

## Making room for Tier 4

By some accounts, off-highway equipment engineers have been struggling to grasp the impact that the EPA Tier 4 standards—and the resulting compulsory phase-in of compliant equipment scheduled for 2008 to 2015—will have on their engineering design and development.

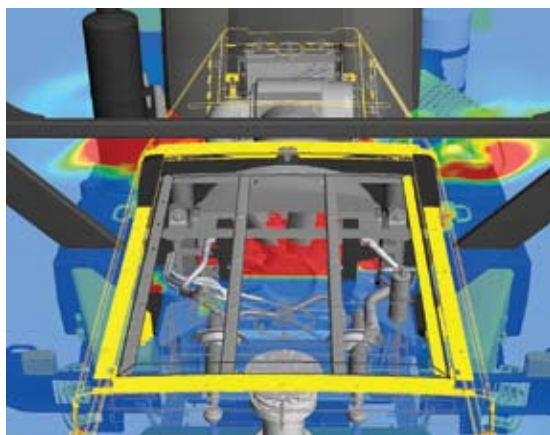
AGCO, like other OEMs, is working with the additional issue of incorporating, over the next few years, the Tier 4 requirements into an already overloaded engineering design cycle. Designing an engine that achieves acceptable top-tank temperatures, hydraulic oil temperatures, and has space allocated for super-heated Tier 4 aftertreatment components such as particulate filters and reduction catalysts is challenging. Today, many companies are forced to

approximate the proper cooling needs of an engine and thus make accommodations such as larger fans and grilles that are often expensive, take up space, increase warranty costs, and reduce styling options.

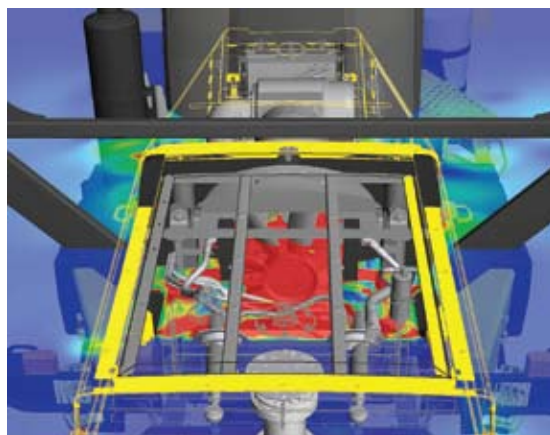
David Bloch, Chief Engineer of Engine Installations at AGCO, leads a team whose primary responsibility is to find a way to design and fit engines within a small underhood compartment while balancing performance, new space demands, and styling requirements.

“Cutting-edge engineering of the underhood is now a critical part of the design process,” said Bloch.

Traditionally, Bloch had used a series of physical tests to map out and analyze engine airflow and thermal management issues, often running up to 20



Exa's PowerCOOL is a tool that AGCO used to simulate thermal flow in the engine compartment. (Heat exchanger hidden to show effect.)



Exa's PowerFLOW simulation tool was used to analyze airflow movement. Flow is colored by velocity magnitude, with red the fastest and blue the slowest.



**CMMs so versatile,  
they can handle  
one application.**

**Yours.**

Now you have a single source for industry's most flexible and portable CMMs. ROMER® and Leica Geosystems — two leading manufacturers of dimensional inspection systems — are now the Portable Metrology Group of Hexagon Metrology™.

**ROMER** offers today's most advanced articulating arm CMMs. For example, the INFINITE® CMM's patented infinite rotation, integrated Wi-Fi connectivity and battery power provide *INFINITE* portability. Other advanced features include quick-change probes and automatic probe recognition.

User-friendly, fast and accurate, **Leica Geosystems'** Universal CMMs are the first that can probe like a traditional CMM, scan like a laser scanner and track like a laser tracker all in one system. With hand-held T-Probe and T-Scan capability, you get complete "walk around" inspection performance on nearly any workpiece, even within the very largest measuring envelopes.

Learn more about the Portable Metrology Group's solutions to your toughest inspection jobs.

Phone (800) 218-7125, email [info@portablecmm.us](mailto:info@portablecmm.us) or visit us on the web at <http://portablecmm.us/>.



**Leica**  
Geosystems

**ROMER**

51170 Grand River Avenue, Wixom, MI 48393-3327

**HEXAGON**  
METROLOGY

[sohex.hotims.com/13783-207](http://sohex.hotims.com/13783-207)

iterations for each proposed design. In the end, hundreds of thousands of dollars and thousands of man hours were required to run, analyze, redesign, and run again each physical model test.

With multiple platforms and numerous variations of engines and cooling packages to support for each platform, Bloch decided that CAE would be required to streamline the process and reduce his budget.

"The first CFD software application I investigated was not user-friendly, and in our numerous attempts to run thermal and airflow simulations, we never got acceptable results; often, no results," said Bloch.

After evaluating the extensive list of simulations required, and with his team already being pulled in many directions, Bloch tried **Exa's** On Demand option.

"It not only handled both our underhood cooling and airflow management demands, but also virtually extended my engineering staff," said Bloch. "We were able to use our fully

detailed geometry with Exa's PowerFLOW and PowerCOOL applications. For the first time, the results reflected the extremely complex underhood geometry."

Using Exa's On Demand servers enabled Bloch and his team to turn around PowerFLOW and PowerCOOL simulations very quickly. "To have CPU-capacity ready and waiting is a luxury most companies cannot afford," he said. "We were able to perform geometry iterations in record time."

"By using Exa's PowerFLOW suite, my team does not have to over-design our engines," said Bloch. "We put in what is needed, exactly where it's required. As we incorporate other Exa products, like PowerCLAY, to morph CAD components and re-simulate, design iterations that would have previously have taken us weeks will be reduced to days."

AGCO is on track to incorporate Tier 4 emissions requirements on time and under budget.

Jean L. Broge

## MEMS is the word for engines

Researchers at **Purdue University** have developed microelectromechanical systems (MEMS) that can survive the harsh conditions inside jet engines to detect impending temperature-induced bearing failure significantly earlier than conventional sensors. The sensors "could be in use in a few years" in military aircraft such as fighter jets and helicopters. However, the technology also has potential applications in both light- and heavy-duty ground vehicle engines.

"Anything that has an engine could benefit through MEMS sensors by keeping track of vital bearings," said Dimitrios Peroulis, Assistant Professor of Electrical and Computer

Engineering. "This is going to be the first time that a MEMS component will be made to work in such a harsh environment. It has high temperatures, it is messy, oil is everywhere, and you have high rotational speeds, which subject hardware to extreme stresses."

MEMS combine electronic and mechanical components on a microscopic scale. "The MEMS technology is critical because it needs to be small enough that it doesn't interfere with the performance of the bearing itself," said Farshid Sadeghi, Professor of Mechanical Engineering at Purdue. "And the other issue is that it needs to be able to withstand extreme heat." Engine bearings must work reliably in environments that can reach 300°C (572°F).

The new sensors directly monitor the temperature of engine bearings, whereas conventional sensors work indirectly by monitoring the temperature of engine oil, yielding less specific data. Advance warning is critical so that an engine can be shut down before it fails.

The work is an extension of Sadeghi's previous research aimed at developing electronic sensors to measure the temperature inside critical bearings in communications satellites.

"This is a major issue for aerospace applications, including bearings in satellite attitude control wheels to keep the satellites in position," said Sadeghi. The wheels are supported by two bearings. If mission controllers knew the bearings were going bad on a specific unit, they could turn it off and switch to a backup."

The MEMS devices will transmit temperature data wirelessly, eliminating the need for batteries, which do not perform well in high temperatures. Power will be provided using inductive coupling, which uses coils of wire to generate current.

"The major innovation will be the miniaturization and design of the MEMS device, allowing us to install it without disturbing the bearing itself," said Peroulis. He added that data from the onboard devices will not only indicate whether a bearing is about to fail but also how long it is likely to last before it fails.

The research is based at the Birk Nanotechnology Center in Purdue's Discovery Park and at Sadeghi's mechanical engineering laboratory.

Jean L. Broge



David Umberger

*Dimitrios Peroulis holds a MEMS sensor at an "environmentally controlled probe station," which re-creates extreme conditions inside engines, enabling researchers to test the sensors. The wireless sensors are being developed to detect impending bearing failure in jet engines, but their use will transcend the mobility industry.*

## BRIC is soaring

While pundits debate whether the U.S. is heading for a recession, other parts of the world offer much potential for off-highway equipment suppliers. Four of the hottest are Brazil, Russia, India, and China, often grouped together as the BRIC countries.

Brazil is first not just to create a good acronym. "All the Southern and Central American countries are growing at 2.5 to 5; Brazil is growing in the range of 4 to 5%. It's the best business environment in the last 10 or 15 years," said Yoshio Kawakami, President, **Volvo Construction Equipment** Latin America.

Other BRIC countries are also showing strong growth. In Russia, that is helped by large fuel holdings. "The rural parts of Russia have a frontier atmosphere, business is very robust. Much of the growth is driven on the back of strong energy prices, though Russia is at the back of the pack compared to other robust BRIC areas," said Sid Bardwell, General Manager, Russia Operations, **Deere & Co.**

However, he noted that "Russia is more business-friendly than the other three." The speakers were part of the Industry Focus panel, "Productivity of Off-Highway Equipment and Machines from a Global Perspective," at the **SAE** Commercial Vehicle Engineering Congress.

In China, there is still plenty of room to continue the rapid growth that has already occurred in many regions of the populous country. Most observers are predicting huge growth as remote areas build up their infrastructures.

"There are two Chinas; some people still don't have running water. But the opportunity is huge. China will surpass the U.S. economy, though per capita income in the U.S. will be higher," said Michael Allen, Director of Contracts, **Komatsu** America—Mining Division.

That type of disparity factors into the types of equipment used in some markets. In Latin America, operator wages in many markets are fairly low, though that is far from a universal truth.

"There's a big gap, some jobs pay \$200 per month for the lowest machine operator, others pay up to \$2000," said Kawakami.

The price of labor can be a key determinant in the way equipment owners determine the type of equipment they buy. In India, inexpensive labor costs prompt many owners to question whether it is cost-effective for them to pay for automated technology.

"We still need to convince customers that technology can improve their profits," said Aravind Bharadwaj, Executive



*Like all four BRIC countries, business is booming in Brazil. "It's the best business environment in 10 years," said Yoshio Kawakami, President, Volvo Construction Equipment Latin America.*



*When it comes to introducing equipment with more advanced components, "We still need to convince customers that technology can improve profits," said Aravind Bharadwaj, Executive Director—Advanced Engineering at Ashok Leyland.*

Director—Advanced Engineering at **Ashok Leyland**.

The rapid expansion of these and other emerging countries, coupled with continued growth in energy-hungry industrialized regions such as North America and Europe, is helping drive up fuel prices. Equipment designers are being pressed to improve fuel economy as expenses rise.

"In Russia, fuel has been heavily subsidized. Now it's the same price as in the U.S. That's put a tremendous focus on efficiency," said Bardwell. He noted that diesel engines in Russia are "Tier Zero."

The availability of cleaner fuels could become an issue for manufacturers, who will have to consider techniques that let engines sold in the BRIC countries use different grades of fuel. In India, there is some pressure to improve fuel quality, but that is not proving to be an easy goal to accomplish as suppliers focus more on meeting existing demand than on environmental concerns.

"Up to this point, fuel availability has been OK, but it's becoming an issue. Making better fuel will require a huge investment," said Bharadwaj.

Manufacturers note that the equipment being sold in these regions is basically the same as that sold elsewhere. The production volumes are the most significant difference.

Speaking for Volvo, Kawakami said, "Products designed for South America are the same as in North America and Europe. The difference is mainly in scale."

Terry Costlow

## Biodiesel inches forward

Biodiesel is beginning to make an impact on petroleum usage, and government researchers are focusing on ways to assure continuing advances. But it has still got some challenges to overcome before market acceptance is assured.

A number of fuel providers and equipment manufacturers are already using blended products, which today add small amounts of biodiesel to petroleum products. Proponents contend that even products such as B2, which uses only 2% biofuels, could make a huge dent in oil imports.



Robert Bosch is researching the effects of biodiesel on engine components, according to Marcus Parche (right). Fellow panelist Mike Weinert of John Deere Power Systems noted that using B2 could displace 1 billion gal (3.8 billion L) of foreign oil each year.

"Since 2005, we have shipped our products with B2," said Mike Weinert, Director of **John Deere Power Systems**. "If B2 was used in all diesel engines, we could displace 1 billion gallons of foreign oil each year."

The interest is not limited to North America, according to panelists who discussed the topic during the "Renewable Energy—Biofuels" panel at the recent **SAE** Commercial Vehicle Engineering Congress. European suppliers are already offsetting high oil costs and regional uncertainty by offering biofuel blends.

"Biodiesel production in Europe is only 2 to 4% of diesel needs, and production costs are higher. The market demand is rising, so vehicle and engine manufacturers need to come on line with products," said John Cottrell, **CNH** Integration Manager at **Fiat Powertrain** Technology.

There is a concerted effort to help make that happen in the U.S. Various government studies call for replacing 20 to 30%

of U.S. petroleum usage with biodiesel and ethanol before 2030. A first step will be to encourage the planting of self-sustainable grasses and other feedstock.

Government researchers are also devising ways to make it cost-efficient for processors to handle materials. That will involve standardizing production techniques for different types of feedstock, which include corn, grasses, wood chips, and other materials.

"To get to our 2030 goals, we can't have different plants for each type of incoming feedstock. We have to develop systems so it is easier to handle different types of materials," said Judy K. Partin, Senior Scientist, Materials Characterization Department at the **Idaho National Laboratory**.

The U.S. government is also providing tax incentives for sustainable fuels. Though that helps spark some investment, researchers note that the past has proven that market prices typically carry more clout.

"The price of oil is the main driver. Government incentives can help, but if the price of oil goes down and stays there, many biofuel programs will probably be abandoned," said Wendy Clark, Fuels Performance Manager at the **National Renewable Energy Laboratory**.

Though interest is high, there are a number of issues that must be resolved before biodiesel fuels move to higher percentage blends and wider acceptance in the marketplace.

"Impurities like methanol cause problems. Methanol degrades plastics and metals and lowers the flash point. Glycerin needs to be removed or it will plug engines," said Clark.

Others note that biodiesel purchased for field tests has more impurities. "Quality is more variable. The water content is usually higher than with diesel," said Cottrell.

Suppliers must also prove to potential customers that they will not have problems with engine reliability. Many companies are analyzing parts to see if they wear out faster with biodiesel.

"The Bosch position is that biodiesel blends are welcome, but the effect on components has to be researched. We're working on ways to test that," said Marcus Parche, Senior Engineering Vice President for Commercial Fuel Injection at **Robert Bosch**.

Other tests show that blending biodiesel and petrodiesel has minimal impact on mileage and power. "Engine performance is basically stable up to 30% biodiesel, with only 1 to 2% power reduction. When you get to 100%, there's a 4 to 10% power reduction," Cottrell said.

Terry Costlow

## Bearing down on energy conservation

Bearings are not the first product many design engineers think of when they are trying to cut energy consumption and emissions. But **SKF**, a leading bearing supplier, is making a big push to change that perception.

The Swedish manufacturer is making sustainability a hallmark of its corporate strategy, aiming to reduce its own carbon emissions while also helping customers employ bearings and other technologies that reduce energy consumption.

"Sustainability is a major goal in many industries, especially transportation. We reduce friction, and that is a perfect match," said Tom Johnstone, CEO at **SKF**. Transportation is a



SKF claims that its new line of Energy Efficient bearings can trim energy consumption by up to 30%.



Isuzu Diesel Engines

The power behind it all.



## The quiet, efficient way to get ahead.

When you want a quiet, clean-burning engine with reliable power – go with Isuzu Diesel. With industry-leading sound and emission control, the growing line of dependable Isuzu Engines is built to meet the strict environmental standards of today and tomorrow. And if you're concerned about fuel efficiency, Isuzu Diesel gives you one less thing to worry about. We're leading the way to help you get the most out of every tank. With models ranging from 15 hp – 530 hp, there's an Isuzu Diesel that's right for you. **Contact your local distributor or visit [www.isuzuengines.com](http://www.isuzuengines.com)** – and get ahead with Isuzu power, efficiency and performance behind all your jobs.

[sohex.hotims.com/13783-211](http://sohex.hotims.com/13783-211)

**ISUZU**

**DIESEL**

key market for the \$8 billion company, accounting for about a third of revenues.

Earlier this year, SKF unveiled a centerpiece for its energy-savings initiative, the Energy Efficient bearing line. The bearings fit into standard sizes as product replacements, but reduce friction enough to trim energy consumption by about 30%.

That is accomplished by using specially engineered internal geometries, new polymer cages, long-lasting grease, and proprietary manufacturing techniques. Along with reduced friction and lower energy consumption, they are quieter, weigh less, and run at lower operating temperatures. Lifetimes are said to be identical to existing product lines.

"We've got tapered roller bearings that are targeted at ship and rail transportation," said Johnstone. Production of the Energy Efficient line began in the fourth quarter. Once large industrial bearings are established, SKF will expand them into other areas of transportation.

The company, which is celebrating its 100 anniversary this year, also unveiled a speed sensor designed for ac electric motors used in hybrids. The inductive sensors, which are integrated into bearings, eliminate some of the interference issues that can plague Hall-effect sensors. Current versions work with 600 to

800 A motors, with future versions going up to 1000 A.

SKF's energy-saving efforts also extend to manufacturing, both its own and for customers. The company has reduced its carbon emissions by 7 and 5% the past two years despite increasing production. That is part of a program called BeyondZero, which looks at both corporate savings and emissions reductions by customers.

"When the energy savings we provide for our customers is combined with our reductions, we want to get to the point that we're a positive factor in the environment, going beyond zero emissions," said Johnstone.

SKF is helping other equipment makers by helping robot users save on energy expenses. Its mechatronic actuators can provide as much as a 90% energy savings over pneumatic power. "Pneumatics are typically only 50% efficient," said Bart Bartholomew, Vice President of Reliability Systems.

Bartholomew added that SKF supplies fly-by-wire technology for aircraft, which saves around 5% in fuel consumption. Some of these benefits could be gained in ground transportation, he said.

Terry Costlow

## Getting a pulse from a magnetic process

Welding parts without the side effects of heat, sparks, spatter, or fumes puts electromagnetic-pulse technology in the green category. And proponents of this eco-favoring technique are eager to show how this processing method can help lessen a vehicle's material load.

"The last couple of years in North America, survival and cost reduction were king," said James Toeniskoetter, President and Chief Operating Officer of **Hirotec America**, a Hirotec Group company formerly known as **Tesco Engineering** until January 2007. "But that could change as weight reduction becomes king again.

Electromagnetic-pulse welding is possible with steel, stainless steel, copper, brass, aluminum, and combinations of those metals. The process unfolds as an electrical current is discharged through a coil that surrounds the workpiece, creating opposing magnetic fields between the coil and the workpiece. Within milliseconds, a hermetically sealed cold weld joins the metals.



*This aluminum-to-copper demonstration piece has been split apart to prove that the metals were bonded at a molecular level.*

Hirotec recently signed a joint agreement with Israel-based **Pulsar** for exclusive rights in North America to develop production solutions via Pulsar's electromagnetic-pulse generators. Prior to the Hirotec-Pulsar agreement, the automotive application list for Pulsar's electromagnetic-pulse technology included welding an aluminum-to-aluminum receiver dryer that was part of the HVAC unit debuting on the MY2006 **Jeep Cherokee**.

Additional production applications of electromagnetic-pulse welding are on the horizon.

Hirotec specialists are testing a variety of potential production applications. "We're using electromagnetic welding to make small hemming component samples with tight radius. These samples help us learn more about the process as we always want to find ways to help customers with their manufacturing problems," said Michael Blakely, Hirotec America Operations Manager.

Whether it is welding or hemming via electromagnetic-pulse technology, the workpiece can be processed from the same equipment using the same power source. "Magnetic pulse has the unique flexibility to do both welding and forming operations with the same machine. One pulse generator can be welding parts on the first shift and forming metal on the second shift," said Blakely.

Kami Buchholz



*Michael Blakely places two dissimilar metals into Hirotec America's C3 machine for cold-welding by an electromagnetic pulse.*

## Cummins' on-road solutions

Cummins mid-range and heavy-duty engines that meet 2010 EPA emissions standards also meet new idling requirements while reducing noise levels.

"These engines are about 30% quieter than their predecessors," said Dave Crompton, Vice President and General Manager, Cummins Midrange Engine Business.



The Cummins Particulate Filter helps engines meet 2010 emissions standards without additional aftertreatment.

The revamped lines should at least match operating parameters of vehicles that are now shipping. "We're confident we can stay at 2007 fuel economy levels," said Steve Charlton, Cummins Executive Director of Heavy-Duty Engineering. Performance levels should remain consistent, he added.

Mid-range engines for medium-duty truck, bus, and specialty on-highway vehicles will use selective catalytic reduction (SCR), combining urea and a catalytic converter to reduce NOx emissions.

"SCR enables us to extend our power range while maintaining excellent fuel economy, maintenance intervals, and overall low cost of ownership," said Crompton. Cummins has used SCR in its mid-range Euro 4 engines in Europe since 2006.

Replenishing the urea supply should be simple. OEMs will typically provide tanks that hold enough urea to match conventional maintenance periods. "Operators should be able to replenish urea at oil change intervals," said Jeff Jones, Cummins Vice President of Sales.

Heavy-duty 2010 engines will not require SCR for NOx aftertreatment, instead using an integrated system comprised of the XPI high-pressure common rail (HPCR) fuel system, cooled exhaust gas recirculation, advanced electronic controls, and the Cummins Particulate Filter, which includes both a diesel oxidation catalyst and a diesel particulate filter.

The XPI HPCR fuel system, designed and produced by the Cummins-Scania

## High-Performance Solutions



Applied Process, Inc. is a leader in the heat treating industry specializing in Austempering — a high-performance heat-treatment process that can increase the strength, toughness and durability of ferrous materials over conventional heat treatments. Since 1984, the company has pioneered the development of new, better, and more cost-efficient austempering technologies.

### High-Performance Solutions

- **Austempered Ductile Iron. (ADI)**  
*Weighs less than aluminum, costs less than steel.*
- **Austempered Steel.**  
*A tough alternative to quench and temper processes.*
- **Carbo-Austempered™ Steel.**  
*Remarkable impact and fatigue properties.*
- **Austempered Gray Iron. (AGI)**  
*Excellent dampening and wear-resistance.*
- **Carbide Austempered Ductile Iron. (CADI)**  
*Greater wear-resistance than Grade 5 ADI.*



**APPLIED PROCESS** SM INC  
**www.appliedprocess.com**  
Tel: (734) 464-8000

Michigan • Wisconsin • Kentucky • China  
Australia • England • British Columbia

joint venture, maintains high injection pressures regardless of engine speed, providing consistent performance across the entire rpm range while reducing emissions. The Cummins Particulate Filter, which began shipping in 2007, is the only aftertreatment needed in 2010.

The heavy-duty ISX, ISM, ISL, ISC, and ISB engines will all meet the **California Air Resources Board's** idle reduction regulation, which requires automatic shut downs after idling for 5 min. Alternatively, engines can emit 30 gram (1 oz) or less of NOx per hour while idling.

Cummins 2008 on-highway engines emit less than 30 g (1 oz) of NOx per hour so they can idle indefinitely. "This capability provides flexibility for customers who occasionally need to

idle more than 5 min," said Jones.

Cummins also announced that it will introduce 11.9-L and 16-L engines, broadening its offering to its North American portfolio for 2010 beyond the currently available 15-L engine. That move comes as Cummins is rapidly expanding its production capability.

Its North Carolina plant was recently upgraded from 550 to 750 engines per day, while a joint venture with India's **Tata** recently doubled capacity to 230,000 per year. "Our goal for 2011 is to produce 1.6 million engines per year," said Jim Kelly, President of Cummins Engine Business.

*Terry Costlow*

## Taking a shine to digital design

Buildings ranging from superstores to government buildings are getting larger, forcing developers to look for new techniques to reduce the cost of elements such as flooring that make a big first impression. More companies are opting for polished concrete for tight budgets and marble or other stone surfaces for buildings where prestige is more important.

**HTC Sweden** is shortening the time needed to finish materials such as granite, natural stone, or even marble, with a 15,000-lb (6800-kg) vehicle that has a diamond-based grinding system capable of polishing about 500 yd<sup>2</sup> (418 m<sup>2</sup>) per day.

The most popular application for the HTC 2500 iXH has been with concrete floors.

Its three grinding heads are 2400 mm (94 in) wide. Underscoring the complexity and cost of floor polishing, the disks contain 10 million tiny diamond fragments, said Karl Thysell, R&D Manager at HTC Sweden AB. The grinding heads, powered by 15-kW electric motors, run at speeds from 450 to 1400 rpm.

Electric motors were chosen over hydraulic systems to eliminate the chance that leaking hydraulic fluid could ruin a finished floor, Thysell said. The vehicle itself is powered by a 4.4-L

**Perkins** engine that runs clean enough to be used indoors.

Thysell noted that HTC, which makes a number of small grinding and polishing systems that are propelled by human operators, has been working on a large vehicle for some time. Modern development software played a key role in moving the 2500 iX into production.

"When we were first developing a system in 1992, we went through a lot of trial and error, with up to five physical prototypes. To get three that would work, we were ordering 20 since something would often break one and we'd



Three polishing heads (inset) let HTC's 2500 iXH finish about 500 yd<sup>2</sup> (418 m<sup>2</sup>) of stone floor per day.



The system collects dust in three containers to meet environmental regulations.



have to scrap it," said Thysell. Only one prototype of the 2500 iX was built, and that was necessary to meet health and safety regulations, he said. Those requirements are important given the amount of fine dust created during polishing. He estimated that eliminating a single prototype saved almost \$500,000.

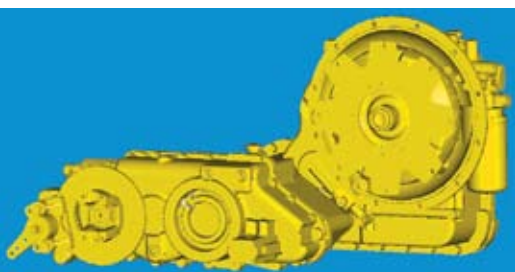
Using tools from suppliers such as **Autodesk** helped the small engineering staff at the 130-employee company understand the many components needed on the 18-ft (5.5-m) articulated vehicle. "With digital prototypes, it's easier to understand many things, especially parts inside the machine that we can't see," said Thysell.

Employing digital development tools also simplifies communication between groups. "The time is long gone when you could afford to have the design and engineering departments working separately and updating one another with drawings," said Thysell. He noted that the company expects to see a 200% increase in new business next year, largely fueled by the 2500 iXH.

Terry Costlow

## Dana has an eye on telescopic handlers

Dana's HSR08 transmission "was engineered to address the compact nature of [side-engine telescopic handlers], where the space demands of Tier III engine cooling packages are adding further constraints," said Alan Stoyell, Dana Product Director. It accommodates the short



Even with the mechanical PTO option, Dana says the HSR08 powershuttle transmission retains an overall length shorter than competitive hydrodynamic transmissions.

wheelbase of such equipment and allows for a high level of maneuverability and ground speed control, says Dana.

An engine-dependent mechanical PTO option is available for implement drives and second auxiliary pump drive. The PTO option was "offered in response to demands from the agricultural sector for increased vehicle versatility," said Stoyell.

The HSR08 transmission features horizontal offset output and offers four forward and reverse speeds to balance tractive effort and travel speed.

A 300-mm (12-in) diameter torque converter matches to 120-hp (90-kW) engine ratings and an 800-N-m (590-lb-ft) input torque capacity. The transmission comes standard with an auxiliary pump drive and helical gears for low noise. The electrohydraulic control system ensures smooth forward/reverse shifting, says Dana. An optional second auxiliary pump drive also is available for applications that require additional hydraulic demand, and a disc park brake is fitted on the transmission output.

Jean L. Broge



**CST**  
CUSTOM SENSORS & TECHNOLOGIES

## Sensing a Better World

*At CST, we provide the off-highway market with a broad range of products and technologies required to fit the needs of construction & agricultural vehicles, heavy duty trucks & buses and the rail sector. CST delivers robust sensors for powertrain, chassis & body systems, emissions, fuel efficiency and safety.*

**Pressure, tilt, fluid level and media quality sensors**

**Gyros and inertial measurement units (IMUs)**

**Position, steering and force sensors**

**Micro-switches, micro-motors and limit switches**








[www.cstsensors.com](http://www.cstsensors.com)

a company of  
**Schneider Electric**

## AddisonMckee comes out of its Shellroller

Used to feed pre-cut flat sheets through a configuration of four position-controlled programmable rollers, **AddisonMckee's** ShellRoller machine can form the outer shell of a muffler or catalytic converter in virtually any round, oval, or asymmetrical configuration and is suitable for use with carbon steel, stainless steel, and titanium.

Each forming work-cell consists of a feed system that loads the sheets using a vacuum pick-up to lift the sheets from an incoming stack and load them into the roller section of the machine for forming. The load station incorporates fanning magnet technology to separate all incoming sheets to prevent feeding multiple sheets into the machine rollers.

In the forming section of the machine, four precision rollers work together to form the various required cross sections. The top and bottom rollers are used to pinch the incoming sheet and feed it backwards and forwards as dictated by the program to create the shell shape. These two rollers are driven by electric servo gear motors and are electronically synchronized to reduce the risk of slippage during forming.

The front and rear rollers then act in conjunction with the feed rollers to create the required part shape. These rollers are positioned using electromechanical linear actuators (as opposed to the hydraulic rollers often used on competitor models) for a clean, quiet operation. The control system controls the position of these front and rear rollers in relation to the feed position of the sheet to generate the required bend radius in the sheet throughout the operation to ensure the correct finished shell shape.



*AddisonMckee has launched its first shell-rolling machine for forming the outer round and oval shapes of catalytic converters and mufflers.*

Designed for what the company describes as "maximum manufacturing flexibility," the standard system is capable of forming shells ranging in length from 75 to 350 mm (3 to 14 in). Cross sections up to 180 mm (7 in) are possible, in either round or as the major axis of an oval section. The minimum radius available is about 65 mm (2.5 in), although this is somewhat dependent upon the material being formed. Machines with larger or smaller capacities are available to create shells of significantly larger lengths or cross sections to meet customer requirements.

*Jean L. Broge*

## New Schneider facility is 'solutions-centric'

Believing that simply providing good product is not enough, **Schneider Electric** recently launched what it calls the Automation and Control Innovation Center, a hands-on demonstration area at its facility in Raleigh, NC, designed to highlight the company's ability to provide industrial solutions, not just products.

The innovation center will be tailored for visiting customers with various Schneider automation and controls products that work together to provide solutions for whatever problems the customer may be experiencing in their production plant. Or, the customer may just want to try out an idea.

"Our people not only understand the specific products and applications for using automation and controls technology, but use their breadth of experience to deliver total solutions for the challenges that customers face," said Andy Gravitt, Vice President, Industrial Automation and Control, Schneider Electric North America Operating Division. He was among the company officials participating in the October 26 Innovation Center grand opening.

Instead of Schneider engineers and others lugging demonstration items to customers across the country, customers can come to the innovation center and see the full array of Schneider products and solutions. Schneider Electric product and service experts will work together to customize the center based on a particular customer's needs.

Demonstrations will be given to both end users, such as vehicle and off-highway equipment makers, and automation and controls equipment OEMs.

Schneider in October also launched the Industrial Solutions



*Schneider Electric in October opened a customer demonstration center at its facility in Raleigh, NC, so customers can see possible industrial solutions played out.*

Center (ISC). Unlike the Innovation Center, the ISC is not a physical place. Rather, it serves as a resource for end users. With more than 50 engineers, the ISC provides application-specific solutions, engineering support, continuous improvement consulting, and project-management services to manufacturers. It is designed to act as an extension of an end user's design and operations teams.

"Our industrial customers want a solutions provider with strong automation, control, and process expertise," said Greg Bodenhamer, Director, Industrial Solutions Center, Schneider Electric North American Operating Division. "The Industrial Solutions Center offers interoperable solutions that can connect control systems to enterprise systems for improved production yield and efficiency, and ultimately, improve total operational performance."

Paris-based Schneider's major brands include **Square D**, **Telemecanique**, and **Merlin Gerin**. Schneider Electric North America Operating Division is based in Palatine, IL.

*Patrick Ponticel*