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# CONEXPO

## The Biggest Show of 2017!



### BATTERY-ELECTRIC LOAD CARRIER

Testing Technologies of  
the Future, Today  
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### VIRTUAL REALITY TECHNOLOGY

Simulated Reality Brings  
Real-World Results  
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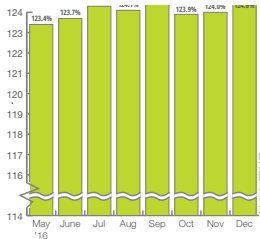
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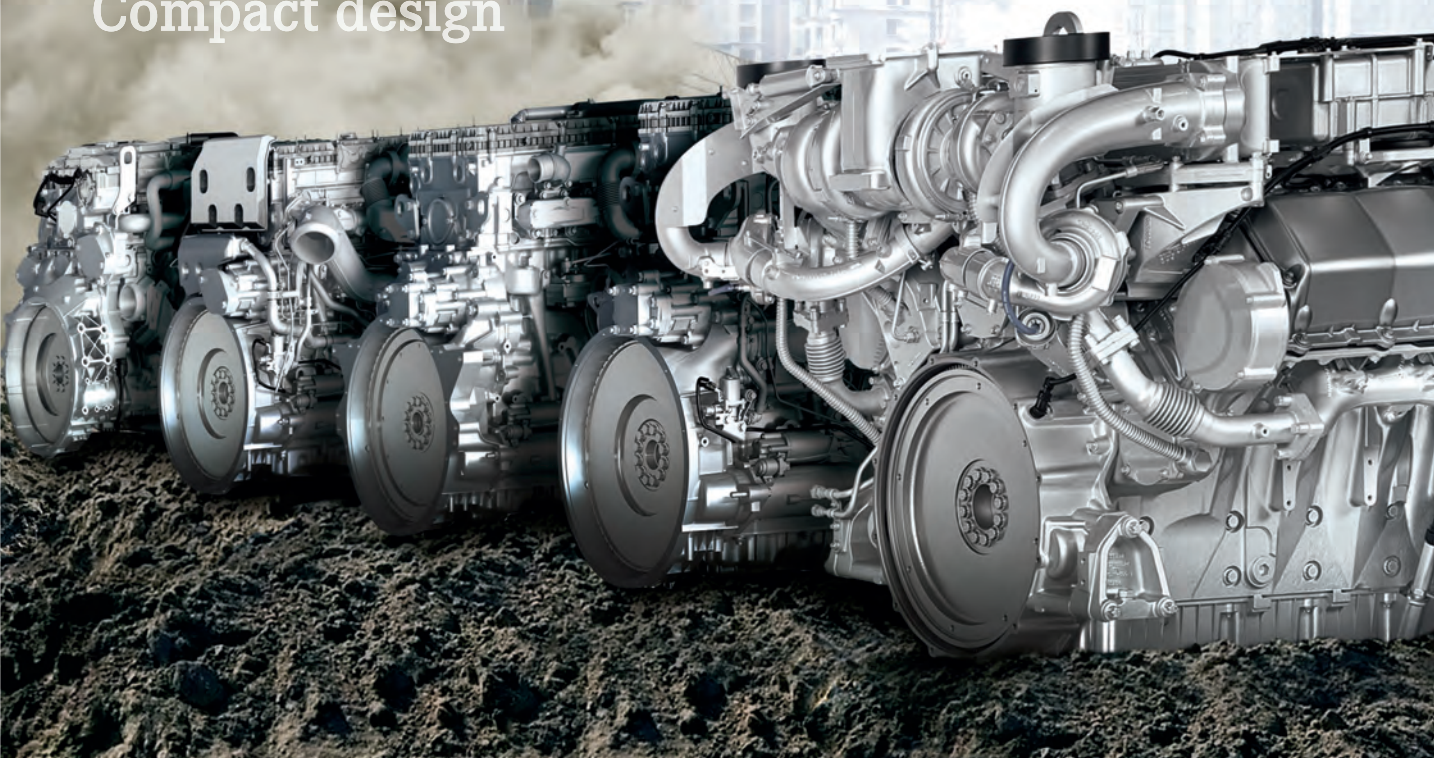
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# The Show of the Year IS HERE

Every 3 years, North America hosts CONEXPO-CON/AGG and IFPE; and every 3 years OEM Off-Highway pulls together a massive show issue filled with the news, products and technologies that have been announced thus far. The March 2017 issue once again repeats the format of our 2014 show issue with our exclusive flip issue to cover both shows in a fun way.

Our CONEXPO coverage starts on page 30 and features pages of equipment launches and new equipment displayed by all of the major manufacturers. But if you think that's a lot, wait until the April/May issue with all of the post-show coverage and product launches from at the show! Flip the issue over for all of your IFPE 2017 technology and fluid power industry trend information.

Be sure to go online to [www.oemoffhighway.com/ifpe-conexpo](http://www.oemoffhighway.com/ifpe-conexpo) to get to-the-minute show coverage and post-show announcements and analysis. And, just as we did during the 2014 show, OEM Off-Highway's new Technology News Tracker broadcast from the North Hall AC Business Media booth N11727 throughout the day provided interviews with key exhibitors to talk about their show launches and visions of the future. The interviews are available online, so check back frequently to see the show content roll in. Or, if you prefer the news get sent to you, make sure you are subscribed to our Industry News eNewsletter at [www.oemoffhighway.com/subscribe](http://www.oemoffhighway.com/subscribe).

And, as we always do, we will be live tweeting from the show floor all of the things we see and hear throughout the day. Follow @OEMOffHighway on Twitter and join the conversation! Search for our custom hashtag, #OEMatIFPE, for show specific announcements, and join the conversation. If you join our OEM Off-Highway Facebook page, you can also see live video and photos from the show as we post them, and engage with us live about what we are posting.

The Pump & Motor Spec Guide has been updated for 2017 as well, and can also be viewed anytime online at [www.oemoffhighway.com/specguide](http://www.oemoffhighway.com/specguide). With the online version, you can filter and search through hundreds of pumps and motors to find the specific product solutions you need for your application.

Don't forget to stop by and say hi to the OEM Off-Highway staff, too! We will be conveniently located just outside of the South Hall 3 doors to IFPE at **South Hall booth SL80131**. You can bring by a friend to subscribe for free to our print or digital (or both) issues and give the gift of industry insight!



## APRIL/MAY ISSUE

- Telematics & GPS Systems
- CONEXPO-CON/AGG & IFPE Post-Show Coverage
- Drivetrain System Advancements
- Construction and Mining Industry Trends
- Aftertreatment Technologies



Michelle

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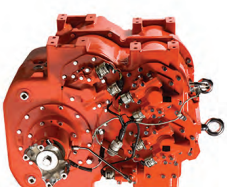
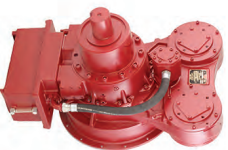


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# RISING PRICES

## Drive Market Improvements

**A** general rise in commodity prices is driving recovery in the U.S. and European mining sectors. The U.S. housing market is anticipated to expand in 2017 due to high employment and rising wages. Firming food prices are alleviating headwinds against agricultural activity around the globe, though China is the only region in which Agricultural Machinery Production is expanding on a year-over-year basis.

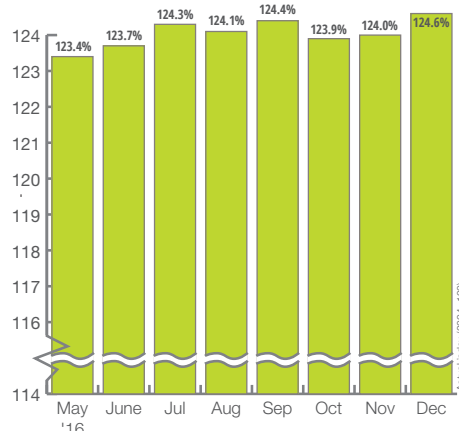
Rising commodity prices indicate further expansion of Europe Construction Machinery and Mining Production in 2017. Meanwhile, Europe Agriculture Machinery Production's recovery trend faltered the past 2 months; transition to recession is not yet confirmed. European and Chinese markets are expected to offset decline in U.S. Heavy Duty Truck Production. |

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ECONOMIC NEWSLETTER!



### U.S. Leading Indicator:

- The U.S. Leading Indicator extended a general rising trend in December.
- General rise in the indicator suggests overall growth within the U.S. economy in 2017.



**Editor's Note:** Please note that this chart has been modified on the Y-axis to show the trend more easily.



*ITR Economics is an independent economic research and consulting firm with 60+ years of experience.*

### QUESTIONS?

[economics@oemoffhighway.com](mailto:economics@oemoffhighway.com)





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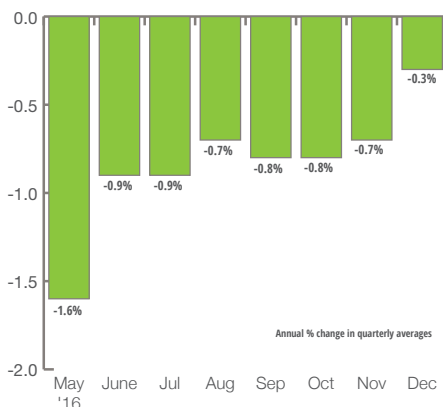
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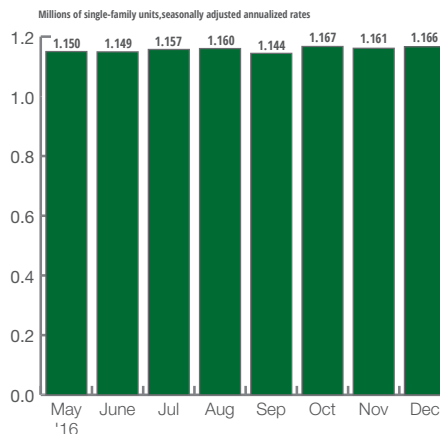
## U.S. Total Industrial Production:

- Average U.S. Industrial Production during the 3 months through December was down 0.3% compared to the fourth quarter of 2015.
- Expect year-over-year growth to take hold in early 2017 for Production as manufacturing activity picks up and headwinds against the mining sector diminish.



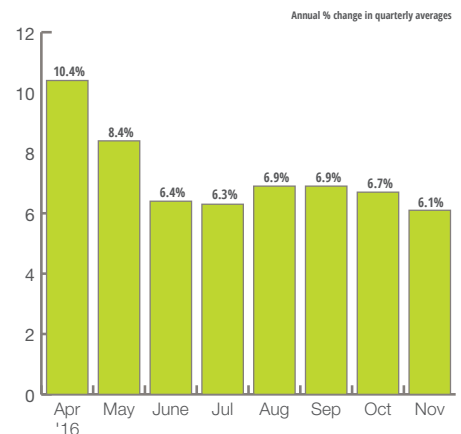
## Housing Starts:

- Housing Starts rose to 1.166 million units for 2016 as a whole.
- Single Unit Housing Starts drove overall growth despite year-over-year contraction in Multi-Unit Starts.



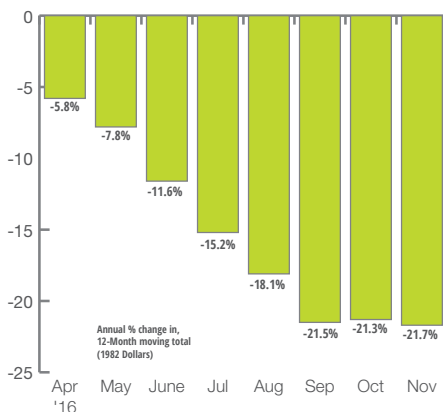
## Private Nonresidential New Construction:

- U.S. Private Nonresidential Construction rose 6.1% in the 12 months through November compared to last year.
- Construction spending will generally decelerate throughout 2017.



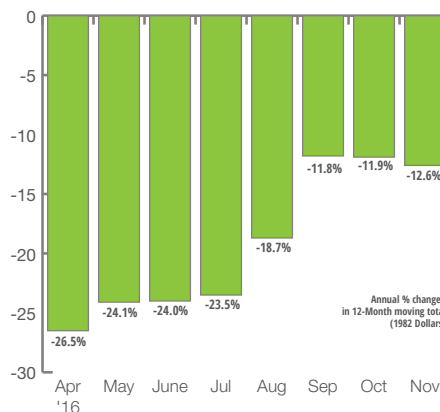
## Construction Machinery, New Orders:

- U.S. Construction Machinery New Orders during the 12 months through November fell 21.7% compared to the previous year.
- Quarterly rise signals that a recovery trend will take hold by early 2017.



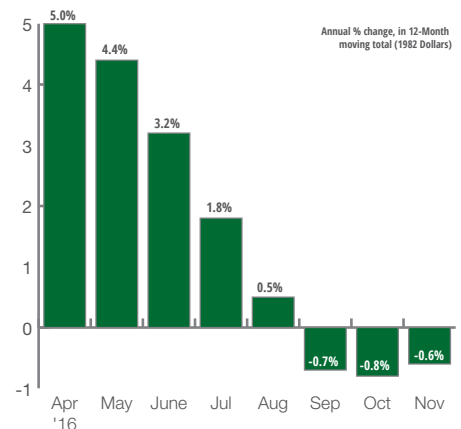
## Farm Machinery & Equipment Shipments:

- U.S. Farm Machinery & Equipment Supplies Production during the 12 months through November fell 12.6% compared to the previous year.
- Expect Production to remain below the year-ago level through at least the first half of 2017.



## Total Public New Construction:

- U.S. Total Public New Construction during the 12 months through November declined 0.6% compared to the previous year.
- Quarterly Construction is down 1.1%, signaling that further contraction is likely in early 2017.

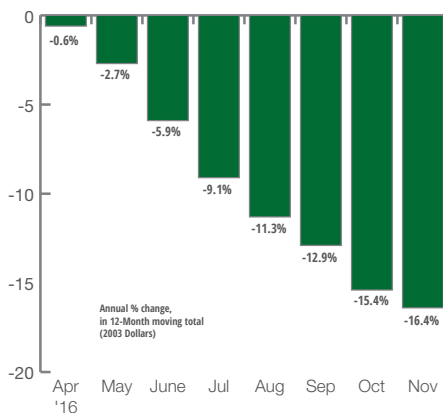






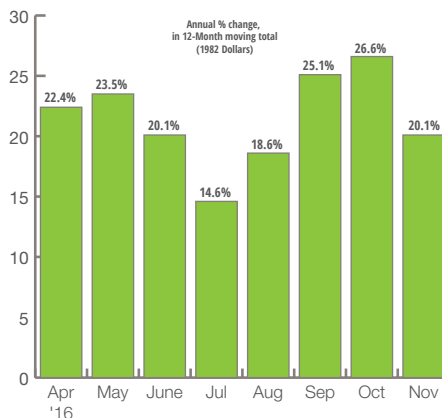
## Heavy-Duty Truck Shipments:

- U.S. Heavy Duty Truck Shipments during the 12 months through November are down 16.4% compared to the previous year.
- Negative quarterly trends suggest further decline is likely over the next quarter.



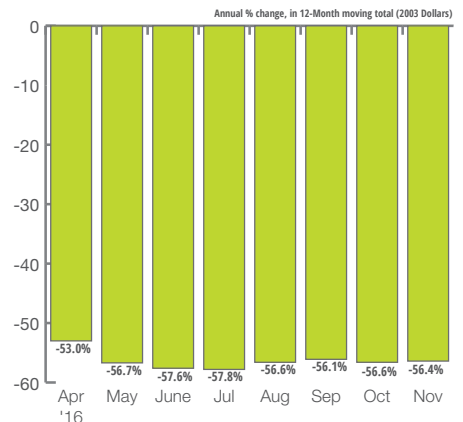
## Defense Industry, New Orders:

- The U.S. Defense Capital Goods New Orders increased 20.1% during the 12 months through November.
- Expect general growth in this segment during at least the next 2 years, albeit at a slower pace.



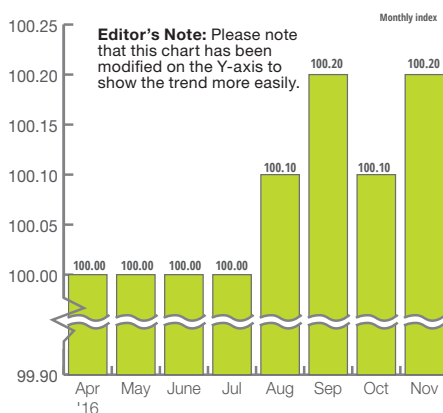
## Mining, Oil & Gas Field Machinery New Orders:

- The U.S. Mining, Oil, & Gas Field Machinery New Orders annual growth rate ticked up to -56.4% in November.
- General rise in this segment is likely but do not expect activity to return to 2014 peak levels in this cycle.



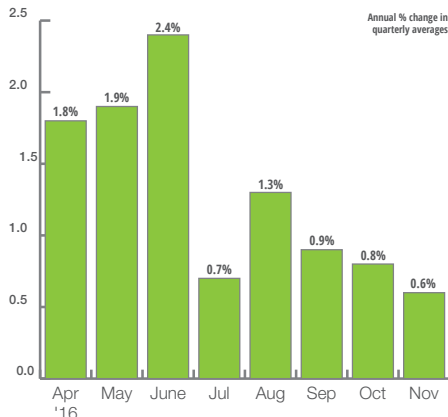
## Euro Area Leading Indicator

- The Europe Leading Indicator has been virtually flat since the beginning of 2016.
- Stability in the Leading Indicator signals that expansion in the European economy will likely be mild this year.



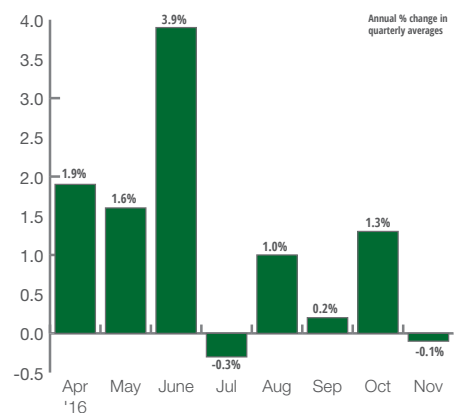
## Industrial Production, United Kingdom:

- The UK Industrial Production quarterly growth rate ticked down to 0.6% in November.
- Prepare for year-over-year contraction in the UK industrial sector by mid-2017.



## Industrial Production, Germany:

- Germany Industrial Production during the 3 months through November is virtually even with the previous year.
- Despite mild decline in the quarterly growth rate, 2017 will generally be characterized by growth.



# Testing Technologies of the Future, TODAY

**Development of a battery-electric, fully autonomous load carrier working as part of an electrified job site demonstrates the potential for improved machine efficiency, safety and emissions reduction.**

by Sara Jensen

**A**t CONEXPO-CON/AGG 2017, Volvo Construction Equipment (Volvo CE) debuted its HX2 concept battery-electric, fully autonomous load carrier. The HX2 is the next generation of concept machines the company has been developing as part of its electric site research project to demonstrate efficiency and emissions-reduction technologies. The project predicts up to a 95% reduction in carbon emissions and up to a 25% reduction in total cost of ownership can be achieved.

The HX2 is one of several electrically powered vehicles operating on the research site. Uwe Müller, Volvo CE's Chief Project Manager for the electric site project, says the ma-

chine is driven by two electric motors powered by a battery. An additional electric motor is used to drive the hydraulics system.

"By using electricity instead of diesel to power construction equipment in a quarry we have the potential to deliver significant reductions in fuel consumption, CO<sub>2</sub> emissions, environmental impact and cost-per-tonne," said Johan Sjöberg, Technical Specialist in Site Automation at Volvo CE, in a press release announcing the electric site project ([learn more, 12259925](#)). "The electrification of construction equipment will produce cleaner, quieter and more efficient machines – this represents the future of our industry."

In addition to battery-electric



The load carrier works in tandem with other concept vehicles on the project site which are tracked by a fleet management system to ensure efficient equipment flow.

operation, the load carrier is fully autonomous. It follows an adjustable, pre-programmed GPS path to maneuver around the job site. The HX2 is part of a complete job site solution; it works in tandem with an LX1 prototype hybrid wheel loader and grid connected excavator to complete daily tasks. Müller says the project's aim is to electrify a transport step in a quarry—from excavation to primary crushing and transport to secondary crushing. A fleet management system is used to track the vehicles and ensure efficient equipment flow.





### Enabling safer, more efficient work sites

A key development effort for this next generation HX load carrier, says Müller, is sharing technologies and components from within the Volvo Group such as electric motors, batteries and power electronics. The HX2 also has a completely new drivetrain integrated into it which he says “was key in order to take full advantage of the electromobility developments that are happening within the Volvo Group.”

Another new feature of the HX2 is the inclusion of a vision system,

which the previous HX1 did not have. The vision system is able to detect obstacles and humans within its vicinity, helping ensure safety for all on the job site.

Fully autonomous operation of the load carrier increases safety, as well, because it enables work to be completed in hazardous environments that might not otherwise be safe for humans to enter. In addition, it eliminates the potential for accidents caused by human error since the load carrier’s maneuvers are pre-programmed into its control system.

Other benefits Müller says the

HX2 offers include a lightweight design, improved efficiency and load capacity. Energy efficiency is higher than that of a traditional load carrier not only through the use of electric drives but also due to the HX2’s ability to recuperate energy as it travels downhill. Load capacity to machine weight on the HX2 is twice as high as it is on a standard load carrier, he says, which enables more material to be carried in fewer passes—aiding both productivity and efficiency.

The HX2 is four-wheel drive with four-wheel steering which Müller



**Volvo  
Concept  
Lab**

The HX2 load carrier will be similar to the previous HX1 model (pictured) but will now include a vision system to detect people and objects in its path.

says makes it an extremely maneuverable machine. In addition, it is capable of delivering the same performance whether it is moving forwards or backwards.

Modularly designed, the load carrier can be tailored to specific customer needs; if necessary, it could be built with two-wheel drive and two-wheel steering. "It's vital that the machine is modular because it isn't a one-size-fits-all solution," says Müller. "The machine, controls systems, charging systems, etc. will need to be adjusted to customer needs."

HX2 and the other concepts being developed for Volvo CE's electric site research project are part of the company's long-term future vision which Müller says have the potential to transform the quarry and aggregates

## Electric Site Research Project

Volvo CE began its electric site project in 2015 and anticipates completion in 2018. It is working together with customer Skanska Sweden, the Swedish Energy Agency and two Swedish universities. Development and testing of the technologies, concept and prototypes are being completed in-house by Volvo CE. At the end of 2018, Skanska Sweden will incorporate the demonstration machines into its operations and test the site concept at a quarry in western Sweden for 10 weeks.

The company says the work is just research and there are no current plans for industrialization. However, it also says collaborating on a project such as this with customers, government and academia enables it to invest in new technologies and explore solutions that are relevant to its customers and address future challenges.

### Learn about more of Volvo CE's prototype vehicles:

Volvo CE Unveils Prototype Electric Hybrid Wheel Loader

Search: [12261519](#)

Volvo CE Unveils Autonomous Concept Vehicles

Search: [12257909](#)

Volvo CE Debuts Prototype Autonomous Vehicles

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industry. "Volvo CE is committed to pushing boundaries and exploring the technology of the future," he

says. "The HX2 and the electric site project demonstrate how Volvo CE wants to work with its customers

early in the development phase to improve total site performance and sustainability while also saving customers money.

"By integrating customers in the development process, we can design the best solution for a task, application and environment together. The knowledge gained in the electric site project will be transferred to future Volvo CE development projects."



### Head to the Web

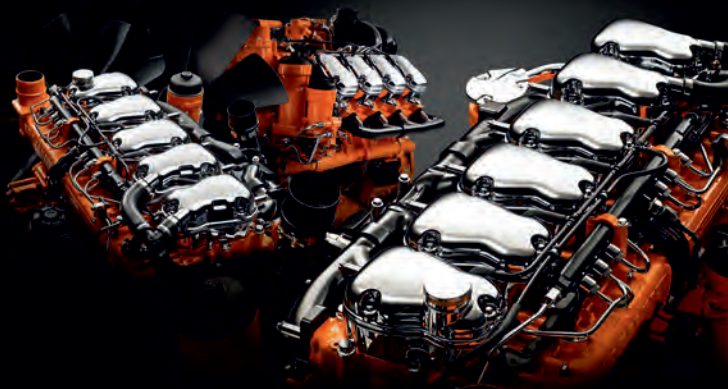
Read about the other Volvo machines at CONEXPO at [oemoffhighway.com/20849290](http://oemoffhighway.com/20849290).

See the machines in person in the Gold Lot at booth G3894 and the North Hall at booth N10036.

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# SIMULATED REALITY Brings Real-World Results

Advancements in virtual reality technology are providing new opportunities for improved operator training and machine design within the heavy equipment industry.

by Sara Jensen

**A**s the costs of virtual reality (VR) hardware and software have decreased in recent years, the technology's use within various industries has grown. The heavy equipment industry, for instance, sees the benefits it can provide, particularly to help provide training and improve safety on job sites.

VR—the computer-generated

simulation of a real-world environment or situation—provides an artificial experience which makes the user feel as if he or she is actually in the simulated environment.

At CONEXPO-CON/AGG 2017, Liebherr featured a VR experience which allowed attendees to step inside its 710 HC-L luffing jib crane currently working on the MoMA Tower in New York City ([learn more, 20847859](#)). Designed



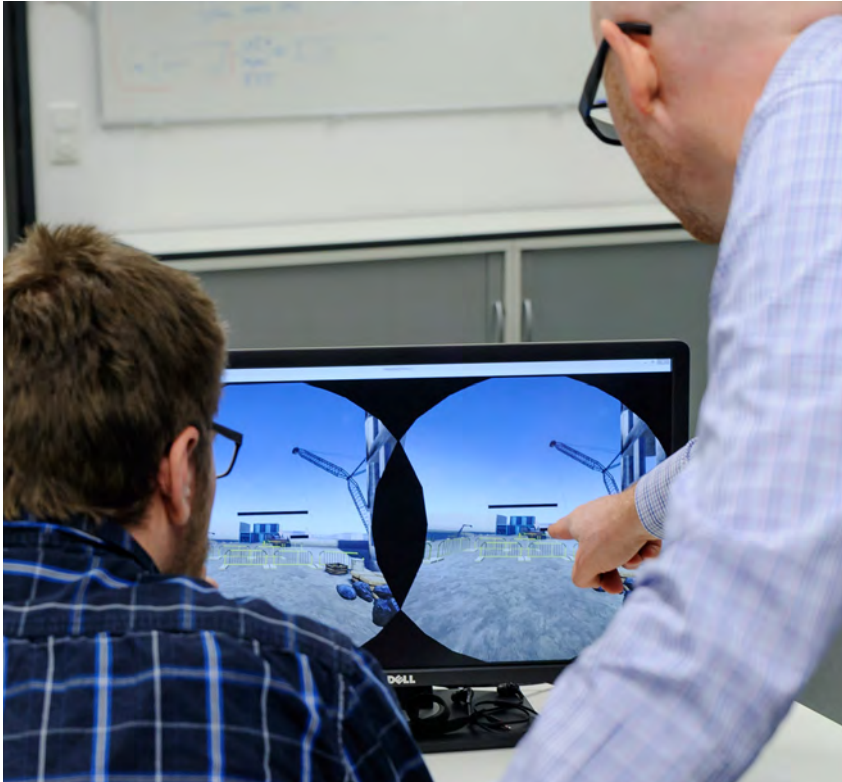
RUB, SCHIRDEWAHN

Fully-enclosed VR goggles and handheld control devices help completely immerse users in the virtual training environment.





The Rhur-University Bochum (RUB) VR technology replicates the actual site where trainees will work; real-world elements such as sound and machinery are included to create as realistic an experience as possible.



RUB, SCHIRDEWALD

RUB researchers used computer game technology to generate the virtual job sites on which users will be trained.

to offer a real-time perspective, the VR experience featured a game pad which could be used to explore the virtual, 3D world. Users could get up close to the crane's man-size hook, fly into the jib, or take in views of the surrounding city. In addition, different weather conditions and times of day could be experienced.

Currently, much of the VR tech-

nology being developed for the construction industry is for training purposes. By training workers in a virtual world, they can acquire the skills necessary to do their jobs in a safe environment. Simulators which place users in the driver seat of a machine is one of the forms this training technology can take (see *image*, pg. 23).

Ditch Witch is among the many OEMs who offer these simulators as a means of providing operator training on their machines. At CONEXPO, the company displayed its HDD virtual reality training simulator which is designed to simulate a real horizontal directional drill (HDD) work site (*learn more*, [20848380](#)).

According to Greg Wolfe, Ditch Witch Director of Training, the VR simulator builds upon the company's existing HDD training simulator. "With this new system, operators will be fully immersed within a virtual reality HDD job site experience," he says. The technology simulates a real job site where operators sit in

a virtual drill cab and use joystick controls to operate the drill in real-life environments.

"The simulator is as close as you can get to the actual operation, other than training on a real machine on a physical jobsite," says Wolfe. "Adapting the simulator into a virtual reality experience heightens the user's sensory factors to a different level in a 'non-dynamic' environment."

By training operators in a virtual environment, they and the surrounding equipment are not put at risk. Additionally, excess depreciation on the equipment is eliminated as it is not being used for both training and work tasks. Wolfe says the VR simulator also allows users to travel to another job site at any time by simply hitting a reset button, helping decrease the overall cost of training.

### Creating a safer work environment

Wolfe says the backbone of the Ditch Witch simulator technology is algorithms the company created 15 years ago for its first HDD simulator. The company worked on the VR simulators together with METECS, an automation, simulation and software company which has developed simulation products for NASA's training efforts.

The VR simulator provides training for the company's entire suite of HDDs and in various environments—from urban to rural. Wolfe says users will be able to control a drill unit exactly as it would be on a real-world job site, with the same vision points replicated on the simulator. "We have placed underground utilities within the expected path of the drill, simulating the need to avoid real jobsite challenges," he says. After each course, an overview is provided to give operators feedback on their performance which also includes steering and utility hits. "By addressing these mistakes in the simulator, the operator can learn from them and avoid similar mistakes as their training

### Virtual Reality for Design and Testing

Read the following articles at [www.oemoffhighway.com](http://www.oemoffhighway.com) to learn more about virtual reality's use within the -industry.

A case for broadening the use of virtual testing

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Technology advancements for now and the next 120 years

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Ditch Witch's virtual reality HDD training simulator will replicate actual job sites to provide a realistic machine operation experience.

progresses.”

Safety was the driving force behind Ditch Witch's creation of the VR training simulator, says Wolfe. Also underlying that benefit is the reduction in total cost of ownership for the equipment or job site owner. The number of mistakes made on the job can be decreased, and productivity increased, as there will be less of a learning curve once a new operator sits in an actual machine on the real job site.

Training on the simulators aims to connect classroom knowledge with operational experience, and provide an engaging format in which an operator can arrive on a job site with the confidence to handle a piece of equipment. “On-the-job training has been the primary method of training for decades, and we still incorporate

this component,” says Wolfe. “You combine this learned skill with our online Ditch Witch Certified HDD Training courses and we believe we've provided a product that helps improve productivity and jobsite knowledge to that participant before he or she is ever on an actual jobsite.”

Researchers at Rhur-University Bochum (RUB) in Germany are currently investigating the possibility of interactive training courses using

VR to increase safety on construction sites. Their goal is to have workers experience the various hazards they would encounter on a job site in order to sensitize them and ultimately prevent accidents from occurring.

Three-dimensional modeling using computer game technology enables the researchers to create the virtual world. To properly familiarize workers with the potential job hazards, the VR world is designed to be a replica of an actual site. Real-world elements such as sound, shadows and construction machinery are included within the virtual environment to provide as realistic experience.

Trainees wear fully-enclosed VR goggles to completely immerse them in the virtual world and use a hand-

### At CONEXPO 2017

**Liebherr: Gold Lot  
booth G4637**

**Ditch Witch: Central Hall  
booth C31927**



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held control device—similar to a remote control—to interact with objects.

The researchers see this technology being primarily beneficial to occupational health and safety planners as a supplement or replacement for printed training materials, presentations and films. Jochen Teizer, an internationally recognized safety expert for the construction industry aiding the research team, said in a press release that the paper and video training materials are on par with watching television as they tend to have a lower rate of success at lasting learning. In the future, the researchers believe all construction workers could be trained using VR technology and have it customized to individual needs and work tasks.

### More than just training

VR technology has been aiding the design and development of new

products for some manufacturers, as well. For instance, CNH Industrial's New Holland Agriculture and Case IH brands both have VR rooms at their U.S. headquarters. The rooms contain a large screen on which CAD models of component, system and full vehicle designs are displayed. Engineers wear 3D glasses or a virtual reality helmet to literally step into their designs to examine them from various viewpoints.

Having this capability helps development teams get a better understanding of how their designs will work. In addition, it can provide a means for teams in different parts of the world to more easily collaborate with one another. Each team can be located in its own VR room but be looking at the same CAD model at the same time, in the same manner and discuss in real-time the product being developed (see sidebar pg. 22

to learn more).

The gaming industry has helped to make VR technology more commonplace, which in turn has reduced its costs and enabled it to be more easily researched and applied to other industries. While the costs are still high, they will continue to go down as its use grows.

Much like younger generations' familiarity with video game controllers has influenced the evolution of machine controls, VR's increasing availability and use could also have an impact on the heavy equipment industry. Wolfe says the Ditch Witch VR training simulator was developed to take advantage of the tech-savvy generation of operators entering the industry. "HDD operators are in high demand, and this virtual reality simulator technology engages with that next generation of drill operators entering the market," he says. "Con-

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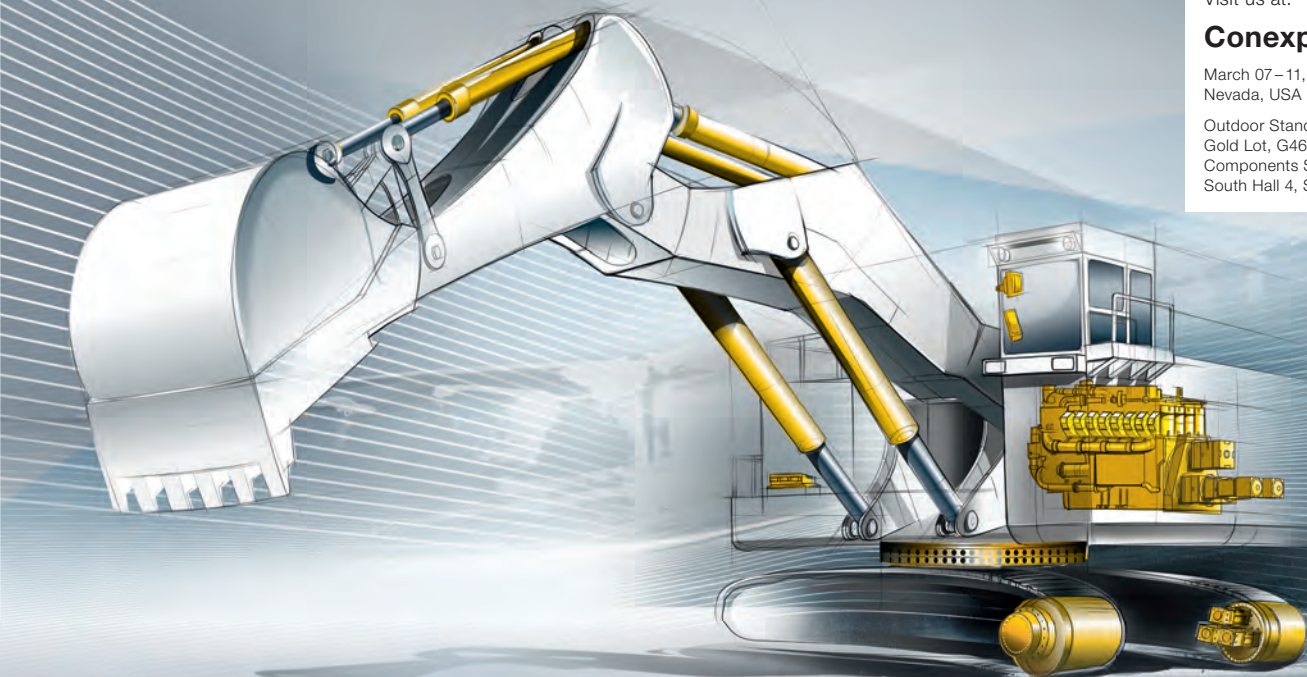


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## Components

tractors need to find available talent and utilizing virtual reality capabilities in training and other areas provides a direct link to emerging talent without the risks associated with more traditional training methods.

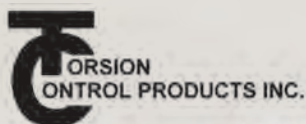
"Virtual reality will be an important component of Ditch Witch's training program in the future, and

we see opportunities to expand the technology into other product areas," Wolfe continues. "Any technology that helps improve safety and productivity are constantly evaluated."

As a demonstration of further ways Ditch Witch looks to utilize VR, it used the technology as a means of

introducing its next generation drill, the JT40, at CONEXPO. Through the VR system, visitors to the company's booth were able to experience the new drill in actual environments to get a better understanding of how it can actually be used.

"As these technological capabilities increase, we fully predict virtual reality will become a critical component for training in the industry along with other applications to introduce our industry to the next-generation workforce," Wolfe concludes. **I**



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**Read about more companies within the heavy-duty equipment industry using virtual technology in various ways.**

John Deere Exhibiting 38 Machines and Virtual Reality Experience at CONEXPO 2017

Search: [20850629](#)

CONEXPO booth N12525

Mack Trucks Uses Virtual Reality to Demonstrate Vehicle Technologies

Search: [12237210](#)

CONEXPO booth S61107

Trelleborg Launching New Virtual Reality App at EIMA 2016

Search: [12273120](#)

CONEXPO booth C22921

Bosch Rexroth Offering Virtual Reality Technology to Provide Immediate Support

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CONEXPO booth S80214

Meritor Launches Virtual Reality App to Highlight Drivetrain Technologies

Search: [20850206](#)

CONEXPO booth S85106

**Watch a video of the Rhur-University Bochum (RUB) researchers' virtual reality training environment.**

Search: [20850305](#)



# THE TRUTH ABOUT IF/VF TIRES

As OEMs continue to introduce larger, heavier and more powerful equipment each year, tire manufacturers have had to develop new technologies that allow the same size tire to carry heavier loads at lower inflation pressures — thereby reducing soil compaction. However, with a range of new tire classification acronyms — like IF, VF, CFO and LSW — there's still confusion about the differences, the intended uses and the benefits of each. If not maintained properly, end users often spend an additional \$6,000 to upgrade tires without seeing any benefit whatsoever.

## THE PROBLEMS WITH IF AND VF

IF and VF technologies are only effective at reducing soil compaction when properly inflated to minimum inflation pressure for the specific load and application. However, industry research\* indicates that approximately half of growers adjust inflation pressure as little as twice per year or less. Furthermore, the increased sidewall flexibility could lead to problems with road lope and power hop. The best way to quickly reduce road lope and power hop is to increase inflation pressures. But by doing so, the grower loses the benefits of the premium technology he or she invested in.

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## TAKEAWAYS

- IF and VF are only effective at reducing soil compaction when frequently adjusted to lowest allowable inflation pressure for the load and application.
- IF and VF are more prone to road lope and power hop than LSW.
- LSW incorporates all the benefits of VF and CFO, but provides added stability, which reduces power hop and road lope, and allows for maximum transport speeds.

Learn more at [LSWadvantage.com](http://LSWadvantage.com)

\*Survey sent to 24,981 growers with less than 2,000 acres and 9,411 growers with more than 2,000 acres in April 2013. A total of 1,044 growers completed the survey.



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## EQUIPMENT LAUNCHES

www.oemoffhighway.com/ifpe-conexpo

# It's Time for the BIGGEST Show of 2017

CONEXPO-CON/AGG and IFPE 2017 unleashed a slew of new technologies, new equipment and the future of the industry.

by Michelle Kopier

**T**here is no greater show for the construction industry in North America than CONEXPO-CON/AGG in Las Vegas, NV. It is the show in which all of the major equipment manufacturers have their latest creations and advancements on display.

At IFPE 2017, the technologies of the present and future of the off-highway vehicle market showed the industry the direction of vehicle development and capabilities. Here is just a sampling of the dozens of vehicles and technologies that were on display at CONEXPO-CON/AGG.

For more on IFPE 2017, see the flip side of the issue.

## John Deere Exhibits 38 Machines and Virtual Reality Experience North Hall Booth N12525

Over 38,000 sq.-ft. of exhibition space housed 38 machines along with 11 John Deere simulators.

The 38 total machines on display at the booth included articulated dump trucks, backhoe loaders, compact track loaders, crawler dozers, excavators, motor graders, scraper systems, skid steers, tractor loaders, wheel loaders, and numerous attachments.

One of the vehicles, the updated John Deere 85G excavator ([learn more, 20851493](#)) boasts features such as hand-controlled proportional auxiliary hydraulics and the ability to be equipped with a hydraulic coupler

that allows the machines to use backhoe buckets. The 85G boasts a 57 hp Tier 4 Final diesel engine outfitted with a diesel particulate filter (DPF) that cleans automatically without impacting the machines' productivity.

Also on display was John Deere's new 844K Series-III and 844K Series-III Aggregate Handler wheel loaders ([learn more, 20847871](#)).

The new wheel loaders offer a 13.5 L John Deere PowerTech Tier 4 Final diesel engine that delivers 380 hp for the 844K-III and 401 hp for the Aggregate Handler configuration. A standard five-speed transmission with torque-converter lockup in gears two through five increases acceleration, speeds and cycles, and optimizes power and fuel efficiency. |



**ABOVE:** John Deere introduces 844K-III and Aggregate Handler configuration to wheel loader line-up.

**RIGHT:** The John Deere 85G excavator features hand-controlled proportional auxiliary hydraulics to operate attachments and a 57 hp Tier 4 Final engine.



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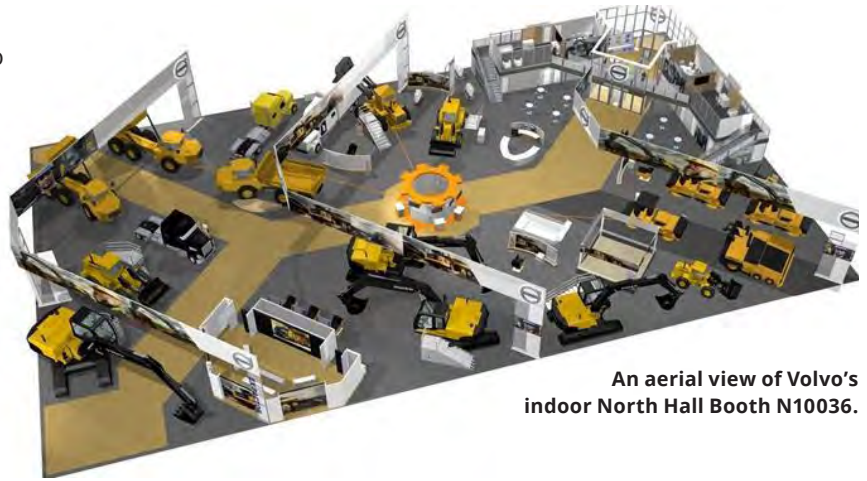
### Volvo Debuts Articulated Hauler — Highlights Intelligent Systems

#### North Hall Booth N10036

Volvo showcased its new intelligent operator systems, machine monitoring technologies, and unveiled a range of new technologies and services, the most notable of which was its ActiveCare Direct and Dig Assist.

Dig Assist allows the excavator operator to set job parameters, such as target depth and grade; conduct In-Field Design; and view job progress in real time, ensuring the work meets exact specifications. Dig Assist is the latest addition to the suite of Volvo Assist programs—which also includes Compact Assist and Load Assist—providing real-time intelligence to the operator in terms that are easy to understand and directly tied to job quality.

Also on display was the Volvo Co-Pilot interface—a scalable,



An aerial view of Volvo's indoor North Hall Booth N10036.

glimpse of future Volvo Assist Co-Pilot programs to be rolled out for soil compactors and articulated haulers.

Among the 26 machines on display were the Volvo A60H, the world's largest articulated hauler; the EC750E, the latest and largest excavator available from Volvo in North America; never-before-seen wheel loaders; and the HX2, a concept

showcased by a gold-painted A40G articulated hauler, which was recently auctioned at Richie Bros. with proceeds benefitting SkillsUSA and Skills/Compétences Canada — organizations dedicated to improving the skill level of North America's workforce.

VOLVO CONSTRUCTION



Volvo Construction Equipment's Dig Assist in action.



The new Volvo A45G.

### Volvo's New A45G Articulated Hauler

Volvo's newest addition to its G-Series line—the A45G—is capable of 45 tonne (T) payloads, but is built upon a dimensionally smaller, lighter and more agile platform than other 45-T trucks making it more nimble, off-road capable and fuel efficient (*learn more, [20849295](http://20849295)*).

The three smallest of the G-Series haulers now have a 1-T higher capacity than before, including: Volvo A25G at 27.5 T, A30G at 32 T and A35G at 38 T. The

A40G remains at 43 T, and the new A45G/A45G FS has a 45-T capacity. The A45G and A45G FS are powered by the latest Volvo D16, 16-L, Tier 4 Final engine, which boasts 469 hp (350 kW). **I**

Android-powered tablet computer that was recently named as the 'Most Innovative Human-Machine Interface Feature' at the 2016 Car HMI (*learn more, [12225013](http://12225013)*). Booth visitors were also able to get a

battery-electric, fully autonomous load carrier, making its first public appearance.

The show concluded Volvo's year-long celebration of the 50th anniversary of the articulated hauler,



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### Doosan Exhibits a Variety of Machinery

#### Gold Lot Booths G4476 & G4876

Doosan's exhibitions included crawler and wheel excavators, wheel loaders, articulated dump trucks (ADTs), as well as log loaders, and a variety of attachments for use with excavators and wheel loaders (*learn more*, [20847273](#)).

Doosan's excavators range from the 6-metric-ton DX63-3 to the largest model, the 54-metric-ton DX530LC-5. Two Doosan models are designed with reduced tail swing for operation on confined jobsites.

Hydrostatic transmissions have been incorporated in two smaller Doosan wheel loader models—the DL200-5 and DL200TC-5—for improved fuel efficiency and precise operation. Key features of the hydrostatic drive include dynamic braking and speed management. The latter is beneficial when operating attachments that require high auxiliary hydraulic flow at slow travel speeds.

#### Articulated dump trucks

Moving more material in less time is just one of the benefits of the

Doosan's DX380LL-5 log loader (bottom left) and DL300-5 wheel loader are just a couple of the many vehicles that were on display at CONEXPO-CON/AGG 2017.



DOOSAN CONSTRUCTION EQUIPMENT

dash-5 Doosan ADTs. The machine is designed to maintain tire contact with the ground at all times due to the machine's tandem rear bogie, front-mounted turning ring, sloping rear frame and front suspension. Doosan ADTs offer permanent, six-

wheel drive that provides traction in all applications.

#### DX380LL-5 Log Loader

Designed for demanding logging applications and tasks such as shovel-logging, sorting and log-load-

ing, the newest Doosan log loader—the DX380LL-5 log loader—weighs approximately 113,500 lbs. (51,482.73 kg) and is powered by a Tier 4-compliant, 318 hp (237.13 kW) diesel engine.

Featuring high swing torque, and powerful hydraulics, the DX380LL-5 is primed for peak performance when working on forestry tracts. Doosan 360-degree rotating log grapples are commonly paired with the log loader's live heel to efficiently lift, rotate, move and place logs. |





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## EQUIPMENT LAUNCHES

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### Keestack Showcases New, Fully-Automated H4 Tracked Cone Crusher with Hybrid Diesel-Electric Drive Concept

#### Central Hall Booth C33043

The light and compact H4 Tracked Cone Crusher by Keestack features the KT-H4 cone crusher, adapted and supplied by a world-leading cone specialist (*learn more, [20851233](http://20851233)*). The fully automated unit produces up to 250 tph at maximum feed sizes of 7 in. (17.78 cm). The wide variety of concaves allows a high flexibility in secondary or tertiary production of highly defined end fractions.

The Keestack H4 features a hybrid diesel-electric drive concept (345 kW Diesel [Tier 4 Final]/330 kVA Genset/135 kW Edrive for crusher). This guarantees economic fuel consumption and ease of maintenance through the wide use of electric motors on screens and conveyors.

The recently introduced full-hybrid version H4e even allows full electric operation through mains or an external gen set. An additional electric motor/hydro pump then supplies the hydraulic driven feeder, the secondary screen module, the tracks and all hydraulic cylinders.

High production rates and a great versatility regarding materials and end products make impact crushers increasingly the technology of choice for efficient mobile recycling applications. Keestack thus optimized its impactor range in terms of transport

weights, ease of operation and maintenance. The use of high-strength steel qualities in machine frames and superstructures effectively reduces weight without compromising the static qualities or machine lifetime. Intelligent monitoring and control systems guarantee trouble-free operation even in heterogeneous material mixes. |



Keestack's new H4 tracked cone crusher is fully automated and features a hybrid diesel-electric drive concept for improved fuel consumption and maintenance.

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## Avant Tecno USA Exhibits Multi-Functional Loaders

### Gold Lot Booth G1628

Avant Tecno USA—celebrating its 5-year anniversary in North America—debuted its full line of multi-functional loaders at its first CONEXPO-CON/AGG show (*learn more, [20851288](http://20851288)*).

The North American team of Finland-based Avant showcased Avant's 200, 400, 500, 600, and 700 Series loaders along with various attachments suited for professionals in the construction, demolition, landscaping, and mining markets.

Able to utilize a multitude of attachments, the versatile compact Avant loaders work in a variety of configurations including concrete mixers, soil screening buckets, vibrating plate and brick paver installation clamp for construction projects; hydraulic breakers, cutter crusher, and an asphalt grinder for demolition jobs.

The compact and lightweight styling of the Avant also makes it ideal for work inside buildings. Avant loaders can be lifted onto the roof, take the freight elevator to the basement, and generally perform construction and demolition tasks in tight spaces that usually requires manual labor. The hydrostatic drive system, offset telescopic boom providing great visibility, and multi-function joystick give full precision control for the best possible results.

Avant's five-model series offers the same compact, articulated, multi-purpose solutions for many types of projects in every season. These versatile machines have multiple cab options, provide excellent lift to weight ratio, and offer low operating and maintenance costs. |

For more equipment and technology launch news from CONEXPO-CON/AGG 2017, head online to [www.oemoffhighway.com/ifpe-conexpo](http://www.oemoffhighway.com/ifpe-conexpo).



AVANT TECNO USA

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## EQUIPMENT LAUNCHES

www.oemoffhighway.com/ifpe-conexpo



At CONEXPO-CON/AGG 2017, Liebherr exhibited a variety of products including the North American debut of its R 920 compact litronic crawler excavator.

### Liebherr Exhibits Extensive Product Line and Components

**Gold Lot Booth G4637 & South Hall Booth S84230**

During CONEXPO-CON/AGG 2017, Liebherr presented an extensive selection of its earthmoving, material handling and construction equipment product range with more than 25 pieces of equipment at its outdoor booth.

The company rolled out its XPower wheel loaders with an innovative power-split driveline concept. XPower is an integrated, innovative machine concept for the large series of wheel loaders with operating weight from 39,020-71,870 lbs. (17,699.17-32,599.68 kg). The concept sets new standards in terms of fuel efficiency, performance, robust design and comfort.

The core of the XPower is the Tier 4 Final/Euro Stage IV power-split driveline installed as standard. It

combines hydrostatic drive, which is ideal for short loading cycles and mechanical drive for long distances and when driving on slopes. The combination of these two drive types in a single wheel loader ensures maximum efficiency and outstanding fuel savings in multiple applications. Liebherr XPower wheel loaders deliver standard power-split transmission and 30% fuel savings.

Liebherr also presented the LH40M and LH22 handlers for the material handling industry. The LH 40 M features an Energy Recovery Cylinder (ERC) that reduces fuel consumption by up to 30%. It promotes faster cycles and greater handling capacity. The LH40 is powered by a Tier 4 Final/Stage IV engine developed and manufactured by Liebherr with an output of 208 hp (155 kW) at 1,800 rpm (SAE J1349). Multiple options and configurations are available to provide the best solution for every

application; from undercarriages to cab options to attachments.

Also on display was the LH 22 M Handler. This machine is powered by a 4-cylinder Liebherr engine with 134 hp (100 kW) at 1,800 rpm and has an operating weight of 50,500 lbs. (22,906.42 kg).

Both handlers come equipped with LiDAT, Liebherr's own comprehensive machine management system for the secure, reliable transmission and analysis of machine data. Based on an ultra-modern communication technology, LiDAT supplies the information needed for machine location and operation, and thus permits efficient remote control of management, task planning and fleet monitoring.

### The A 918 Litronic Excavator

Remarkable high lift capacities, top digging performance and excellent travel are features of the A 918 excavator. With an operating weight



between 38,800 and 43,600 lbs. (17,599.38 and 19,776.63 kg), and an engine output of 161 hp (120 kW) the A 918 is the ideal machine for classic earthmoving, road construction or water infrastructure and pipeline works.

#### **The R 920 Compact Litronic Crawler Excavator**

The new Liebherr R 920 Compact crawler excavator is powered by a Tier 4 Final/Stage IV engine with 136 hp (100 kW) and has an SCR system with urea injection and oxidation catalyst. The particulate filters are optionally available.

The R 920 Compact combines the properties of a standard crawler excavator, such as high performance and versatility of a compact machine. With a short tail swing of only a 6 ft. (1.83 m) radius, the machine can be operated effectively

on construction sites where space is limited. The dimensions of the R 920 Compact ensure unrestricted movement around the jobsite and easy transportation from one site to another.

#### **World Premiere of Liebherr's Rough-Terrain Cranes**

Liebherr extended its mobile crane product range with an additional series of rough-terrain cranes in the 100 US T (90-metric ton) and 110 US T (100-metric ton) classes. High safety levels in every respect were the main priority for the design of the new Liebherr LRT cranes. Both new crane models feature an outrigger monitoring system as standard. The support status, on tires or outriggers, is detected automatically and saved to the crane controller. The attachment of the ballast to the turntable and the installation of the optional

double folding jib, including its angle adjustment, are also recorded and monitored.

The 110 US T (100-metric ton) LRT 1100-2.1 has a 164 ft. (50 m) telescopic boom with a "Telematik" telescoping system on which the various telescoping sections can be extended independently with a single cylinder and then pinned to the telescopic section above. The 30,800 lbs. (14-metric ton) of counterweights ensure high stability.

The lifting capacity of the LRT 1100-2.1 is around 15% higher than the 100 US T (90-metric ton) model which features 26,500 lbs. (12-metric ton) of counterweights. The LRT 1090-2.1 features a 154 ft. (47 m) telescopic boom. Its telescoping system consists of a two-stage hydraulic cylinder with a rope extension mechanism (*read more on Liebherr's CONEXPO line-up, [20847859](http://20847859)*). |

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More information at:  
[www.cabconceptcluster.com](http://www.cabconceptcluster.com)



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## EQUIPMENT LAUNCHES

www.oemoffhighway.com/ifpe-conexpo



Hydraulic Excavator

CATERPILLAR INC.

### Caterpillar's Line-Up Includes 40 Machines and Two Exhibit Areas North Hall Booth N10924 & Gold Lot Booth G4490

At CONEXPO-CON/AGG 2017, Caterpillar presented its extensive line of machines and technology with 40 machines on display in two different exhibit areas totaling 60,000 sq. ft.

Cat Connect Technologies for machine control and monitoring shared the spotlight with the iron it enhances—ranging from a skid steer loader to a 96-T excavator.

Eight Cat machines made their public debut at CONEXPO including excavators, wheel loaders, a dozer, an articulated truck, a telehandler and cold planers. Caterpillar also introduced new remote control technologies and connectivity technologies at the show.

New machines on display included the M317F Wheeled Excavator (*pictured on page 41*), a compact radius design that expands versatility and enhances productivity in tight work areas.

The 390F and 336F XE Excavators, both with crawler undercarriages, have been updated to deliver improved productivity and lower costs. The 390F

can be equipped with the industry's only integrated payload system for accurate truck loading. The 336F XE has the payload system as standard equipment, as is 2D GRADE—with the option of a number of integrated Cat Connect grade control systems.

Cat's new 986K on display replaces the H Series model and delivers lower cost per ton in earthmoving and aggregates operations. The 950 GC made its North American debut in the Gold Lot, where it was displayed alongside the full-featured 950M. In addition to the 950M, the 972M XE and 982M (*pictured on page 41*) were on display.

The new 745 Articulated Truck includes an all new cab with enhanced visibility. Innovative machine control features further improve operator efficiency and safety. The new stability assist system reduces the risk of rollovers, and the new Economy Mode reduces fuel consumption.

The updated D6T Dozer features a new transmission and new Auto Shift system that allows the D6T to achieve fuel savings on the order of 20%, compared with the previous model. Fuel savings can increase to as much as 30% in light-load and finish-grad-

ing applications. The fully automatic system maintains production while optimizing fuel efficiency. Additionally, the updated D6T is now equipped with GRADE with Slope Assist as standard equipment.

In the Gold Lot exhibit, an operator station enabled remote control of a D8T dozer in Peoria, IL. The new Cat Command remote control system for the D8T offers a choice of two operator interfaces—a portable Operator Console designed for line-of-sight use and an ergonomically designed Operator Station that can be located remotely when the dozer is equipped with the Command Vision System. Wireless connectivity enables the operator to work from a safe location, whether nearby or far away.

The full line of Cat paving products was represented at CONEXPO, with emphasis on three new cold planers—PM825, PM622 (*pictured on page 41*) and PM312. The new PM800 Series complements the previously released PM600 Series and features increased engine power for demanding applications (*read the full report on Caterpillar at CONEXPO, [20847195](#)*). |



Cat PM622 Cold Planer



Cat M317F Wheeled Excavator



Cat 982M Wheel Loader



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At ConExpo 2017, we are pleased to introduce our Expanded Hall Effect, Pushbutton and Joystick product lines; our new CANbus Keypads and Joysticks designed for ISO 13849 rated vehicles; and our new Touch Encoder which combines the Touch Display versatility with Rotary Encoder functionality. To learn more, visit [www.grayhill.com](http://www.grayhill.com).

**Grayhill**  
Intuitive Human Interface Solutions



South Hall 4  
Booth S84905

# Advanced Technology Launches

**CONEXPO-CON/AGG 2017 is more than equipment. The show is also rich with advanced technologies that highlight the direction of equipment development.**

**E**very 3 years, equipment manufacturers and users from around the world get to peruse the latest vehicles and technologies that will make the worksite safer, more productive, more fuel efficient and environmentally friendly.

The continued demand for vehicle performance means product development team members are constantly seeking new ways to enhance features of different vehicle sub-systems. Head online for more technology insights from CONEXPO-CON/AGG 2017 at [www.oemoffhighway.com/ifpe-conexpo](http://www.oemoffhighway.com/ifpe-conexpo).

## BKT Displays Earthmax Tire Range at CONEXPO 2017

**Central Hall Booth C22020**

BKT displayed the top-of-the-range tires of its Earthmax tire lineup for construction, mining and earthmoving vehicles at CONEXPO.

The BKT tires are designed for the purpose of favoring best load distribution on the ground when fitted on dumpers, wheeled loaders, dozers or graders.

All Earthmax patterns have a common feature: the all-steel structure conferring major resistance to the casing and hence against impacts such as punctures and penetration of foreign matters. These features are of essential importance when facing obstacles on the ground, which might expose the tire to the serious risks of puncture or casing deterioration.

The Earthmax lineup satisfies user needs on difficult terrains such as those belonging to large construction sites, quarries, pits and mines.

Yet, the most spectacular tire in the Earthmax range, is Earthmax SR 45 Plus with its stunning diameter dimensions of 106.4 in., or 2.70 m (size 27.00 R 49). Specifically engineered for rigid dumpers, this giant radial tire is ideal for long-haul operations. Additionally, the strong all-steel casing structure

ensures excellent stability and makes it particularly resistant to any kind of impacts ([read more, 20850957](#)). |



## Hirschmann Launches Phase II of PRS90 Indicator at CONEXPO 2017

**Gold Hall Booth G72715**

Hirschmann MCS provides crane operator aids, control systems, and sensors including load moment indicators, wireless/wired load, angle, and anti-two block systems for mobile cranes. These systems and sensors meet OEM and retrofit requirements in lifting applications.

At CONEXPO 2017, Hirschmann MCS launched Phase II of the PRS90 indicator which offers both wireless and hardwired system options ([learn more, 20849842](#)). The PRS90 system features a 4.3 in. (10.92 cm) color graphic display that monitors and displays up to eight sensors at one time.

Also on display was the qSCALE I2/I3 load moment indicator (LMI) featuring advanced software capabilities, simplified calibration, and superior HMI graphic interface with 4.3 in. and 7 in. (17.78 cm) color display options. Hirschmann also featured the consoles, controls and sensors from the iSCALE Control System that can be used in any application. |



## Groeneveld Launches Progressive Lubrication Systems to North American Market at CONEXPO 2017

South Hall 2 Booth S65718

At CONEXPO 2017, Groeneveld Lubrication Solutions showcased its entire product range featuring the best solutions for automatic lubrication, oil management and safety support systems especially developed for the construction and on-road industry.

### The perfect lubrication solution for every application

Uptime of the equipment is a crucial element in the construction and mining industry to maintain the often occurring 24/7 operation. Therefore, automation of the lubrication process and oil management is a logical step, and one with a quick return on investment.

The Groeneveld booth promoted the entire product ranges - from the XS for smaller machines like mini-excavators and small wheel loaders, up to the unique Twin dual-line lubrication system for larger machines - all designed to reduce repair and maintenance costs, and lower the grease consumption (*read more, [20849641](#)*). |



See Eberspächer heaters at



Booth # B-8711

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## TECHNOLOGY LAUNCHES

www.oemoffhighway.com/ifpe-conexpo

## CrossControl Launches New Controller Platform with More Flexibility and Interface Configurability Bronze Hall Booth B91913

CrossControl (formerly maximatecc) is launching a new platform of controller products, featuring highly configurable I/O interfaces, flexibility in Master/Slave role assignment and variation in I/O count per device ([learn more, 20846741](#)).

All configuration is software based and the platform uses CODESYS for configuration and application programming. The platform enables OEMs and system designers to design modular control systems where it is easy to handle optional features and variations across a wide equipment product range. The modular approach takes down system cost, and software re-use means engineer-

ing time and cost can be reduced significantly.

CrossFire SX is a versatile I/O controller that is freely configurable as Master, Slave or Smart Slave. With the Smart Slave configuration a slave can be programmed to perform closed loop control tasks. It has 40 I/O channels that can be set up for virtually any sensor or actuation device.

CrossFire IX is a compact slave I/O device with 14 I/O channels, offering a very affordable addition of I/O channels when the task does not require the larger CrossFire SX. It also features optional data storage capabilities and a WiFi interface that can be used for e.g. connecting a Smartphone to the system, for presentation of system information locally and for transferring production data to the cloud. **I**



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## Grayhill Introduces New All-In-One Touch Encoder and Concept Armrest at CONEXPO 2107

South Hall 4 Booth S84905

Grayhill Inc. exhibited at CONEXPO in Las Vegas, NV, from March 7-11, 2017 ([learn more, 20850155](#)). CONEXPO is the largest construction and aggregate tradeshow in the U.S., displaying the latest off-highway machinery, engines and components, and equipment used in aggregate processing and manufacturing.

Products Grayhill displayed at CONEXPO 2017 include:

- Expanded Hall Effect, Pushbutton and Joystick Products.
- New line of CANbus Keypads and Joysticks designed for ISO 13849 rated vehicles.
- New CANbus Displays (5, 7, and

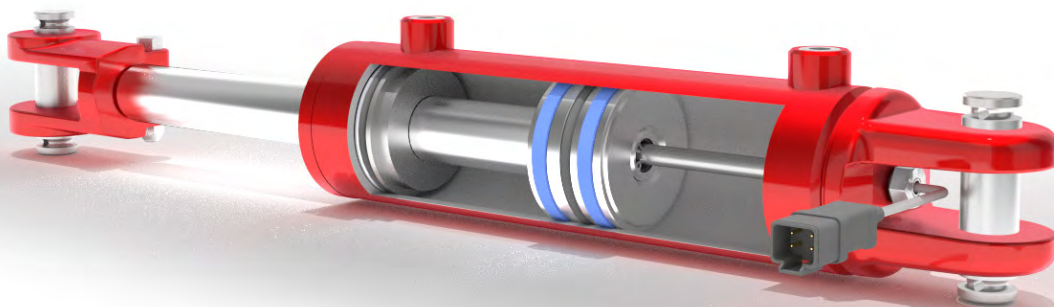


## Rota Introduces New Position Sensor Features at CONEXPO/IFPE 2017

### South Hall 4 Booth S84130

Rota Engineering Ltd. unveiled new position sensor features for hydraulic cylinders at CONEXPO/IFPE 2017 (*learn more, [20842242](#)*). These sensors have been designed for ultra-robust environments where the smallest size footprint is required to maintain critical pin-to-pin dimensions of existing cylinders. These sensors are used on mobile cranes, forklifts, telehandlers, scissor lifts, loaders of all kinds, etc. where knowing the cylinder position adds to safety or efficiency.

The latest feature released is a field calibrateable sensor. This sensor allows for end users to override the factory calibration and select any portion of the active stroke zone to output a full scale signal to achieve maximum resolution. This feature coupled with the field installable mechanical package allows ultimate flexibility for the OEM, or dealer network, to stock sensors for applications where a smart cylinder is an option. |



10.4 in. [12.7, 17.78, 26.41cm]) with updated electronics and improved display performance.

- Introduction of all-in-one Touch Encoder that seamlessly integrates the versatility of a touch display with the functionality a rotary encoder, resulting in an all-encompassing, futuristic intuitive user interface experience for the next generation of vehicle display control.
- Introduction of a new concept armrest. This innovative system features a CANbus touch display, a touch control panel with in-mold electronics technology, and demonstrates the integration of the new Touch Encoder. |

### More technology launches online

Get the latest CONEXPO & IFPE technology launch information as it happens online at: [www.oemoffhighway.com/ifpe-conexpo](http://www.oemoffhighway.com/ifpe-conexpo).



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## NEW PRODUCTS

[www.oemoffhighway.com/ifpe-conexpo](http://www.oemoffhighway.com/ifpe-conexpo)

## Indexing Plunger Latch Mechanisms with Rest Position

**Bronze Hall Booth B90106**

J.W. Winco Inc. announces it now has available GN 417 Metric Size Zinc Die-Cast Indexing Plunger Latch Mechanisms with Rest Position.

- RoHS compliant
- For applications where the plunger has to stay in its retracted position
- Design of the holes/slots allows for fixed or adjustable mounting of latch mechanism base onto Tubing or T-slot aluminum structures
- Receptacle for Indexing Plunger Latch Pin with adjustable slots in base is available upon request
- Plunger housing is zinc die-cast with black plastic coated textured finish
- Plunger pin and spring are stainless steel

[oemoffhighway.com/12272751\\_](http://oemoffhighway.com/12272751_)



## Absolute Rotary Encoders with CANopen Interface

**South Hall 4 Booth S84150 -**

POSITAL's IXARC high-precision magnetic absolute rotary encoders are now available with CANopen interfaces.

- For applications in vehicles, mobile machinery, cranes, lifts and offshore equipment
- Communication interface features autobaud function for direct connection to CANopen network without need to manually set transmission speeds
- Single- and multi-turn models are available
- Diagnostic LEDs show device status
- Variety of connection options are available, including cables of various lengths and radially or axially oriented M12 or M23 connectors
- Housings with bus-in/bus-out connectors are available for applications where it is convenient to connect several devices in series (daisy chain)

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## EXTREME VIBRATION LED WORK LIGHTS

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## Head to the Web

Find more new CONEXPO/IFPE products at [oemoffhighway.com/ifpe-conexpo](http://oemoffhighway.com/ifpe-conexpo).



## EPDM- and Nylon-Core SCR Hoses

### South Hall 3 Booth S80242

The Parflex Division of Parker Hannifin Corp. now offers a standard line of SCR Hose for on-vehicle DEF transfer with EPDM or nylon core tubes to meet new Tier 4 specifications being implemented in 2018.

- Heated hoses designed for heating and conveying DEF throughout SCR (selective catalytic reduction) system on commercial vehicles
- Eliminates problems associated with low ambient temperatures, such as condensation, coagulation or freezing of liquids within hose
- Locks in heating elements with patented, extruded sheath for added protection and long-lasting uniform heating
- Assemblies are optimized based on customer performance requirements and dosing system specifications
- Thermal performance is balanced to ensure even heating throughout assembly length
- Power densities can be customized for different dosing control systems
- Thaw performance and final hose assembly lengths are limited only by maximum available power of the dosing system
- Standard assemblies are available with 4 mm/0.16 in. (EPDM core), 5.5 mm/ 0.22 in. (EPDM core), or 6 mm/ 0.24 in. (nylon core) I.D.
- Each assembly is electrically tested, pressure tested and cleaned before shipment

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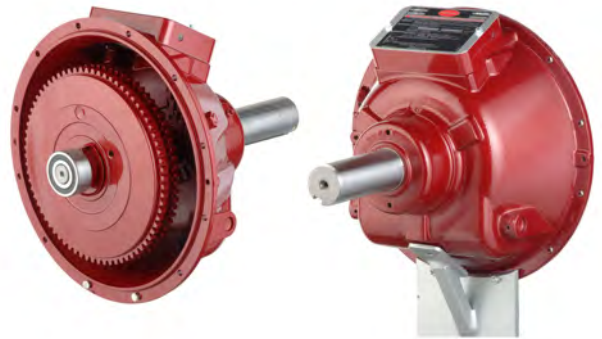
## Remote Over Center PTO

### South Hall 4 Booth S85515

Twin Disc has debuted its RO 114/214 "Remote Over Center" PTO.

- Leverages patent-pending design to remotely engage over-center mechanism
- Complimentary to previously released RO 111/RO 211
- Can be engaged and disengaged remotely via control valve and/or electronic control when complex machinery configurations or location hinder easy access to activation
- Hydraulic or pneumatic actuation is achieved through ports, making access to fittings uncomplicated and straightforward
- Hydraulic or pneumatic pressure is required only to engage or disengage the PTO
- Fluid or air supply can be shut off when not needed
- More efficient by eliminating need to have constant hydraulic or pneumatic flow
- Allows for side load and inline applications
- External cooling, filtration or rotary union are not needed

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## EXPERIENCE THE LATEST SPAL TECHNOLOGIES AT CONEXPO, BOOTH B92112

### BLOWER BENEFITS:

- Enhanced wheel design with reduced noise levels
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- Available in dual and single scroll designs
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- IP68 & IP6K9K sealed motor with internal electronics
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## NEW PRODUCTS

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## Dual-Stage Fuel Filters

**South Hall 4 Booth S85116**

Baldwin Filters' BF46002 Dual-Stage Fuel Filter is the first fuel filter to take advantage of a new media technology developed at CLARCOR's Innovation Center.

- Proprietary, highly engineered media has multiple layers to trap and hold the smallest contaminants
- Provides maximum protection to modern high pressure fuel systems
- Offers higher efficiency by removing contaminants under 5 microns
- Long-lasting design
- Continually provides ISO 4406 12/9/6 cleanliness levels for significantly larger amounts of fuel
- Features over 25% higher dirt holding capacity

[oemoffhighway.com/20851428](http://oemoffhighway.com/20851428)



## In-Line Contamination Monitor

**South Hall 3 Booth S80547**

MP Filtri USA Inc. has introduced its ICM 2.0 in-line contamination monitor.

- Automatically measures and displays particulate contamination, moisture and temperature levels in various hydraulic fluids
- Designed to be mounted directly to systems where ongoing measurement or analysis is required, and where space and costs are limited
- Features eight-channel contamination measurement and display
- Measures and displays international standard formats ISO 4406:1999, NAS 1638, AS 4059E
- Moisture and temperature sensing fluid dependant
- Data logging and 4,000 test result memory
- Manual, automatic and remote control flexibility
- Multicolor indicators via LCD (K versions) and LED with output alarm signals as standard
- Robust die cast aluminum construction
- LPA View software (included)
- Pressure maximum of 420 bar (6,091.6 psi)
- Environmental protection IP65/67 versatile
- Secondary connector allows simultaneous control/download of results during operation
- Option available to download all results onto a USB stick, direct from ICM
- Provides 4-20mA analog output as standard

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**CONEXPO-CON/AGG 2017**

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## Variable Fan Drive

**South Hall 4 Booth S83852**

The Horton RCV1000 is a variable fan drive that is a smaller version of the RCV2000.

- Engineered for use with the HTEC 1800 fan
- Provides precision cooling for large-bore diesel applications
- Delivers maximum cooling efficiency through features such as greater heat dissipation, innovative reservoir, actuator and valve system
- Optimized magnetic design speeds reaction time, increasing modulation and cooling
- Features simple wiring configuration

[oemoffhighway.com/20841160](http://oemoffhighway.com/20841160)



## Earthmoving Tires

**Silver Lot 3 Booth S6535**

Titan International Inc. announces the launch of its expanded STL2+ line.

- Includes the 875/65R29 and its Low Sidewall Technology (LSW) equivalent, the LSW875/55R34.5, which are specially suited to Cat 982M wheel loaders
- Additional sizes in lineup include 23.5R25, 26.5R25 and 29.5R25
- Dual-purpose E-3/L-3 tread can be selected with either cut-resistant or wear-resistant compounding for performance in any operating conditions
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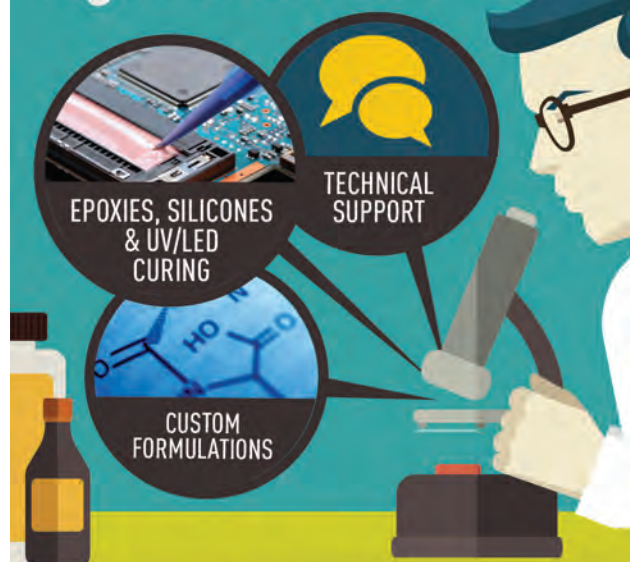
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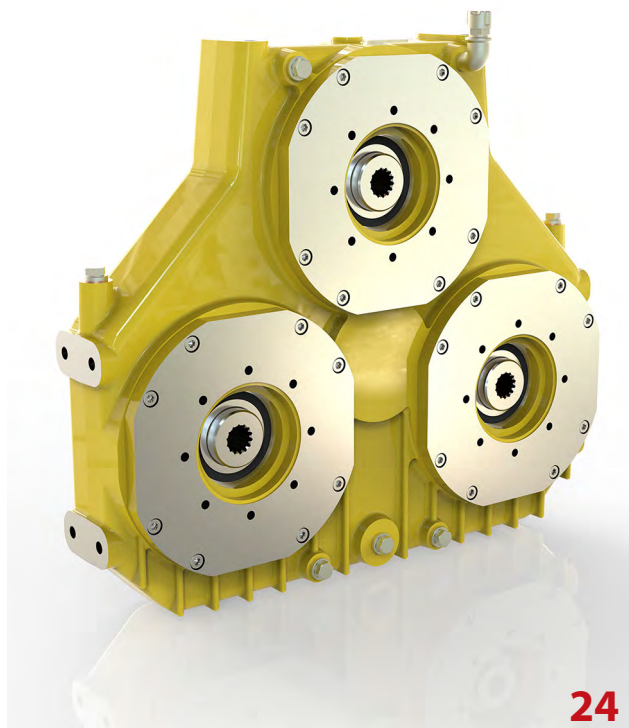
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The cab designed by a University of Illinois at Urbana-Champaign student engineering team was printed at DOE's Manufacturing Demonstration Facility at ORNL using carbon fiber-reinforced ABS plastic.



# The Growing Potential of 3D PRINTING

**A project to 3D print an excavator is the first large-scale use of steel for such a process, demonstrating the rapid growth of this manufacturing technology's capabilities.**

by Sara Jensen

**A**t this year's CON-EXPO-CON/AGG and IFPE show, a fully functional 3D printed excavator was on display. In addition to the printed machine, a second excavator was printed on site; both were displayed in the show's new Tech Experience area ([learn more, 12208226](#)).

Known as Project AME (advanced manufacturing excavator), the 3D printed excavator was a 2-year project initiated by the Center for Compact and Efficient Fluid Power (CCEFP) to demonstrate the potential use of 3D printing (aka additive manufacturing) within the fluid power and mobile equipment industries. In particular, the project aimed to show the feasibility of printing with metal alloys and comprised the first large-scale use of steel in 3D printing.

CCEFP received a grant from the National Science Foundation (NSF) for the project. It was also supported by the Association of Equipment Manufacturers (AEM) and National Fluid Power Association (NFPA).

The Dept. of Energy's (DOE) Manufacturing Demonstration Facility (MNF) at Oak Ridge National Laboratory (ORNL) lead the actual printing of the excavator.



ORNL's Lonnie Love (third from left) with the winning student engineering team from the University of Illinois at Urbana-Champaign who got the opportunity to see its design being printed on the Big Area Additive Manufacturing system at ORNL.

The 3D printed portions of the excavator were the operator cab, the stick (distal end of the boom) and the heat exchanger. Mike Gust, Industrial Liaison Officer at the CCEFP, says only three portions of the machine were chosen because of the available time and resources necessary to complete the design and printing of the excavator. However, he says it gets the main point across which is to make the industry aware that additive manufacturing is quickly becoming more prevalent and to have engineers "think out of the box in the future if they are involved in designing next generation equipment."

## Material choices and printing processes

Engineering student research teams from Georgia Tech and the University of Minnesota worked on the excavator design to make it conducive to 3D printing, as well as to decrease size, weight, materials cost, and maintenance while increasing machine efficiency. The excavator's boom, cab and heat exchanger were designed as part of three separate student design projects.

When developing the project, Gust says the 3D printing processes themselves were chosen first,

then the materials for the three parts. Carbon fiber composites were chosen as the material for the cab due in part to the fact that its design would be part of an undergraduate design contest and CCEFP wanted to choose a material for which the process was already proven. "The steel process for the boom was nowhere near ready and required significant development by ORNL. This would have been too difficult and time consuming for undergraduate students who are taking other coursework at the same time," he explains.

In addition, he says carbon fiber composites were chosen because





**The BAAM (Big Area Additive Manufacturing) machine is the world's largest polymer 3D printer. It is capable of printing components up to 20 ft. long, 8 ft. wide and 6 ft. tall.**

"we wanted to demonstrate 'conventional BAAM (Big Area Additive Manufacturing)' on a lower stressed component and carbon fiber reinforced composite was what was currently available." (See sidebar to learn more about BAAM.)

Lonnie Love, Corporate Fellow at ORNL, says the BAAM was the best 3D printer to use for the cab because of the chosen material, as well as its size, detail and geometry requirements. The goal for the cab was to have the ability to create big, flat panels with organic shapes, which the BAAM printer allowed.

Additionally, he says the cab uses a new coating developed by Polynt for BAAM and applied by TruDesign.

Love says one of the exciting things about Project AME is the different processes and capabilities

it demonstrates. "Not all 3D printers are the same. Each has their strengths and their weaknesses."

The project demonstrates three of the seven types of 3D printing processes available. Each printer type has a range of things it can do. "For us that's a very important thing to educate the construction industry about," Love says. "You don't want to just go out and buy a machine, you really want to think through what your objective is, and we can help you figure out what's the right type of system for your applications."

Graduate students from Georgia Tech took on design of the steel boom. By using 3D printing, the fluid passages of the boom's hydraulic system could be printed inside the boom structure, eliminating some

### What is BAAM?

The BAAM (Big Area Additive Manufacturing Machine) is a 3D printer which can manufacture strong, lightweight composite parts without the need for tooling. It was co-developed by Oak Ridge National Laboratory (ORNL) and Cincinnati Inc.

BAAM is said to be the world's largest polymer 3D printer, capable of printing components up to 20 ft. (6.1 m) long, 8 ft. (2.4 m) wide and 6 ft. (1.8 m) tall. Parts can be printed 500-1,000 times faster than industrial additive machines.

ORNL has partnered with Cincinnati Inc. to commercialize the BAAM technology.

of the hoses and tubing that would be included in a traditional machine. This helps reduce weight and material costs as material is printed only where it's needed. While some casting processes could come close to recreating this type of design, Gust says "the tooling and production costs are quite prohibitive unless the volumes are high."

Steel printing was chosen for the stick to demonstrate the use of this process on a highly-stressed component. Gust says power bed additive manufacturing was chosen as the printing method to show how accurate additive manufacturing can be.





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Love notes that at the time of Project AME's inception, there was no large-scale 3D printer that could print steel. Because of this, ORNL spent the next 2 years developing a system to meet this need. The lab worked with Wolf Robotics who will be offering the printers on a commercial basis. "When developing a new technology, ORNL tries to work directly with a machine tool manufacturer (such as Wolf Robotics and Cincinnati Inc.) so that by the end of a project, a [manufacturer] can actually go out and purchase one if they want it," says Love.

One of the challenges associated with printing metal components is their tendency to warp. "Whenever you are melting metal it expands, and when it cools it contracts," explains Love. "As you do this, you're building up a lot of stress in the parts and they will want to distort and curl."



A portion of the student-designed cab inside the Big Area Additive Manufacturing system at ORNL.

Love says the team found early on that printing the 7 ft. (2.1 m) long stick vertically instead of horizontally would help overcome this issue. Despite the stick's height, he says the

area being grown—a cross section of the stick—is short which helps to manage the stress. Additionally, the temperatures at the interface between each layer are in the desired



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range to keep warping to a minimum. Love says temperature is a large factor when it comes to 3D printing metals, and as such the controls of the printer were modified to measure and compensate for warping by adjusting the temperature and speeds when necessary as the part was grown.

Aluminum was the chosen material for the heat exchanger due to its excellent heat transfer properties, says Gust. Students at the University of Minnesota were responsible for designing it. The heat exchanger stores and cools oil in a single unit to reduce the size and weight of components used within the excavator, which also helps improve overall machine efficiency.

Printing of the heat exchanger was done using a Concept Laser powder bed system ORNL has on site. Love says this 3D printer was chosen due

to the level of detail necessary for the heat exchanger which has very fine ports and fluid passages.

The University of Minnesota team worked with ORNL's engineers to design the heat exchanger for 3D printing. Love says once the university team saw the flexibility offered by the concept laser system, it was able to think completely differently about how to design the heat exchanger.

For the excavator cab, a design contest was held for undergraduate engineering students across the U.S. Teams were challenged with designing and printing a futuristic cab and human machine interface (HMI) that was both aesthetically pleasing and functional. A panel of industry experts judged and chose the winner, a team from the University of Illinois at Urbana-Champaign (UIUC). The winning team received a \$2,000 cash prize donated by the NFPA and a trip

to ORNL to see its design printed.

"Additive manufacturing will revolutionize the way things are designed and produced in the not-so-distant future," Gust said in a press release announcing the winner of the cab design contest ([learn more, 12220923](#)). "This contest helped to raise awareness of advancements in technology to the next generation of engineers and we're excited that future engineers are bringing this newly designed machine to life." |

### Head to the Web

Watch a video of the student-designed cab being 3D printed at Oak Ridge National Laboratory.

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# Taking Action to Develop the **FUTURE ENGINEERING WORKFORCE**

**Student design competitions help provide fluid power education and encouragement for a career in engineering.** by Sara Jensen



**T**he NFPA Fluid Power Action Challenge is one of the National Fluid Power Association's (NFPA) many programs aimed at introducing students to fluid power and a potential career in engineering. The Fluid Power Action Challenge is a design competition for middle school students that challenges them to use fluid power to move small objects from one location to another.

Through the program students learn about fluid power principles, and then use what they've learned to design a simple machine. The Action Challenge consists of first a Workshop Day, then a Challenge Day several weeks later.

During the Workshop Day, students learn about fluid power and its use in everyday life, as well as careers within the industry. They then put this new knowledge to use by building basic pneumatic kits and working on simplified machines which rotate or lift objects. At the end of the Workshop Day, students are given the Action Challenge problem they will be tasked with doing on the Challenge Day.

Each year there is a new problem scenario, such as creating a machine which clamps, lifts and extends, or



**Deltrol reverse engineered a version of Action Challenge winner Eisenhower 1 (pictured) which closely mimics the student-designed machine.**

one that clamps lifts and rotates. Changing the problem scenario ensures students don't copy designs from previous years. Upon receiving the problem, teams are given a kit of supplies and all of the tools they will need to create their designs.

Students then spend the next few weeks developing and building a design. On the actual Challenge

Day, the teams are gathered together and given an identical kit to the one they initially received at the end of the Workshop Day to recreate their design on site during a set amount of time. While students are building their machines, Action Challenge judges walk around to speak with the teams about how they worked together and came up with their designs.

Once the machines are built, they are put into action moving objects, again within a set amount of time. Judges keep score by seeing how well each team's machine works and how many objects are moved in the time allotted. Teams are judged based on their portfolio, design and teamwork in addition to how the machine works.

Over 20 challenges were scheduled to take place during 2016, and typically consist of around 25 teams per challenge.

Anyone interested in hosting a Fluid Power Action Challenge event—schools, members of the industry—can contact the NFPA to do so. In addition to helping provide guidance on how to host an event, the NFPA offers grants of up to \$250 to schools or classrooms interested in participating in the Action Challenge to help offset costs.

## **At IFPE 2017**

**See the winning student design at Deltrol's booth S81420 in South Hall 3.**



BELOW: The winning team from Dwight D. Eisenhower Junior High School in Hoffman Estates, IL, whose design was reverse engineered and displayed by Deltrol at IFPE 2017. Team members are Anna Zawistowski, Jimit Gosar, Ahmer Khan, and Hetaxi Patel.



LARRY LISS (DELTROL ENGINEERING LAB SUPERVISOR)



LARRY LISS (DELTROL ENGINEERING LAB SUPERVISOR)

## Industry involvement

Members of the fluid power industry can take part in the Action Challenge in various ways, such as being a judge for a local competition or hosting an event. Deltrol Fluid Products has hosted events for the past 8 years now. Bob Hammond, Manifold/Systems Engineering Manager at

Deltrol, noted during a presentation at the Center for Compact and Efficient Fluid Power's (CCEFP) Fluid Power Innovation Research Conference (FPIRC, [event information, 10754800](http://eventinformation.10754800)) the company's goal in doing so is to encourage students to "just become an engineer" whether or not they plan to pursue a career in

fluid power. He said getting women interested in engineering is a prime focus, as well.

Hosting a challenge involves a variety of tasks such as making contact with teachers; scheduling the workshop, challenge dates and venue; running the challenge and getting volunteers. Additionally, as host the com-



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pany—and any industry partner who donates to the event—purchases the kits students will need to create their designs. Deltrol asks for a \$10/student registration to help offset costs. Hammond says the company sees its involvement with the challenge as a means of community outreach, as well as a way in which it sets itself apart

from others in the market.

In 2016, the company hosted two challenges, and featured one of the winning designs at its booth at IFPE 2017 (*event information, 10207254*). Hammond says Deltrol asked the best machine performers of each challenge to relinquish their machines to the company whose

### Programs for All Ages

In addition to the Fluid Power Action Challenge, the National Fluid Power Association (NFPA) offers similar programs for high school and college students.



For the 2016-2017 school year, the NFPA has introduced the Fluid Power Robotics Challenge, a scholarship which supports the FIRST Robotics program. The NFPA is offering one merit-based scholarship of \$10,000 per year for four years to high school seniors who have participated as part of a 2017 FIRST Robotics Competition Team (*pictured above*). The scholarship can be used for an engineering course at any accredited U.S. technical school/college or university.

Read more about the FIRST Robotics program in the article "Putting science and technology education FIRST" at [www.oemoffhighway.com/12015543](http://www.oemoffhighway.com/12015543).

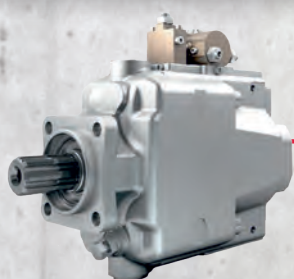
For college-level students, the NFPA has created the Fluid Power Vehicle Challenge which is based off a program developed by Parker Hannifin Corp. Participating engineering students are challenged to redesign a traditional bicycle by using hydraulics as the method for



#### NFPA Fluid Power Vehicle Challenge

power transmission. Each team is required to include in their designs an accumulator for storing energy, an electronic control system and regeneration technology.

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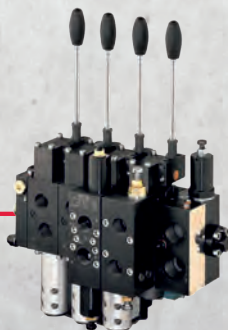
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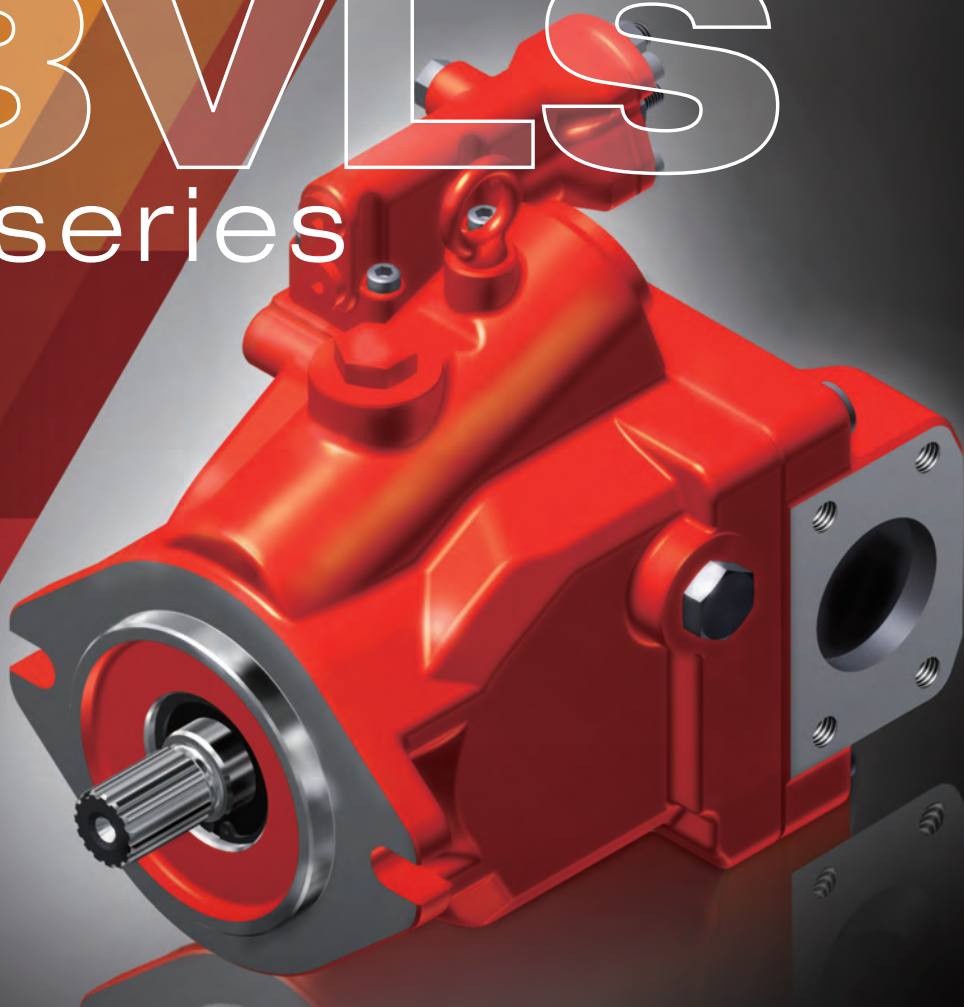
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## EDUCATION: FLUID POWER ACTION CHALLENGE

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engineering team chose one design to reverse engineer into a pneumatic machine with a controller that emulates the original student design.

The 2016 problem scenario consisted of building devices which could lift and move objects from a "Pick-Up Area" to designated "Drop-Off Shelves." Machines had to pick up and place as many objects as possible within the 2-minute challenge timeframe. Design footprints were limited to being able to fit inside the area of an 18 x 8 in. (45.7 x 20.32 cm) rectangle which is surrounded by a 1-1/2 in. (3.81 cm) high wall.

Eisenhower 1, designed by a team of students from Dwight D. Eisenhower Junior High School in Hoffman Estates, IL, was the winning machine which Deltrol reverse engineered and exhibited at its IFPE booth. "Their machine had the minimum number of axes of motion to complete the

task and their design was simplistic, effective and efficient," says Hammond. In addition, the machine was able to place an object in the highest available point position on the Drop-Off Shelves. This, and many other aspects of the student design, were closely mimicked by Deltrol's version, he notes.

Deltrol's goal in choosing a machine to reverse engineer and display at IFPE was to highlight the engineering capabilities of middle school students and bring the Action Challenge to the attention of other members of the industry. "Our goal is to simply grow the amount of challenges held across the country annually," says Hammond. "This type of event promotes young minds to start exploring career options related to engineering early, whether directly in our field or another. We're making critical thinking, problem solving engineers and we like it!"

Visit [nfpahub.com/fpc](http://nfpahub.com/fpc) to find out more about how to get involved in the Fluid Power Action Challenge, or see a list of upcoming challenges.

The Deltrol product design team worked together with the company's development team to measure Eisenhower 1's machine parameters and lay out the skeletal framework for its machine design. Hammond says pneumatic cylinders were reviewed for feasibility and purchase; following cylinder selection, the company 3D printed the cylinder mounts and articulation axles in house to then add to the design. "We added an air source and a PLC for controlling all the cylinder movements and needed timings. We were then able to set it up in Las Vegas, turn it on, and let it do its thing." |

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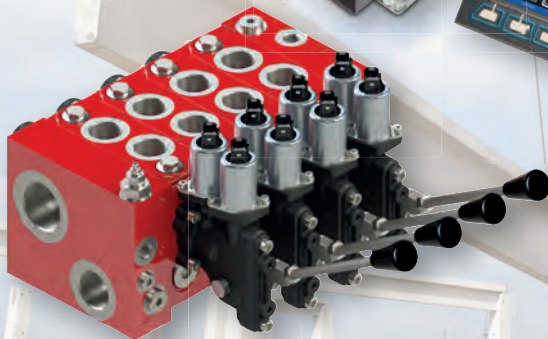
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# New Sensor Designs Aid Creation of SMART HYDRAULICS

Evolving sensor technology is providing manufacturers with more flexible and precise options for the development of smart hydraulic systems.

by Sara Jensen

Smarter hydraulic systems which include sensors and other electronic components are becoming ever more prominent within the mobile equipment industry, helping to increase the accuracy and efficiency of these systems. Like all companies, sensor manufacturers are continually evolving their products in order to further advance the capabilities of the systems in which they're integrated.

Flexibility and ease of installation were key criteria for Rota Engineering when it was developing new features for its position sensors for

hydraulic cylinders. These sensors will now include field calibration and installation capabilities, and were introduced at CONEXPO/IFPE 2017 ([learn more, 20842242](#)).

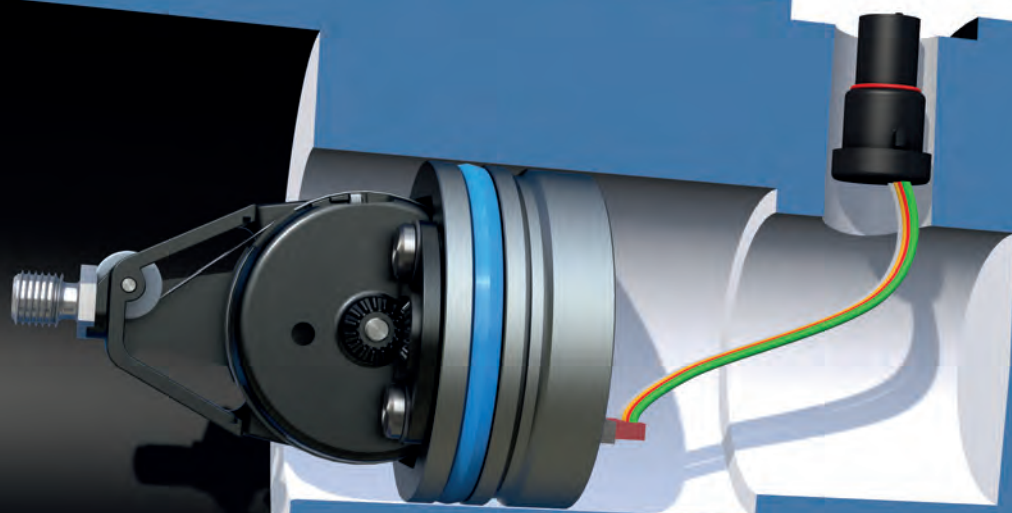
Mark Hoffman, Vice President of Sales & Marketing at Rota Engineering Ltd., says the new features will provide an OEM the flexibility to install the sensors when necessary, and help reduce part numbers which will in turn lower costs. Warranty cost and complexity will also be minimized as the sensor itself can be swapped out instead of having to remove the entire cylinder in which it's integrated.

Installation of the sensor is as simple as screw-

ing it into the end of the hydraulic cylinder, says Hoffman. Once installed, the entire sensor is encased within the cylinder to protect it from external elements. Only the sensor's nut and wire for connecting to the power and signal electronics is exposed.

Hoffman says the ease of installation is beneficial for both manufacturers and end users, and is particularly advantageous for very large hydraulic cylinders. "Sometimes these sensors go into cylinders that are so big it requires something like a forklift or telehandler to actually remove the cylinder from a piece of equipment," he explains. The field installation capabilities, however, eliminate the

cost of using such tools should there



The SIKO SGH10 encoder can be installed directly into hydraulic cylinders, protecting it from external elements.

SIKO GMBH

be a need to remove or replace the sensor. "With our package, they would simply unscrew the sensor, put a new one in, [and be] back up and running."

MTS Sensors also recently introduced a field-serviceable sensor, the Flexible MH (FMH) linear position sensor ([learn more, 12238848](#)). It features a two-part design to separate the flexible sensing element and electronics from the sensor housing without the need to open the hydraulic system in which it's installed.

### Giving customers what they want

According to Hoffman, the new position sensor features Rota is offering are those for which the market was asking. To implement them, he says it was a simple software addition to the sensors which are micro-processor based.

Field calibration of the sensors enables factory calibrations to be overridden, and customers can select any portion of the active stroke zone to output a full-scale signal to achieve maximum resolution.

Hoffman explains that a cylinder manufacturer may have an 8 in. (203.2 mm) stroke cylinder designed to offer a certain voltage over that stroke measurement. However, there may be times the cylinder never makes it to that full stroke length. Field calibration enables the voltage to be modified to fit the actual stroke measurement without having to modify the cylinder or replace it with a different one. This allows the cylinder manufacturer to stock a single part number—the Rota position sensor—to meet varied cylinder requirements.

OEMs can also benefit from stocking just one part, both in the case of the sensor and the cylinder. In many cases the position sensor may be an



The Rota position sensor installed in an agricultural application.

ROTA ENGINEERING LTD.

This enables the position of the cylinder to be precisely detected at all times in comparison to inductive, magneto-restrictive or hall-based technologies. While wire actuated encoders have existed in the market for some time, the company says this is the first time they have been used

with hydraulic cylinders.

The sensor is designed to be installed directly into a hydraulic cylinder, with its wire mounted in the piston head and wound up in a wire drum. When the cylinder extends, the wire is pulled out which causes the wire drum to rotate. Magnets within the sensor detect this rotation and are scanned by sensor electronics through the SGH10's pressure-resistant base plate to calculate linear travel.

optional component to a hydraulic system or machine design. As such, the OEM can stock one cylinder part number and add the sensor during machine production when necessary, providing further flexibility and cost reduction opportunities. "They've got one sensor for several different applications," says Hoffman.

"As the requirements of IoT (the Internet of Things) grow, flexibility to fit into many different business models is paramount. Flexibility, robustness, ease of installation and warranty cost drive these new features," he adds.

When developing its SGH10 wire-actuated sensor, SIKO GmbH worked closely with customers to ensure its new sensor design would meet their needs. Precision and accuracy were among the key requirements for the SGH10 which provides direct stroke measurement. Initially debuted in 2015, the sensor was introduced to the U.S. market at IFPE 2017 ([learn more, 10207254](#)).

SIKO says precisely determining the stroke of a cylinder to measure and monitor machine motions to be carried out is one of the most important tasks for sensor technology integrated into hydraulic systems. Because of this, "both machine and sensor manufacturers are always looking for new innovations in stroke measurement for hydraulic cylinders" ([learn more, 12167680](#)).

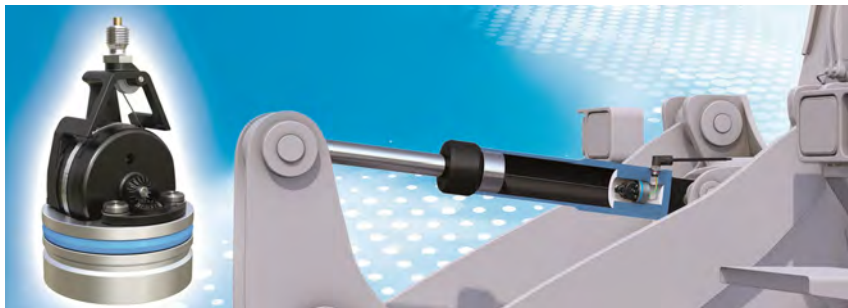
### Precision measurement

To ensure precision and accuracy, SIKO made its SGH10 wire actuated.



The MTS Flexible MH (FMH) linear position sensor has a two-part design to separate the flexible sensing element and electronics from the sensor housing without having to open the hydraulic system in which it's installed.





SIKO GMBH

All of this is accomplished without contacting the sensor electronics which are encapsulated on the unpressurized side of the sensor system. The lack of contact eliminates wear and increases the lifespan of the sensor system.

The entire sensor, in fact, is installed directly into the hydraulic cylinder to protect it from external elements. Unlike a sensor mounted externally on a cylinder, with the SGH10 customers will not have to worry about sensor information being compromised by damage or loose parts. Everything is safely contained within the cylinder and meets protection class IP69K, ensuring durability in harsh applications.

SIKO notes that the sensor was designed specifically for mobile applications, and as such has a high resistance to shocks and vibration, as well as high electromagnetic compatibility.

Like the Rota position sensors, flexibility is also an important feature of the SGH10. Analog or CANopen outputs can be used with the sensor, and programmed over the sensor's whole measurement range (0-1,000 mm/0-39.4 in.) to reduce the number of variations a manufacturer will need to keep in stock.

Additionally, the SGH10 can be integrated into telescopic cylinders, expanding the systems and applications in which it can be used.

Integration costs can be reduced, as well, with the SGH10 as it does not require piston drilling like other systems do. SIKO says other systems often require the sensor rod to be integrated into a piston over the entire measuring path

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### Watch a video of SIKO's SGH10

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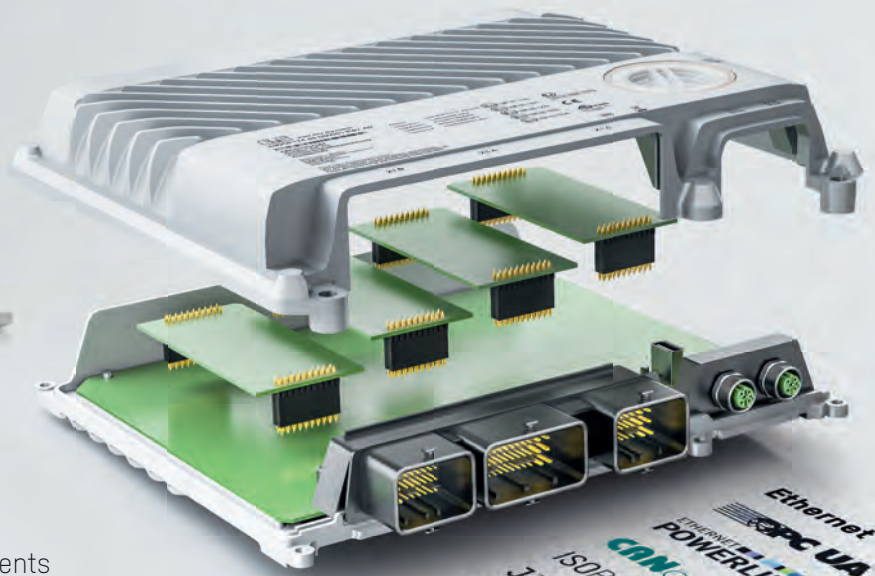
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which is costly and can weaken the structure of the piston. The SGH10, however, requires only a small thread put into the piston to mount the sensor cable.

As the use of smart hydraulics continues to grow, sensor features such as precision, accuracy, flexibility and ease of installation will remain important factors to ensuring intelligent hydraulic system performance. |

## At IFPE 2017

Visit these companies in South Hall 3.

SIKO: booth S83815

Rota: booth S84130

MTS: booth S80518



Rota's position sensor simply screws into a hydraulic cylinder for ease of installation and replacement in the field.

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# Stiebel Exhibits Gearbox Products for Mobile Hydraulic Applications at CONEXPO 2017

At CONEXPO, Stiebel exhibited several of its gearbox products aimed at providing improved efficiency and electric mobility capabilities.

**T**he shift towards new mobile hydraulic applications goes hand in hand with sophisticated and commercially effective systems which are capable of mastering the growing challenges under the toughest conditions. With their adaptable and high performance gearboxes, the specialists at Stiebel Drive Technology are developing the appropriate technologies – ones that also score in terms of energy balance. The company exhibited its latest products and proven developments at the second largest construction machine trade show, CONEXPO-CON/AGG in Las Vegas – in the South Hall 3, stand S81405.

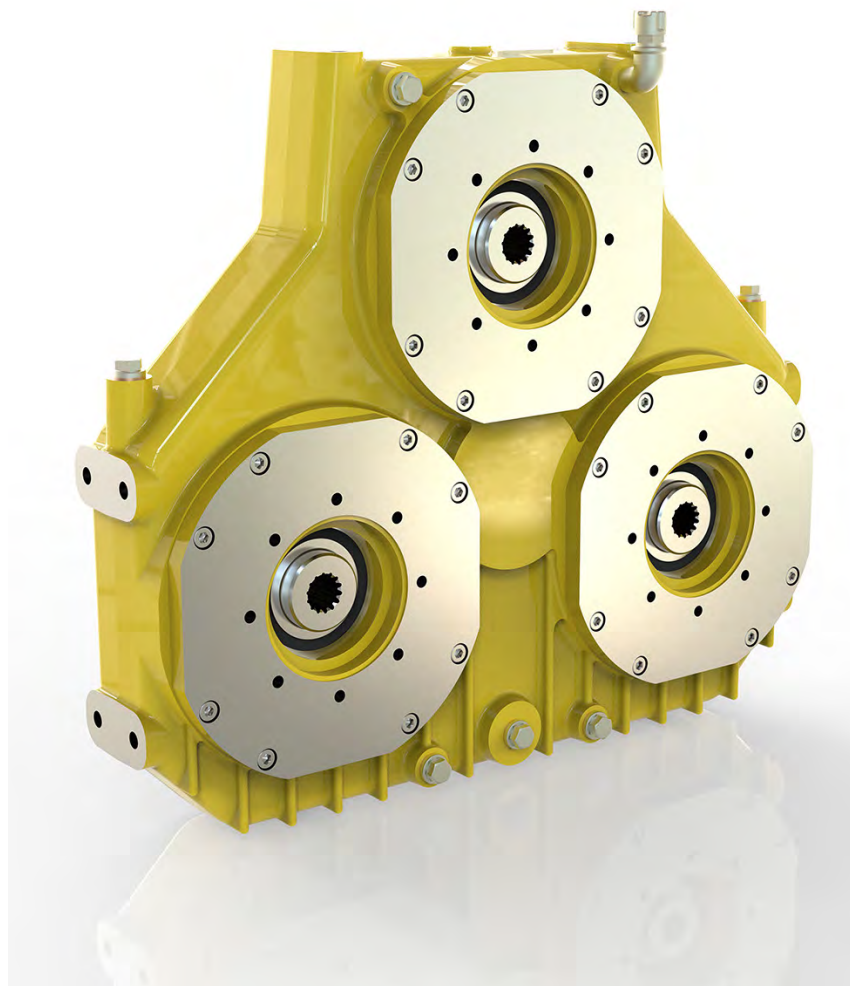
One convincing drive solution is the Stiebel type 4652 transfer gearbox which is used in mobile tracked drilling rigs. The massive casing ribbing and the geometric offset of the drive/take-off shafts deliver an improved energy balance. This normally renders an additional oil cooler unnecessary. With its maximum power of 700 kW (938.72 hp), torque of 3,300 Nm (2,433.96 ft.-lbs.) and maximum rotational speed of 2,500 min<sup>-1</sup>, sustainable and economical drilling operations are supported.

## Electric mobility for efficiency and reduced emissions

A further development is the compact type 4669 summation gearbox ([learn more, 12270619](#)). This unit can

be fitted directly to two integrated electric motors. Thanks to the high degree of production tolerance (radial and axial runout) of the power

transmitting components, the massive block casing, the manufacture of assemblies and the excellent quality of the gearing, a high degree of oper-



The torsionally stiff type 4382 gearbox from the P2000 Series offers a range of flexible attachment options.

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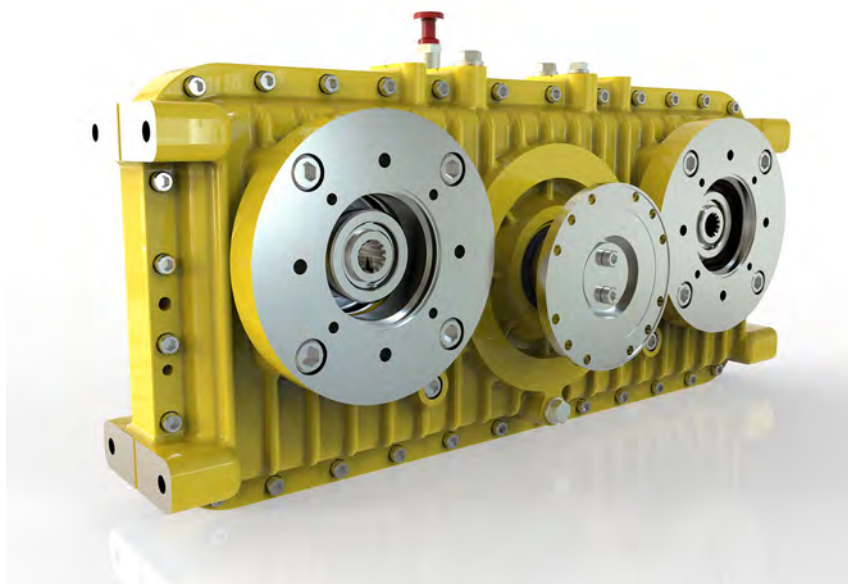
ational reliability and smooth running are ensured. Stiebel has developed the summation gearbox primarily as a sustainable tractive force for medium- and heavy-duty electric commercial vehicles and mobile working machines. The solution can alternatively be designed to accommodate a generator which is driven via a cardan flange.

### Compact diversity for hydraulic mobility ideas

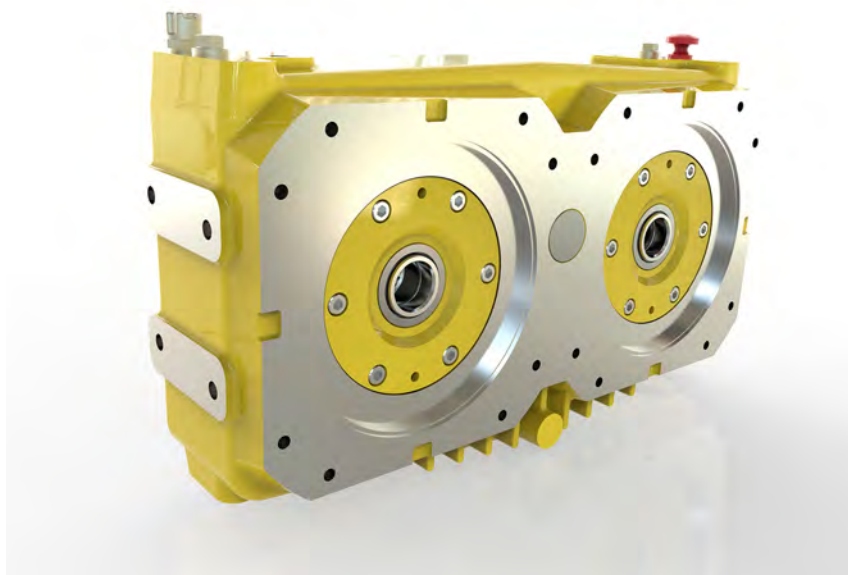
Stiebel Drive Technology is also providing highly adaptable support for diverse ideas in the area of mobile hydraulics with its single-stage type 4382 transfer gearbox from the P2000 Series. Following the proven modular design principle, this torsionally stiff gearbox offers a range of different mounting variants. Connection is possible via a cardan flange or SAE case. On the take-off side there are three pump connections with freely selectable SAE connectors. With its weight of 200 kg (440.92 lbs.) and block casing, this compact gearbox offers space-saving integration possibilities. The lubrication of all relevant components is undertaken by a special system with internal ribbing and oil grooves.

### Further mobile hydraulic solutions for 2017

The type 4395 transfer gearbox with integrated, drive-side clutch offers many different drive options, such as diesel-electric hybrid solutions. The very large shaft spacing of the power take-off shafts in inline configuration (achieved with offset intermediate shafts) allows large motor components up to SAE size 0 to be fitted, both in drive and direct drive mode, and simultaneously hy-



The Stiebel type 4652 transfer gearbox is in particular demand for drilling rigs due to its excellent energy balance and power transmission capabilities.



The compact type 4669 summation gearbox can be fitted directly to two electric motors.

draulic drives up to SAE size E to be driven by the drive shafts on both sides. The benefits are particularly apparent in terms of the optimized – and therefore environmentally friendly – energy and fuel consumption figures.

A different solution is offered by the type 4611 pump drives which are equipped with two different transmission ratios at the pump take-offs. This facilitates optimum output speeds for various types of hydraulic

pumps. The Stiebel gearbox is ideally suited for use in snow groomers or utility vehicles.

With these and other ideas – such as the B2000 intermediate gearbox range which has undergone continuous development and proven itself in operation for 40 years – Stiebel Drive Technology continues to set the standards in the field of drive technologies. In Las Vegas visitors to the CONEXPO trade show could discover the benefits for themselves. |

### At IFPE 2017

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# Manuli Hydraulics Exhibits New Flat-Face Multiconnector Solutions at CONEXPO 2017

Manuli Hydraulics officially launched its new range of Flat-Face Multiconnector solutions, as well as displayed a variety of other products.

**F**rom March 7-11, 2017, Manuli Hydraulics welcomed visitors to its stand at CONEXPO/IFPE in Las Vegas.

Manuli Hydraulics prides itself on its ability to work in partnership with its OEM customers, providing individual solutions for their unique requirements. During the CONEXPO event, experts were on hand to answer all attendees' questions and to explain

how Manuli Hydraulics can help to make their hydraulic systems more reliable, cost effective and efficient.

CONEXPO also saw the official launch of Manuli Hydraulics' new range of Flat-Face Multiconnector solutions ([learn more, 20848990](http://www.manulihydraulics.com/20848990)), which it demonstrated on the stand. This new product range allows OEM customers to experience the industry-leading performance of Manuli's flat-face quick couplings along with the added efficiencies of a multiconnector block solution.

Last but not least, Manuli gave away a top of the range PING golf bag as the prize for achieving the fastest time on its new "José's Golf



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## At IFPE 2017

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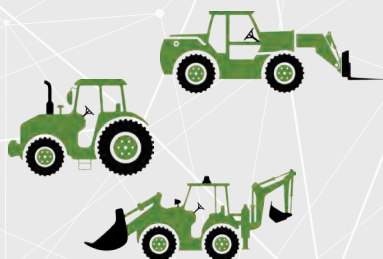
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## PRODUCT LAUNCH

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# Parker Displays Expanded Line of TOUGHJacket Hoses at IFPE 2017

Parker has expanded its TOUGHJacket hydraulic hose line which features specially formulated polyurethane jackets to meet industry requirements for high abrasion resistance.

**P**arker Hannifin, the global leader in motion and control technologies, has expanded the Parflex hydraulic hose line with the introduction of a family of TOUGHJacket hydraulic hoses, designed to withstand the strains of large-scale, heavy-duty applications. The new hoses, featuring special Parker-formulated polyurethane jackets to meet industry requirements for mega/super tough abrasion resistance, exceed the abrasion resistance and durability of super enhanced rubbers by more than 100%.

These compact and lightweight hoses also offer ultra-low length change under pressure and superior UV resistance. The 563TJ hydraulic hose series offers the best change in length characteristics at +/-1%. This makes it an ideal solution for boom or cable track applications where long lengths are required because abrasion and length change are the biggest con-



tributors to hose failure. The SAE acceptable change in length specification is +2% to -4%. Most hoses shrink at least 2% in a constrained environment which can be disastrous for the hose and cable tracks. If 100 ft. (30.48 m) of hose is run in a boom, it must accommodate for the extra 4 ft. (1.22 m) of hose that will be required due to shrink or run the risk of the hose pulling the fitting off the hose or destroying the cable track.

TOUGHJacket hoses are up to 40% lighter than competitors' products which means less counterweight, more payload and the ability to lift farther/higher. Its small O.D. makes routing easier in cable tracks. Twin or multi-line configurations are available to further reduce abrasion and/or prevent tangling.

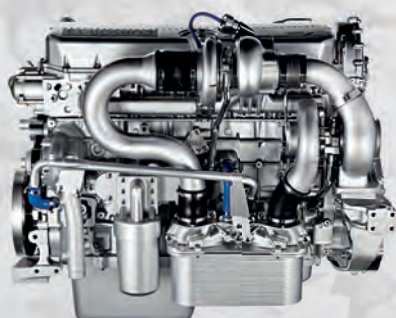
The new hoses are available in four series, in sizes from 1/4 to 1 in. I.D. (6.35-25.4 mm). |

### At IFPE 2017

**Parker displayed its new TOUGHJacket hoses in South Hall 3 booth S80242.**



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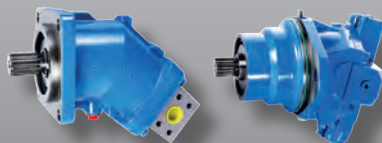
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