The tilt cab and large hinged doors on three sides and at the bottom of the engine compartment provide ground-level access to the engine; hydraulic pumps; and all key components, including fuel, air and oil filters, drive belt, hydraulic hose connections, water pump, A/C compressor, alternator, and starter. Short hoses and electrical wires that are bulkheaded between systems also contribute to the ease and safety of servicing.

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Robust box section frames and a field-proven center hitch design provide a solid foundation. A dual-pad pump drive, steering cylinder mounts, and chrome-plated lift arm and tilt link pins are examples of design changes built into the C Series to increase machine life. Fast and smooth multi-functioning is due to a high-performance control valve. "We put the control valve and hydraulic pumps through extensive lab 'torture' tests that simulated the most brutal logging conditions and environment," McDonald said. "The tests verified a significant increase in the service life of the control valve and pumps."

"In designing the C Series, special attention was focused on keeping the machine cool and free of debris. The machine is segmented into separate compartments that are pressurized to prevent debris from entering. The pressurized airflow keeps electronics, sensors, and other key components cool during long workdays. A high-capacity cooling system and on-demand reversing fan keep the machine running at the proper operating temperature, optimizing performance, durability, and fuel efficiency. The oversized, hydraulically driven fan spins at a slower speed overall and only turns as fast as



New work tools were developed to meet the increased capabilities of the C Series wheel feller bunchers, including the new SH-56B, featuring Caterpillar's patented Strait Grip bunching finger, and no-pinch-point tower.

needed to maintain proper hydraulic and engine temperatures. It automatically reverses every 5 min of run time to keep the cooling system free of debris.

The cab is centered between the axles for a smooth ride. The standard air suspension seat with neck and back support and new high-capacity HVAC system add to operator comfort. A clean three-piece front windshield, large rear

windows, and skylight give the operator a 360° view, including the rear tires.

Additional functions include Control Adjustability to customize the machine operation for each operator, Terrain Selection Mode to optimize performance on hills or flat ground, Creep Mode to improve machine functionality particularly in first thinnings, and Road Steer Mode for high-speed transport of the machine. These functions, combined with complete electrohydraulic controls, provide the operator with a smoother machine, increasing productivity.

New work tools have been developed to meet the increased capabilities of the C Series wheel feller bunchers, including the new SH-56B, featuring Caterpillar's patented Strait Grip bunching finger and no-pinch-point tower. "The SH-56B keeps bunches tightly compressed and straight, providing excellent productivity in thinning applications," said McDonald. "It also optimizes skidder and loader efficiency because the stems are well organized."

Jean L. Broge

Thursday, December 15, 2011: Noon ET

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A look at some of the systems being developed to keep operators safe.

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