



Announcing
2022's IDEA
Awards Finalists 11



Wireless Sensor
Boosts Predictive
Maintenance 20



AM Improves
Component
Production 24

July/August 2022

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A SMOOTHER ROAD AHEAD?

Mobile Hydraulics Market
Rebound A Strong Sign 34

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Inside



FEATURES

34 COVER STORY

Mobile Hydraulics Market Rebound in 2021 Leads to Positive Future

Continued growth in the material handling and construction equipment sectors are benefitting the mobile hydraulics market.

IDEA AWARDS

11 Nominees Showcase Innovation

Voting starts Aug. 15 for this year's top awards for new product excellence.

MAINTENANCE

20 Sensata Wireless Sensor Uses AI and Machine Learning to Improve Predictive Maintenance

The 6VW sensor uploads data to Sensata's cloud-based platform where sophisticated analysis creates deeper insights into potential rotary asset faults.

3D PRINTING

24 Additive Manufacturing Brings Opportunities to Improve Component Design and Production

New design options and reductions to production time and costs are possible with additive manufacturing.

COMPONENTS

30 Bosch Rexroth Launches Range of Electrification Products for Off-Highway Equipment

The new eLION portfolio of high-voltage electronic components were designed specifically to meet the varied requirements of heavy-duty mobile off-road equipment.

11

IDEA AWARDS



DEPARTMENTS

- 6 Editor's Note
- 8 Industry News
- 38 Products
- 39 Advertisers Index
- 40 One More Thing

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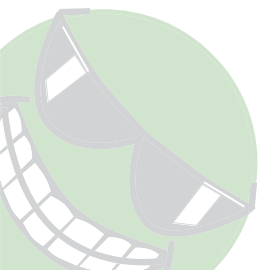
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NFPA Industry & Economic Outlook Conference to Provide Vital Market Perspectives

The full speaker lineup for the 2022 IECC has been announced, and will provide economic and trend outlooks to help fluid power industry professionals plan for the future.

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bauma 2022 to Highlight Key Technology Trends for Construction and Mining Equipment

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ISSN 2831-4883 Print. ISSN 2831-4891 Online.

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SUBSCRIPTIONS U.S. and possessions outside U.S.: \$60/yr; \$90/two yrs. Single copies: \$10.00 each. In Canada: \$70.00/yr, \$110.00/two yrs. Canadian GST #R126431964. International: \$90.00/yr, \$140.00/two yrs. To order, phone 847-763-9670. Fax orders to 847-763-9673. Send subscription payment to: Power & Motion, PO Box 3257, Northbrook, IL 60065-3257. Out-of-print copies available in complete volumes as positive microfilm from NAPCO 800-420-6272 x 6578. Photocopies of articles \$5.00 each. Payment must accompany request.

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How do We Shape the Future Workforce?

As I write this, powertrain manufacturer Cummins Inc. has just announced Jennifer Rumsey as the company's new president and CEO. She is the first woman to hold this position with the company and it got me thinking about the future of the engineering and manufacturing workforce—a subject that is certainly not new but growing in importance as more people reach retirement age and take with them their industry knowledge.

Seeing a woman like Rumsey elevated to such a high-level position is great from this writer's perspective, particularly in an industry where women continue to not be as highly represented. There has certainly been great progress made in recent years, and there are plenty of initiatives out there aimed at improving the diversity of those working in the fields of engineering and manufacturing.

This is an aspect that has come up time and time again when having discussions or attending events in which workforce is a subject—the need to bring more diversity into the engineering and manufacturing space in addition to younger generations. Not only will this help to fill the workforce gap but also bring new ideas and talent into the industry and of course aid the economy by providing good jobs to people.

But how do we go about doing so? That continues to be the million dollar question, and a discussion I've had many times over the years with people in or related to the industry.

The subject came up recently while attending a media event. Several of us were talking at dinner about how we can attract younger generations in particular into the fluid power and related markets. None of us had a solution, but among the suggestions were finding ways to demonstrate what the industry does and why it is just as exciting as other engineering fields.

There are of course some programs out there which aim to do this, like FIRST Robotics or efforts put forth by the National Fluid Power Association (NFPA) such as its Fluid Power Vehicle Challenge—a competition for college students in which they apply fluid power technology to new bicycle designs.

So what will the future of the engineering and manufacturing workforce look like? That remains to be seen, but in this humble author's opinion the more we can demonstrate what the industry does and those working in it, like Rumsey, the better the chances of attracting new talent into it and shaping what could be a more inclusive workforce. *Read an extended version of this editor's note at powermotiontech.com/21246567.*

We want to hear from you!

What do you think needs to be done to help attract more people to the industry? What programs do you find good at doing so, and could they be adapted to the fluid power and other related industries? Let us know!



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Fluid Power SME Looks to Provide Hydraulic and Pneumatic Expertise to Manufacturers

The new design and consulting firm provides manufacturers with a third-party resource to create their hydraulic and pneumatic designs. **by Sara Jensen**

Rance Herren, a veteran of the fluid power industry with over 37 years of hydraulic and pneumatic application experience, has launched a new company aimed at helping manufacturers with their fluid power designs. Fluid Power SME, LLC provides certified expertise in hydraulics and pneumatics from an objective, third party capable of offering design services and consultation.



Fluid Power SME

- Areas of expertise include:
- Hydraulic and pneumatic system design and component specification
- Software-driven circuit simulation and analysis
- Documentation and technical writing
- Component sourcing services
- Hydraulic and pneumatic technical training, as well as IFPS certification preparation and testing
- Failure analysis and subject matter expert witness
- General fluid power technical consultation.

Not all manufacturers have hydraulics and pneumatics expertise in-house, and with the growing skills gap in the industry, it is becoming more difficult to find those with the necessary knowledge, which prompted Herren to start the company.

Herren explains in the following Q&A with *Power & Motion* his reasons for starting the company and why it will be beneficial for manufacturers of various types to work with Fluid Power SME.

Power & Motion: What lead you to start Fluid Power SME?

Rance Herren: There is a real need in the fluid power industry for access to competent and objective technical advice so that OEMs



Rance Herren

and end-users of equipment that utilize hydraulic and pneumatic technologies can be more self-assured in their decision making. Fluid Power SME advocates on the client's behalf, empowering them with flexibility and autonomy.

P&M: What makes Fluid Power SME different or unique in the industry?

RH: Fluid Power SME is unique in that we do not manufacture or sell components or systems. We are industry-certified professionals that specialize in bringing unfiltered, objective advice and robust design solutions to help our clients overcome technical challenges to bring their project initiatives to reality.

P&M: What types of customers is the company looking to work with?

RH: Fluid Power SME works with OEMs and end-users of all sizes, industries and geographies. We are at our best with clients that are forward thinking, technically driven and in the end, want options to facilitate and accelerate their projects.

P&M: Are you seeing a greater need in the market for the types of services Fluid Power SME can provide? If so, what is driving this?

RH: The fluid power industry is suffering a drain on the talent pool that is alarming, to say the least. The number of individuals coming into and staying in the industry compared with those leaving or retiring is strikingly disproportionate. The Fluid Power SME model seeks to fill this gap by focusing on technical competency and the transfer of knowledge to the next generation.

Rance Herren has more than 37 years of hydraulic and pneumatic application experience in a variety of roles and industries (including 24 years in oil and gas), and is widely recognized as an expert on fluid power system design, troubleshooting and failure analysis. Herren is a graduate of the Industrial Controls Technology program at California State University Fullerton, the Industrial Electrical Technology program at Chaffey College in Rancho Cucamonga, Calif. and holds multiple advanced fluid power certifications. He is the past president (2016) of the International Fluid Power Society and remains a lifetime member, technical contributor and advisor. **P&M**

Fluid Power Industry Mourns Passing of Tom Wanke

Wanke's years of expertise and dedication to the fluid power industry will be missed.

by Sara Jensen

It is with great sadness to report fluid power industry veteran Tom Wanke, CFPE, of Milwaukee School of Engineering (MSOE) passed away on June 21, 2022. Wanke was director of the Fluid Power Industrial Consortium (FPIC) and Industry Relations, with a nearly 50-year career at MSOE.

Wanke was also a member of *Power & Motion's* Editorial Advisory Board through which he provided his insights and expertise on topics of coverage that would best benefit professionals working in fluid power and motion control.

On a more personal note, I have known Tom for most of my B2B editorial career covering the fluid power industry. And during that time I have always been happy to get the chance to speak with him—whether it be catching up on life or what's happening in the industry.

When I last saw Tom in person at an industry event, which was the first in a long time after many months of no in-person events, it was as if a day hadn't passed at all. We spent almost an hour talking about how lives and careers were going, as well as what's been happening in the fluid power industry in recent years and some of the editorial initiatives we wanted to possibly undertake with *Power & Motion*.

During the FPIC quarterly events he helped coordinate, Tom was always ready with a question or two. You could tell learning was important to him because even after his years of experience in the industry he still wanted to know more about how things work, and pass that knowledge on to others. This could be seen through his long career at MSOE working with students as well as the formation of FPIC in partnership with the National Fluid Power Association (NFPA) which serves to provide industry professionals with further education on topics and trends impacting the markets they serve.

And that's how I will always remember Tom—no matter the subject, he was prepared to learn and discuss and provide insight or education where he could.

His advocacy for the fluid power industry will also never be forgotten. You could tell he was passionate about the subject and wanted to share that with others as well to help further advance the industry.

"Tom's impact on the fluid power industry will be felt for generations," said Eric Lanke, president and CEO of the National Fluid Power Association, in the MSOE press release announcing Tom's passing. "He has been an instrumental partner in our growth and vitality, and we join the countless number friends, former students, and colleagues that are mourning his passing."

"Tom was a respected leader in the fluid power industry. His dedication to MSOE and the industry was unparalleled," said Sheku Kamara, MSOE dean of applied research, in MSOE's press release. "Tom was committed to not only helping industry partners but also educating future generations of fluid power professionals through continuing education classes and the NFPA Fluid Power Action Challenge."

A Distinguished Career in Fluid Power

Wanke started working at MSOE in 1974 as a technician at the school's Fluid Power Institute (FPI), considered one of the foremost academic fluid power research laboratories in the U.S.,

while a student there in fluid power engineering technology. From MSOE he received an associate degree in fluid power engineering technology and a B.S. in Mechanical Engineering Technology, and later an M.S. in Engineering Management with a fluid power specialty.

Shortly after becoming a project engineer at FPI in 1978, Wanke was named its director in 1980. While there he helped strengthen relationships between MSOE and members of the fluid power industry. He brought many skills and expertise to the position including:

- hydraulic component and system design reviews, development and evaluation;
- field troubleshooting and failure analysis; and
- fluids, filtration and contamination control in hydraulic systems.

After helping establish FPIC in 2016, he was named its director and also served as an adjunct associate professor in the Mechanical Engineering Department.

Over his career Wanke received several accolades for his accomplishments within the fluid power industry. He was the first recipient of MSOE's Karl O. Werwath Engineering Research Award and was part of the inaugural class of professionals inducted into the International Fluid Power Society Hall of Fame in 2019. Additional awards include:

- NFPA Fluid Power Champions Award in 2015
 - NFPA Outstanding Service Award in 2014
- Service Award from the International Fluid Power Association in 2011.

As part of his industry involvement, Wanke was a member of



Tom Wanke

several organizations—Society of Automotive Engineers (SAE); International Fluid Power Society (IFPS) and an IFPS certified fluid power engineer; International Standards Organization Committee TC131 for Fluid Power Standards; chairman of the NFPA Technical Board. He also served as chairman of the Technical Conference at both the 2011 and 2014 International Fluid Power Expositions (IFPE) and a member of the IFPE Management Committee.

Per MSOE's press release, Wanke was instrumental in securing the \$5 million Endowment for Fluid Power Education at

MSOE from the Estate of Otto J. Maha. In 2007, he was honored with one of the first Otto J. Maha Pioneers in Fluid Power Awards during the 45th anniversary celebration of the FPI. And five years later at the institute's 50th anniversary celebration Wanke received the first-ever MSOE Fluid Power Achievement Award for its efforts to make the FPI a reputable institution. **P&M**

The Power & Motion staff sends its sincerest sympathies to Tom's family and loved ones at this time as well as those who knew him personally and professionally.

Motion Launches Fluid Power Business Unit

The new Mi Fluid Power Solutions will be a complete provider of fluid power, integrated electronic controls and electromechanical technologies for industrial and mobile equipment.

by Sara Jensen

Motion Industries Inc. is forming a fluid power business brand which will be known as Mi Fluid Power Solutions (Mi FPS). The company states in its press release announcing the new brand that it will unify top tier fluid power business units including:

- the former Kaman Fluid Power divisions of BW Rogers,
- Catching FluidPower,
- Intellimotion,
- Calkins Fluid Power,
- Northwest Hose & Fittings,
- Western Fluid Components
- and Inrumec.

Hydraulic Supply Company and Motion's OE Mobile service capabilities will also be a part of the new business unit.

By bringing all of these entities together under a single brand, the company will be better able to position itself as what it terms as a complete provider of fluid power, integrated electronic controls and electromechanical technologies for industrial and mobile equipment.

Main areas of focus for Mi FPS will include:

- hydraulics,
- pneumatics,

- lubrication,
- filtration,
- process pumps,
- precision industrial tooling and
- factory automation products.

Components of virtually any size will be available as new or serviced products and range from hydraulic pumps and motors to valves and cylinders.



Motion states in its press release the new brand comprises North America's largest network of over 65 on-demand retail fluid power hydraulic and industrial hose assembly stores and support facilities, including repair, build and engineering capabilities. A variety of industries will be served, including automotive, aerospace, mobile off-road equipment and pharmaceutical.

"Fluid power combines products and engineering skills to design a system that solves a customer's need," said David Mayer, Motion's Group vice president of Fluid Power, in the company's press

release. "We have partnered with the world's best suppliers to provide more products, more inventories and more robust capabilities to ensure we can optimally solve a project, maintenance or production problem. Our deep inventory of hydraulic equipment, pneumatics, pumps, filtration, motors and lubrication products get any equipment up and running quickly. We also offer services that run the gamut from barcoded hose assemblies and VMI delivery services to pressure testing, design of mobile equipment, hydraulic manifold design and custom power units with complete integrated controls and software."

Motion's president, Randy Breaux, said, "Fluid power continues to be in high demand due to its unique ability to deliver high forces and torque in the most challenging applications. As North American industry and infrastructure grow, the Mi FPS team is well-positioned to offer the latest product and service innovations to meet this rising market demand. Thanks to this talented group and investments supporting the new brand, we are ready to serve our customers even better than before—offering more choices and more solutions." **P&M**



IDEA AWARDS

Nominees Showcase Innovation

Voting starts Aug. 15 for this year's top awards for new product excellence.



The nominees are in for the 2022 IDEA Awards, presented by *Electronic Design*, *Machine Design* and *Power & Motion*. Nominees in eight categories now will have those innovative products evaluated by the sharpest mind in manufacturing: yours.

Readers can go to powermotiontech.com to review the nominations and vote for the products that best exemplify the IDEA Awards program ideal of innovation that helps engineers do their jobs smarter, safer, faster and more efficiently.

The categories are:

- Automation & Controls
- Design Software
- Cloud Computing
- Electric Drives, Motors and Components
- Fluid Power Components
- Mechatronics & Motion Control
- Robotics
- Sensors

“This year’s IDEA Award finalists represent both the present needs of traditional manufacturing as well as the future of the digital age,” said Bob Vavra, senior content director for *Power & Motion*. “I’m always impressed with the breadth of entries as well as how these new products bridge the gap between the machine-driven technology in wide use today and the new developments, such as data management, design software and robotics.”

Voting opens Aug. 15, and voters can cast their ballots in any category by using the online ballot on the home pages. Only eligible manufacturing professionals are eligible to cast votes. All other votes will be disqualified.

Voting will conclude Friday, Sept. 9 at 5 p.m. EST, and winners will be announced online on Oct. 15 and in the October issues of *Electronic Design*, *Machine Design* and *Power & Motion*.



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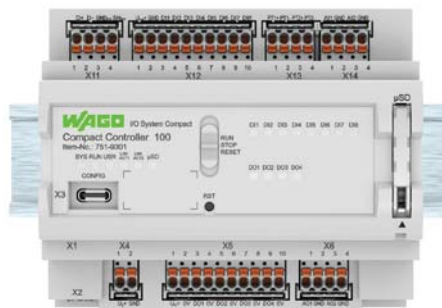


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Compact Controller 100

WAGO's Compact Controller 100 is a combination small-scale PLC and remote I/O, perfect for smaller applications. Programming uses Codesys 3.5 and users can interface with industrial devices using protocols such as MODBUS TCP, EtherNet/IP or EtherCat. Along with a powerful processor and MicroSD card slot, the CC100 has additional communication ports including a serial port for connection with numerous devices such as bar code readers and automatic scales.

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AUTOMATION & CONTROLS

WIN-911 2021

The WIN-911 2021 remote alarm notification software update relies on extensive input from both end-users and technology partners to provide improved features and benefits, including reduced installation time, reduced configuration time and simplified navigation. Streamlining industry-leading capabilities into a simple workspace reduces system resources by up to 50%, providing faster performance and increased productivity. WIN-911 2021 directly connects with top SCADA systems and results in fast, seamless integration to securely interact with equipment and process alarms.

WIN-911
www.win911.com

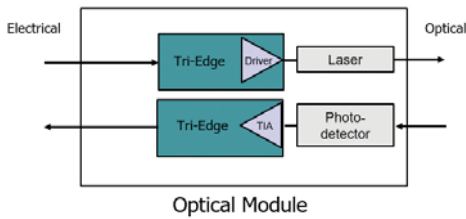
CLOUD COMPUTING

Allen-Bradley ASEM 6300 Industrial Monitors

The Allen-Bradley ASEM 6300M industrial monitors help OEMs differentiate machines and meet a wide range of application needs. Several design options give OEMs freedom to customize monitors based on cost, performance, look and feel. Design options include stainless-steel for washdown, aluminum or edge-to-edge glass, single- and multi-touch, sizes from 8.4 to 24 in. in standard and widescreen. All have high-resolution displays. The monitors can display up to four tiles on one screen.

ROCKWELL AUTOMATION
www.rockwellautomation.com/en-us/company/about-us.html





CLOUD COMPUTING

Tri-Edge CDR Platform

Semtech's Tri-Edge PAM4 CDR platform is optimized for optical interconnect in next-generation 200G/400G data centers and Cloud applications, offering power savings up to 20% per optical link versus DSP technology. To meet demands placed on data center infrastructure by ever-evolving Cloud use cases, Semtech introduced production of its GN2558/GN2559 CDRs to enable advanced connectivity over multi-mode fiber, delivering a low-cost solution with the low power/latency analog signal processing to meet the demands of Cloud applications.

SEMTECH
www.semtech.com

DESIGN SOFTWARE

Altimade

Altimade is the first collaborative experience for designers that brings the manufacturing ecosystem into the PCB design workflow. Altimade is accessible through Altium's EDA tools, delivering a modernized "design with manufacturing" approach. Designers can track the progress of their projects and collaborate with manufacturing from start to finish without leaving their design environment. Designers obtain real-time supply chain data, validate their BOMs, generate quotes, place an order, and maintain a record of design changes and delivery status.

ALTUIM LLC
www.altium.com



DESIGN SOFTWARE

Design Power

A new software platform offering multiple digital design modules to support the engineering and specification of belt-drive systems across a broad array of applications. Design Power features a state-of-the-art knowledge base with design guidance and sophisticated belt-performance models. Automatic syncing with the Gates catalog streamlines and empowers the design process with access to the latest products, specifications, ratings and list pricing. Design Power also adds new organizational features on par with the best digital collaboration tools.



GATES
www.gates.com



DESIGN SOFTWARE

Studio 5000 Logix Designer

The new version of Studio 5000 Logix Designer software significantly reduces download times for users and improves the overall user experience by allowing users to do more while online. For example, users can now import and export project

activity, including comments and documentation made by others, without first going offline with the controller, which was required before this new Studio 5000 version release. In addition, new data types configured as time types reduce the need for users to manually format integers.

ROCKWELL AUTOMATION
www.rockwellautomation.com/en-us/company/about-us.html

ELECTRIC MOTORS & DRIVES

eLION Motor-Generators

Rexroth's electric 700 V eLION motor-generators cover a nominal power range from 20 to 200 kW (peak power up to 400 kW) and deliver nominal torques of up to 1050 Nm and maximum torque of up to 2400 Nm. They are available in four sizes with different lengths and winding configurations. Both standard and high-speed variants allow the best design solution for traction and implement function needs. eLION benefits include high efficiency, lower emissions, and robust and scalable components designed specifically for mobile machinery.



BOSCH REXROTH
www.boschrexroth.com/en/dc

ELECTRIC MOTORS & DRIVES

Gen 4 115

Elemental Motors 4th Generation Axial Transverse Flux Motor delivers real-world torque densities of 75Nm/liter, 25Nm/kg continuous. The patent pending topology is compact with large IDs having either inner or outer rotation for bold machine creations. The servo motors unique topology is exceptionally efficient at lower RPM and typically replaces other servo motors and 2-stage gear reduction to improve improving efficiency. The motors are tough with windings encased in iron armatures without end turns for better resistance to vibration and the elements.



ELEMENTAL MOTORS
www.elementalmotors.com

ELECTRIC MOTORS & DRIVES

BLV Series R Type

The BLV Series R Type features an all-new 100/200 W BLDC motor and driver design for battery-powered robotics applications like AGVs and AMRs. The compact driver has reduced its volume and mass by 80%, while the high-resolution motor sensor regulates the speed at $\pm 0.01\%$ and enables better positioning performance. The usable voltage range is expanded to 15~55 VDC, and power consumption has decreased by 10%. Along with software improvements, the compact driver now supports CANopen communications in addition to Modbus.

ORIENTAL MOTOR
www.orientalmotor.com/brushless-dc-motors-gear-motors/brushless-dc-motors-gear-motors-blv-r-type.html



ELECTRIC MOTORS & DRIVES

PowerFlex 755TS Drive

The PowerFlex 755TS variable frequency drive is the first six-pulse drive to incorporate TotalFORCE technology from Rockwell Automation to help companies get the most out of equipment. This new drive brings a simplified and consistent user experience to virtually any motor control application, including traditional fan, pump and conveyor applications, and more advanced processes that typically require specialized drive solutions. Built-in predictive models use continuous operation monitoring to calculate the expected remaining life of drive components, reducing unplanned downtime and maintenance costs.

ROCKWELL AUTOMATION
www.rockwellautomation.com/en-us/company/about-us.html



FLUID POWER COMPONENTS

Hägglunds Fusion Drive System

Hägglunds Fusion is designed to house the motor, pump and controls in the torque arm, allowing for a smaller footprint. Compact in design, the Fusion places the entire hydraulic drive system on the torque arm. No additional gearbox, foundation or external equipment is needed. With all components in one place, it is easy to install and maintain. The plug-and-play design provides maximum torque from zero speed along with built-in protection from torque peaks.

BOSCH REXROTH/HÄGGLUNDS
www.boschrexroth.com/en/us/hagglunds/hagglunds-fusion/

FLUID POWER COMPONENTS

NIV Series PEEK Media Isolation Valves

The NIV Series Media Isolation Valve is a solenoid-operated device that uses a flexible diaphragm to isolate the actuation mechanism from the fluid path. Isolation valves are commonly used for a wide variety of applications, including those that require precise, repeatable dispensing of media for analytical instrumentation. Industries and applications that commonly use these valves to isolate gas or liquid include drug dispensing, laboratory equipment, analytical, chemical analysis, sampling and life science/biotech, among others.

CLIPPARD
www.clippard.com



FLUID POWER COMPONENTS



Aeroquip EC881 Dynamax Hose

Featuring patented DuraPulse inner tube technology, Aeroquip by Danfoss EC881

Dynamax two-wire braided hose delivers impressive lifecycle and high pressure and temperature tolerance. The hose outperforms standard EN857 type 2SC hose specifications with 35% higher pressure rating, 26% higher operating temperature, 8 times higher abrasion resistance, 1/3 SAE bend radius (50% more flexible) and 5 times more impulse life with a qualified 1 million impulse cycle performance. The hose can replace heavy, rigid four-wire spiral hose in certain applications.

DANFOSS POWER SOLUTIONS
www.danfoss.com/en-us/about-danfoss/our-businesses/power-solutions/

MECHATRONICS & MOTION CONTROL

LoPro V6 Extended Line

The expanded LoPro actuator line from Bishop-Wisecarver makes it more versatile than any other actuator. LoPro has always provided reliability, especially in harsh and extreme environments. This includes resistance to debris, corrosive washdowns, extreme temperatures and more. The variety of drive systems captures a range of speed, thrust, length and accuracy capabilities. The product features an Enhanced Stiffness configuration provides greater stiffness and moment load capacity. Vibration-resistant wheel plates improve performance in vehicles, agricultural equipment and more.

BISHOP-WISECARVER
www.bwc.com



FLUID POWER COMPONENTS

3 NPT Heavy Duty Threaded Line Vac

EXAIR's 3 NPT Heavy Duty Threaded Line Vac is a powerful in-line conveyor that transports high volumes of material through ordinary pipe. Designed for rugged, industrial applications, it is made of a hardened alloy to prevent premature wear when transporting abrasive or heavy materials like garnet, glass, sand, tumbling media and metal fittings. They feature large throat diameters to convey more material over long vertical/horizontal lengths. Utilizing a pressure regulator, conveyance rates can be finely tuned for the application.



EXAIR CORPORATION
www.exair.com

MECHATRONICS & MOTION CONTROL

The Electromechanical Cylinder EMC-HP

Compact power with greater freedoms, less maintenance

EMC-HP - THE RELIABLE CYLINDER FOR HEAVY LOADS, HIGH-PRESSURE AND SHEET CONFIGURABLE

KEY TECHNICAL DATA

- Max. bore diameter: 100, 125, 160, 200 mm
- Max. stroke: 1,000 to 1,500 mm
- Max. pressure: 350 bar
- Max. flow rate: 1,000 l/min
- Max. weight: 1,000 kg

The EMC-HP is a high-power electromechanical cylinder specifically developed for heavy-load applications. Robust and compact, it guarantees a long service life and continuous performance even under the harshest conditions thanks to new sealing concepts, the optional unique water cooling on the drive screw, and maintenance-friendly lubrication. A high-precision planetary screw drive ensures exact positioning with maximum control accuracy. The EMC-HP is a highly reliable cylinder, even when subjected to continuous high forces.

BOSCH REXROTH
www.boschrexroth.com/en-us

MECHATRONICS & MOTION CONTROL

Modular Gantry Robot for Automated Liquid Handling

The Modular Gantry Robot for automated liquid handling in laboratory devices allows OEMs to develop instruments targeted to their specific application in minimum time. Customized for load, speed and size, these gantry robots are preassembled or delivered as kits, including cabinet and supporting components. The platform features an open-source motion and fluidic application programming interface. A library of common drivers reduces the learning curve and enables development of an optimized control strategy.



FESTO
www.festo.com/us/en

MECHATRONICS & MOTION CONTROL

pneumagiQ PQ90

pneumagiQ PQ90 is the world's first multi-gripper platform. Featuring a single compressed air inlet and integrated pneumatic controls, PQ90 is a plug-and-play solution that interfaces two pneumatic grippers at 90 deg. offset with any robot. It features a built-in air blow-off port, sensor connectors, and single-cable communication means PQ90 can eliminate the need to source components and depend on skilled engineering resources. PQ90's ultra-low weight, IP66 rating, and minimalist design maximizes the usable payload and freedom of motion of the robot.



IMPAQT ROBOTICS
<https://impagtproject.eu>

MECHATRONICS & MOTION CONTROL

ION/CME N-Series Digital Drives

ION/CME N-Series Digital Drives are compact, PCB-mountable modules that provide high-performance motion control, network connectivity and power amplification for Brushless DC, DC Brush and step motors. Three power output levels are available: 75, 350 and 1,000 watts and communication options include Ethernet, CAN, RS232, RS485 and Serial Peripheral Interconnect. N-Series IONs are fully programmable and perform profile generation, PID servo compensation, direct encoder input, field-oriented control and other motion control functions.

PERFORMANCE MOTION DEVICES
www.pmdcorp.com

ROBOTICS

MP1000R Autonomous Mobile Robot

Using Bosch Rexroth's ROKIT Locator Software, the MP1000R, made in collaboration with mobile robotics company Geek+, can navigate autonomously in highly dynamic environments without additional infrastructure. The MP1000R is a scalable solution which can replace manual forklifts and tuggers, leading to improved efficiency and safety. The MP1000R can safely and autonomously transport materials on pallets or shelves within a facility with flexibility similar to human-operated equipment and has a max payload of 1,000 kilograms.



BOSCH REXROTH, in Collaboration with GEEK+
www.boschrexroth.com/en/dc
www.geekplus.com/en



ROBOTICS

Kria KR260 Robotics Starter Kit

The Kria KR260 Robotics Starter Kit is a scalable and out-of-the-box development platform for robotics. It provides a seamless path to production deployment with the existing AMD-Xilinx Kria K26 adaptive production SOMs. The SOM starter kit enables rapid development of hardware-accelerated applications for robotics, machine vision and industrial communication and control. The KR260 delivers nearly a 5-times productivity gain, up to 8 times better performance/watt and 3.5 times lower latency compared to competitive GPU solutions.

AMD
www.amd.com/en



ROBOTICS

UR20

The new UR20 cobot can handle heavier loads up to 20 kg with a greater reach of 1750 mm. It's the lightest robot on the market in its payload and reach class, weighing only 64 kg with a small footprint of about 245 mm. The cobot features an all-new joint design, increasing all joint torques approximately 25%, joint speeds by as much as 65% and TCP speed of 100%. The updated software brings smoother motion and increased uptime.

UNIVERSAL ROBOTS
www.universal-robots.com

SENSORS

SDBT-MSX



The Festo SDBT-MSX is the world's first proximity switch with automatic switching point adjustment. Simply install the SDBT-MSX near the approximate end position, connect the cable to the controller, and turn on the system. Since the switching point is learned during operation, there is no need for a power supply during installation. Programmable to PNP/NPN and NO/NC, as well as defining the switching window range reduces the variety of switches in inventory. SDBT-MSX is designed for T-slot mounting.

FESTO

www.festo.com/us/en

LoRa Edge™ LR1120 New Global Coverage



SENSORS

LoRa Edge LR1120

The LoRa Edge LR1120 is an ultra-low power chip targeting global geolocation applications. It provides multi band LoRa and Long Range-Frequency Hopping Spread Spectrum (LR-FHSS) communication over sub-GHz and 2.4 GHz Industrial, Scientific and Medical (ISM) bands and licensed S-Band for satellites. It integrates a Cloud-native multi-constellation global navigation satellite system scanner and a passive Wi-Fi MAC address scanner, both leveraging Semtech's LoRa Cloud services.

SEMTECH

www.semtech.com

SENSORS

AWR2944 Single-Chip Radar Sensor

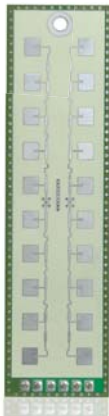
Empowering automakers to develop vehicles with increased visibility of their surroundings, the high-resolution 77-GHz AWR2944 single-chip automotive radar sensor from Texas Instruments can help automakers meet the latest automotive safety regulations and provides best-in-class radio frequency performance in a small form factor. The AWR2944 integrates a fourth transmitter to provide 33% higher resolution, enabling vehicles to detect obstacles more clearly and avoid collisions. The sensor's unique hardware improves the ability to sense oncoming vehicles at distances up to 40% farther away.

TEXAS INSTRUMENTS

www.ti.com

SENSORS

IMD-3101 Radar System For Motion Control Applications



With its special designed radar beam, the IMD-3101 offers reliable motion detection for sensor controlled light automation in warehouses. Its features perfectly meet the requirements of monitoring aisles in high-bay warehouses. The narrow aperture angle sets it apart from the typically wide-angled motion sensors. Thanks to the smart antenna design and modern signal processing, the detection focuses on a limited field to prevent interferences or unwanted triggers caused by movements in neighbored aisles.

INNOSENT GmbH

www.innosent.de/en/index

SENSORS

6VW Predictive Maintenance Multimodal Sensor

The 6VW series IoT sensor delivers insights via the Sensata IQ platform and can monitor each asset using six sensing modalities: vibration, temperature, acoustic emission, speed, humidity and magnetic flux. Using powerful AI-driven algorithms explicitly designed for rotary assets data from the sensor is analyzed at the edge for anomalies and then pushed to the Sensata IQ cloud-based platform for analysis and data visualization. The platform identifies potential faults, calculates the asset's projected remaining useful life and delivers alerts to various users.



SENSATA TECHNOLOGIES

www.sensata.com

SENSORS

2 Series Mixes Signal Oscilloscope

The 2 Series MSO is the industry's first portable oscilloscope that provides benchtop performance in the field and lab without sacrificing functionality. Weighing less than four pounds and only 1.5 in. thick, its intuitive UI and sleek design feature a 10.1 in. touchscreen, conventional control knobs and optional hot-swappable battery back providing up to eight hours of power. The scope offers unmatched performance and portability, measuring bandwidths up to 500 MHz and providing an optional arbitrary function generator, built-in pattern generator, voltmeter and frequency counter.



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www.tek.com/en



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www.manuli-hydraulics.com

Sensata Wireless Sensor Uses AI and Machine Learning to Improve Predictive Maintenance

The 6VW sensor uploads data to Sensata's cloud-based platform where sophisticated analysis creates deeper insights into potential rotary asset faults.

by Sara Jensen

Sensata Technologies has introduced the new wireless 6VW series IoT (Internet of Things) sensor designed to aid predictive maintenance of rotary assets. The sensor delivers information to the recently launched Sensata IQ platform—a cloud-based platform which uses artificial intelligence (AI) to process data from Sensata IoT devices.

According to Bryan Siafakas, director of Product Management for IoT Solutions at Sensata Technologies, only about 15% of rotary assets are currently monitored in a typical factory today. “This solution is really driving at enabling customers to monitor the remaining 85% of their plant’s assets.”

This is particularly important with the ongoing skills gap and labor shortages facing manufacturing and other industrial applications. “We’re seeing a big exodus of maintenance and plant personnel who had worked [at a facility for] 30+ years that could just walk by a machine and be able to hear it



The 6VW is a multimodal sensor which can detect vibration, temperature and acoustics to get more accurate data on how rotary assets are performing.

and say something doesn't sound right.” Newer employees do not yet have that level of expertise.

With the 6VW sensor, manufacturers can bridge that skills gap by putting the sensor on their machines to measure vibration and acoustics to detect potential faults and optimize maintenance workflows.

A More Flexible, Reliable Wireless Sensor

The 6VW is a wireless sensor capable of operating on cellular, LTE or Wi-Fi. It is a multimodal sensor which allows collection of various data points beyond vibration due to sensor fusion onboard of several sensors, says Siafakas. The sensor is able to collect temperature, vibration and acoustics information to provide customers with a more accurate picture of the health of their machine.

Collecting acoustic information is important, says Siafakas, “because it allows you to detect some higher frequency faults such



The Sensata IQ platform makes it easy to deploy asset health monitoring to prevent unplanned downtime within manufacturing environments.

as lubrication faults which a typical vibration sensor is not able to detect.”

Essentially, a wider range of faults can be detected, and more alerts sent to the maintenance team so they can plan accordingly. The 6VW sensor can also do electrical detection, expanding upon the types of faults to which it can alert personnel.

Siafakas says the sensor is easy to install; it mounts via a magnet and can be configured within 5 min. using Sensata’s mobile app. He explains that users answer a few questions during the configuration process based on information found on the motor to which the sensor is mounted.

He also notes the 6VW is a versatile solution capable of working with a range of rotating assets including fixed speed and variable speed motors, whereas other solutions are not able to work with variable speed motors.

There is a database of bearing knowledge built into Sensata’s technology as well. This includes data on the critical frequencies at which bearings operate, allowing for a higher level of confidence in predicting faults says Siafakas.

The reliability of the technology is a key feature, as well. Some industry reports have put fault characterizations at about 60% but Sensata feels its is greater than 95%. “If we say that’s a bearing fault, we’re greater than 95% confident that actually is indeed a bearing fault,” says Siafakas. “That’s really important because if you provide false alerts or notifications, the maintenance personnel are going to lose trust in the system and not use it.”

This is also beneficial for ensuring the maintenance personnel come prepared to solve the problem. If they are alerted there is a bearing fault, they can be sure to come with the right tools and spare parts to fix the problem immediately.

Sensata’s technology also notifies personnel of a component’s remaining useful life. While there may be a fault, knowing how soon that could cause a critical problem enables maintenance personnel to take appropriate action. “If it’s three months it’s not as critical as something that is going to [fail] in two days,” says Siafakas.

All of this helps to reduce unplanned downtime and improve overall equipment effectiveness.

Built-in Intelligence and Cloud Capabilities Improve Analytics

Sensata’s new 6VW sensor has intelligence and processing built into it. Siafakas says it is a hybrid of sorts as it utilizes edge computing as well as sends data to the cloud. “By default, it sends data to the cloud [about] four times a day. But if [the sensor] detects an anomaly on the edge it will upload that data to the cloud for more sophisticated analysis,” he explains.

Combining edge computing and analysis in the cloud ensures no faults are missed and the company can provide insights to customers with a high degree of confidence.

When data is sent to the cloud—the Sensata IQ platform—Siafakas says sophisticated analysis can take place to characterize and detect faults through the use of AI and machine learning. Data from other Sensata sensors can also be uploaded to easily monitor data from all of the sensors on an asset in one place.

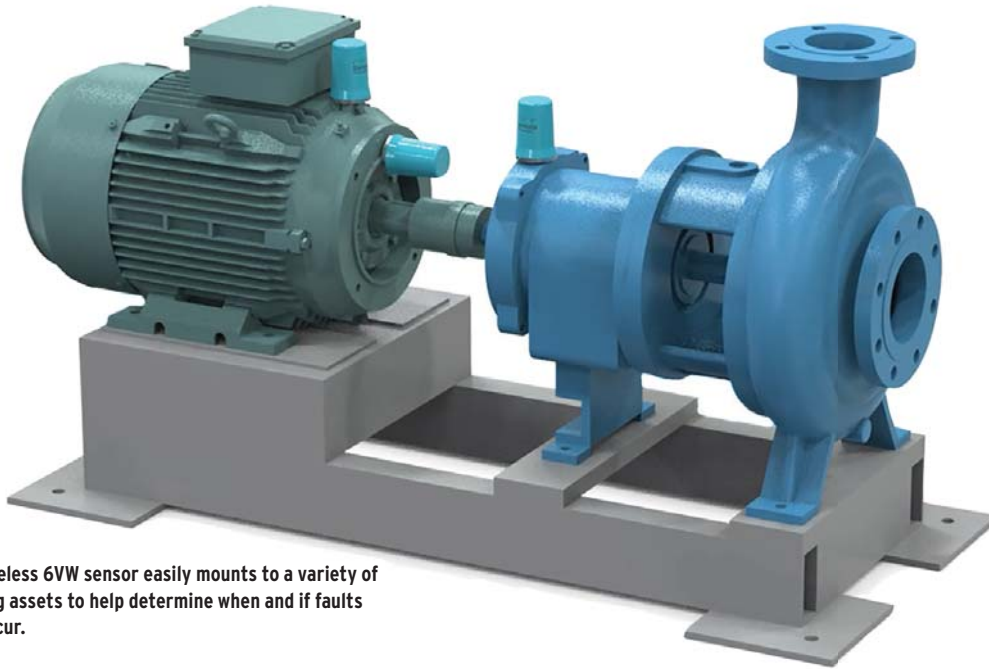
Alerts can be sent to mobile phones and via email, making it easy for personnel to stay on top of any potential issues. These alerts are configurable, allowing users to set their own thresholds for when they would like to receive an alert.

Siafakas says the AI and machine learning within Sensata IQ—made possible through a partnership with Nanoprecise—can baseline the data it receives from the rotary asset, essentially learning what its normal operation is. And it will continue to learn over time and provide alerts about any deviation from that baseline performance.

Nanoprecise brought its experience with AI and machine learning for rotating equipment which paired well with Sensata’s sensor expertise, says Siafakas. “They really allowed us to give a high degree of accuracy of prediction of motor faults and fault characterization.”

This technology pairing allows Sensata and its customers to make sense of the sensor data—something customers were looking

[Maintenance]



The wireless 6VW sensor easily mounts to a variety of rotating assets to help determine when and if faults may occur.

to get from the company—and give actionable insights to maintenance personnel.

Having the ability to analyze sensor data in the cloud is vital to ensuring a manufacturer's uptime. "If you look at a

typical manufacturer, they have about 144 unplanned downtimes a year which cost, for an average plant, about \$2.3 million a year," says Siafakas. "So, leveraging solutions like Sensata IQ and the 6VW allows

customers to detect those faults before they happen and reduce the associated downtime that happens with them."

In addition, a manufacturer can better streamline their operations and reduce



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maintenance costs through inventory management. Many will have backup motors sitting on a shelf in case there is a failure, and these can be expensive as well as tie up capital. With these Sensata solutions, personnel can better predict faults and when they will actually need replacement parts.

Growing Need for Digital Predictive Maintenance Tools

Siafakas says the company will continue to evolve the Sensata IQ platform with new features added for which its customers are looking.

“I absolutely see a big need in the market right now for this,” he says. Many companies still have a person coming and walking around to monitor assets, or there are assets which are not currently being monitored in real time.

There is an opportunity now to minimize or eliminate the number of manual checks on assets. Technology such as wireless

Technology such as wireless sensors and connectivity has progressed, making a better case for their use in predictive maintenance.

sensors and connectivity has progressed, making a better case for their use in predictive maintenance. “I do see these solutions starting to disrupt that manual way of working,” says Siafakas. “I see an increasing reliance on sensors to be able to bridge the skills gap and reduce the manual walking around and report writing.”

The ability to utilize technology instead of people will be vital in the coming years to help overcome the labor shortage manufacturing is facing. Older generations are leaving the industry and fewer skilled workers are entering it, which will make it necessary for companies to find an alternative means

of replacing the years of knowledge those leaving will take with them. Technologies like Sensata’s predictive maintenance solution are seen as a means of doing so.

Return on investment (ROI) will also be a key driver for the uptake of these types of solutions. Current reports show an ROI of less than one year for many of these digital predictive maintenance systems says Siafakas.

As manufacturers see the ROI and other benefits, and transition more toward Industry 4.0 and beyond, “we’re going to see a large adoption of these systems in the coming years,” he concludes. **P&M**



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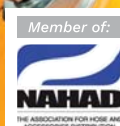
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With additive manufacturing, material can be placed only where necessary, helping to reduce component weight and machining costs.

Aidro Hydraulics & 3D Printing (a Desktop Metal company)

ADDITIVE MANUFACTURING Brings Opportunities to Improve Component Design and Production

New design options and reductions to production time and costs are possible with additive manufacturing.

by Sara Jensen

Additive manufacturing—also commonly referred to as 3D printing—continues to make headway in many industries, including fluid power.

Valeria Tirelli, president & CEO of Aidro Hydraulics & 3D Printing (a Desktop Metal company) and member of *Power & Motion*'s Editorial Advisory Board, said her company discovered additive manufacturing a few years ago. "At the beginning the idea was to use additive manufacturing for making tooling or prototypes for our hydraulics production." But as the company worked with it more and understood the potential of the technology, Aidro realized it could change how it went about designing its parts and adopt the principles of additive manufacturing, which is to add material only where it is needed.

As Tirelli explained, additive manufacturing offers a completely different approach from conventional manufacturing of hydraulics parts. Instead of starting with a metal block which is machined, metal powder is layered and added where necessary. This leads to the ability to create new, more optimized designs with varying geometries and even the ability to reduce part counts and component weight.

Improved Manufacturing Potential

Tirelli noted there are many advantages additive manufacturing can offer. Among them is the ability to integrate multiple parts into a single unit. Instead of assembling three or four components such as valves and manifolds, a single part can be designed which incorporates those components.

This can help with weight savings and eliminates the need for assembling as well as the potential for leakage from coupling multiple parts. It also reduces the amount of machining required for the different parts.

Improved sustainability is also possible with additive manufacturing, she said. Less material and energy are used than with conventional manufacturing methods. Because there is less material used, the amount of machining typically required is again reduced, which equates to less energy used to produce parts.

Creation of lighter-weight parts through the use of additive

manufacturing can benefit sustainability efforts, as well, particularly for the end use customer of the part. Vehicles or mobile machinery into which the lightweight parts are installed can benefit from improved fuel efficiency as use of lighter weight components helps reduce overall vehicle weight, and thus fuel use.

And as mobile industries move toward further electrification, the ability to create and utilize lightweight components will be particularly beneficial to compensate for the heavier weight of other components like batteries and ensure desired efficiency gains are achieved.

To help improve sustainability on the design side, PolySpectra—a company developing advanced photopolymers for additive manufacturing—has created an augmented reality (AR) tool which can help prove out designs before creating them. This helps to reduce the amount of material that would be used for a prototype that may just then get thrown away.

“There is so much 3D printing that happens just to visualize how a part is going to [look and feel],” explained Raymond Weitekamp, founder of PolySpectra. No matter how good a person is with CAD and evaluating all possible angles and dimensions of a part, it will still wind up being printed then possibly thrown away because the shape was not what originally thought.

PolySpectra’s free, web-based tool allows users to upload their STL files—the standard file type for 3D printing—to get an instant AR preview of their design. Once uploaded, the AR rendering can be moved via the computer’s cursor to see how it will look from a variety of angles. A QR code allows files to be viewed on mobile phones for further ease of use. With this tool, design teams can evaluate what Weitekamp referred to as a massless prototype. Although it cannot be tested in the same manner as a physical prototype, it allows evaluation of designs at an earlier stage and the ability to make modifications before printing, which reduces material waste and printing time.

While the rendering in the AR tool may not be perfect or look exactly the same as it would in real life, said Weitekamp, it allows fast iterations of designs. “You could change the design and reload the preview every few seconds if you needed to in that phase,” he said, which could benefit the development process.

He noted that many times what may seem like a good design in CAD once 3D printed turns out not to be. By using the AR tool, designs can be better proved out without wasting material, time or fully printed parts.

As AR technology continues to advance, so too will the possibilities for quickly evaluating and modifying designs. “What I think is really exciting about this idea of massless manufacturing or prototyping is you can still have [customization and options] with a dramatically lower carbon footprint,” said Weitekamp.

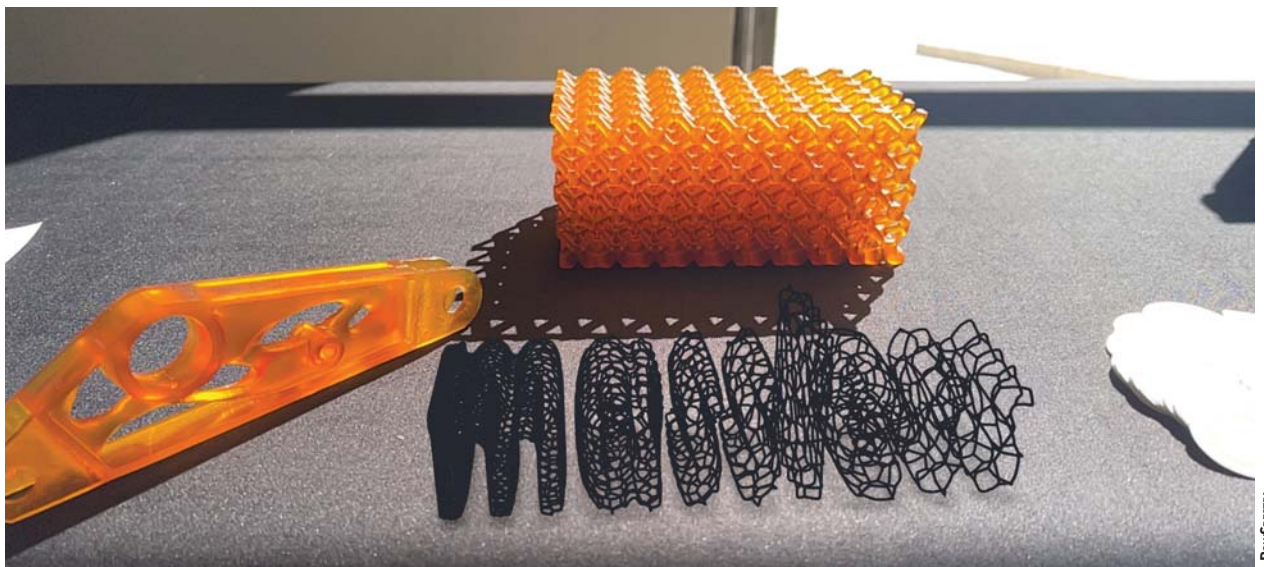
Digital and Supply Chain Opportunities

Digitalization of the manufacturing process is another advantage additive manufacturing can provide. Tools like PolySpectra’s, for instance, can enable digital files to be easily viewed and shared.

“One of the visions of 3D printing is to go towards what I would call distributed digital manufacturing, but one version of that some people call the virtual warehouse,” said Weitekamp. Instead of having a warehouse full of components which need to be kept track of, companies could have a database of files. When parts are needed, the appropriate files are found and 3D printed.

This could greatly save on warehousing space as well as time spent tracking the whereabouts of parts. It could also aid supply chains by minimizing the number of parts a company ships as it could 3D print them instead.

Tirelli also noted the benefit of additive manufacturing for spare parts production. “With additive manufacturing, we have the possibility to create a digital inventory. So instead of having a physical part in inventory and keeping it for maybe 20 years,



A variety of 3D printed designs can be evaluated when using massless prototyping like PolySpectra's augmented reality tool.

[3D Printing]

with additive manufacturing we can keep the file [and 3D print] on demand.”

Production on demand can be used to produce parts that might otherwise be out of production as well as offer the opportunity to produce parts where and when they are needed because files can be kept and sent digitally. This can enable local printing of parts, said Tirelli, which saves on costs not only for inventory but also shipping and transport.

Vehicle OEM Daimler Buses announced in May 2022 owners of Mercedes-Benz and Setra buses and touring coaches will be able to 3D print spare parts at their own premises. Customers will need a certified 3D printer, a one-off registration process and a license for the required part in the desired quantity, the company said in its press release announcing this new offering.

This new offering makes it quicker and easier for customers to get the spare parts they need, helping minimize their downtime



With the ability of customers to 3D spare parts themselves, Daimler Buses is helping to digitize and decentralize inventory and production which has economical and sustainability benefits.

which can be costly. Starting in July/August 2022, more than 100 parts of the currently more than 1,500 different 3D-printable components will be available as the first licenses from the digital warehouse said Daimler Buses in its press release. More parts will be added in the future.

Improving supply chains through these digital capabilities is a key advantage many see for additive manufacturing. By enabling parts to be produced on demand where needed, there will be less reliance on shipping and thus fewer issues with supply chains as many are currently facing.

Tirelli noted the ability to integrate multiple parts into a single unit can also benefit supply chains by reducing how many parts need to be shipped.

In early May 2022, U.S. President Joe Biden launched a 3D printing initiative as a means of improving supply chains. Known as AM Forward, the goal is to have private sector companies purchase parts produced using additive manufacturing (AM) from smaller U.S.-based suppliers reports The Hill.

Initial companies participating in AM Forward include GE Aviation, Honeywell, Lockheed Martin, Raytheon and Siemens Energy.

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Material Options Area of Continued Development

The materials used for additive manufacturing remain an area in which companies are working to make further advancements. Weitekamp said PolySpectra's development of advanced photopolymers for additive manufacturing aim to overcome the durability issues of polymers typically used.

"Most polymers that can be 3D printed are not rugged enough to be directly incorporated into an industrial end-use component," he said.

As he explained, there are materials which become brittle when they get hot while others are tough but lose their mechanical integrity once they get warm. PolySpectra was founded to overcome this challenge by using completely new chemistry based on a catalyst which Weitekamp said won a Nobel Prize in 2005.

The result, COR Alpha, is a polymer which is capable of being tough and hot

Production on demand can be used to produce parts that might otherwise be out of production as well as offer the opportunity to produce parts where and when they are needed because files can be kept and sent digitally.

at the same time. This provides various industries with a material rugged enough to survive under higher temperatures and harsh environmental conditions, benefiting use for truck and car parts, medical devices, robots and more.

"Without that ability to meet the same performance or safety criteria of the existing injection molding or CNC methods, you can't even start to do the really fun stuff that additive manufacturing promises," said Weitekamp.

Despite PolySpectra's material being a polymer—or essentially a high-performance plastic—he said its properties

could enable it to be a metal substitute which could benefit manufacturers' lightweighting initiatives as plastic is a less dense material.

Metal additive manufacturing is an area in which a lot of research and development efforts are taking place, as well said Jeff Grabowski, manager of Business Development, QuesTek Innovations, LLC, during his presentation on materials performance for fluid power components at the National Fluid Power Association (NFPA) Fluid Power Industrial Consortium's (FPIC) March 2022 event. QuesTek is a provider of



HBC Ex radio remote controls.

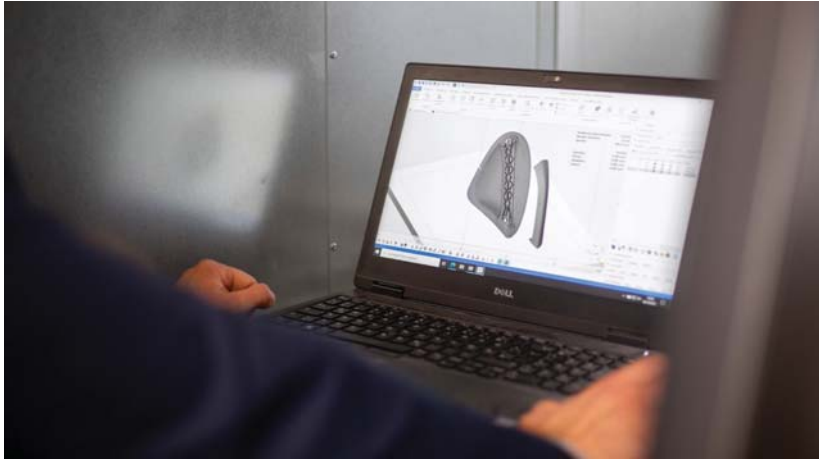
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Daimler Buses is making it possible for customers to now 3D print spare parts at their own facilities, making it quicker and easier to get parts and reduce downtime.

Integrated Computational Materials Engineering (ICME) technologies and is working to address issues the industry currently faces with using metals for additive manufacturing.

While technical progress has been made in regards to metallic additive

manufacturing, Grabowski said there are still many technical questions yet to be resolved regarding mechanical and metallurgical issues. Two of the biggest challenges, and areas in which QuesTek is focusing its research efforts, are issues with some materials and processes not being

suitable for use for additive manufacturing.

“Typically, the research in metal additive is taking legacy [material] compositions that have been around for 50+ years that were intended for large castings with slow cooling rates, or for forgings that are forged and heat treated,” said Grabowski.

Using these legacy compositions can lead to cracking or low strength when 3D printed. Completely different heat treatments are also necessary when 3D printing parts, he said, which is why most of QuesTek’s additive manufacturing projects are looking at ways to optimize the heat treatment process.

Grabowski said time and again QuesTek has demonstrated that no matter the metal type, proper heat treating of additively printed materials is vital to ensuring the desired strength or other properties are achieved.

QuesTek is also designing new alloys tailored for additive manufacturing which can provide desired properties while using fast cooling rates which cannot be achieved when using a slow cool casting process. The company has also developed a variant of the commonly used 17-4 stainless steel that can be 3D printed and offer the strength properties many applications look for without the need to treat the material.

Industry Challenges Yet to be Overcome

Return on investment (ROI) is chief among the challenges still associated with metallic additive manufacturing, said Grabowski. The cost of powder versus the cost of bar stock and the cost of printing versus the cost of machining are all aspects that need to be considered. Currently, when looking at these factors, metal additive manufacturing is more expensive, he said.

Aidro’s Tirelli agrees that additive manufacturing can be more costly than traditional processes due in part to it still being considered a newer technology. In addition, she noted there are fewer suppliers of metal powder—which is what Aidro uses for its additively manufactured parts—compared to conventional metal

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bar material, leading to its higher cost.

Industry mentality is another critical aspect which needs to evolve, said Tirelli. Hydraulics and the general mechanical industry is quite conservative, so even though innovations are taking place people within the industry need to open their minds to new design approaches like additive manufacturing. “Additive manufacturing requires a completely new mindset compared to the past,” she said and as engineers see the benefits and opportunities with this technology they will open their minds and start utilizing it more.

To help increase industry knowledge about additive manufacturing, she said Aidro’s approach is to share what it has done and discovered as it has used the technology.

Although costs in some regards may be higher when it comes to additive manufacturing, Weitekamp it might not actually be as expensive as thought because not all costs in the production process are taken into consideration. While a photopolymer may be more costly than a polypropylene or ABS plastic, there are other costs associated with the latter such as molding the plastic which can have a high tooling cost. And if the design changes slightly, there could more costs added he explained.

Overcoming psychological barriers will be important, said Weitekamp. People are used to the manufacturing technologies that exist today and have been around for decades, requiring a shift in mindsets and evaluating all potential costs of the production process.

Another key challenge Tirelli noted with additive manufacturing is the lack of knowledge about how to use it. When Aidro decided to invest in additive, she said the company trained its personnel on the technology as well as hired people from outside the hydraulics industry, but with expertise in additive manufacturing, to help expand its internal knowledge base.

Learning how to use the 3D printers as well as how to design and manufacture components using them takes time, and it can be a disruptive process for companies. But companies should prepare themselves for that because there are also many benefits to using the technology.

When choosing to use additive manufacturing, Tirelli said it is important to find the right products and geometries that will provide the most opportunities because it cannot be used to substitute production of all conventional parts. “We need to identify the good parts; these are

the parts with a complex geometry, are experiencing supply chain issues or have some specific requirements like being lighter in weight or more compact,” she said. “If we identify the good parts, then additive manufacturing will be a successful technology.” **P&M**

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Bosch Rexroth Launches Range of Electrification Products for Off-Highway Equipment

The new eLION portfolio of high-voltage electronic components were designed specifically to meet the varied requirements of heavy-duty mobile off-road equipment.

by Sara Jensen

Bosch Rexroth is launching a portfolio of high-voltage components for vehicle electrification specifically designed for off-highway mobile equipment. Known as eLION, the line of 700V components include:

- motor-generators,
- inverters,
- gearboxes, and
- software modules.

Additional electrical components such as DC/DC converters, power distribution units, on-board chargers and high-voltage cables are also included in the product range.

Electric Components Meet Heavy-Duty Requirements

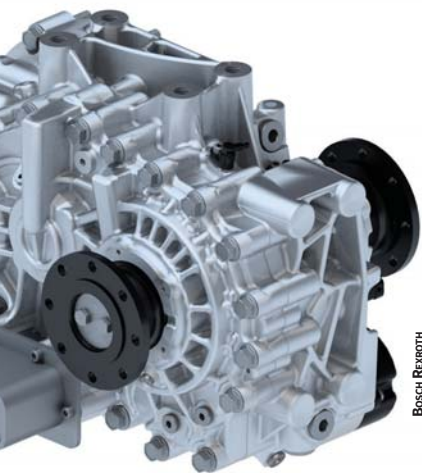
The eLION portfolio is defined by the fact it is robust, scalable, and safe said Matthias Kielbassa, vice president, Electrification, Off-Highway Mobile Machines at Bosch Rexroth, during the company's Electrified Mobile Product & Application Conference (EMPAC) at which it introduced the new product line.

As he explained, ensuring a robust design is vital for components used in mobile off-highway equipment as they work in demanding environments. Machines and their components are exposed to corrosion, dust, shock,

vibration, ambient temperatures and more which can cause wear and tear. Because of these factors, Kielbassa said the company decided to develop a dedicated portfolio of products capable of withstanding these environmental conditions instead of adopting existing products.

The entire portfolio is designed with high levels of shock and vibration resistance, as well as higher protection class ratings of IP6K9K. Components feature a shock resistance up to 50 G and vibration resistance of 10 G said Kielbassa. Additionally, all components can be operated without any derating over a wide temperature range. The motor-generator can be operated at a range of -40-100°C (-40-212°F) while the inverters have an operating temperature range of -40-85°C (-4-185°F).

Kielbassa said typical inverters used in factory automation applications can be operated between 0 and 40 C (32 and 104 F). "It is a completely different world and that is why it was necessary to develop a portfolio that can



Bosch Rexroth

The compact Rexroth eLION gearboxes for the electrification of mobile machines are available in a 2-speed version (eGFZ 9200, left) and in a 1-speed version (eGFZ 9100, right, shown in two possible configuration options).

[withstand] the operating conditions [of off-highway applications].”

Scalability of the components within the eLION portfolio was necessary as well to ensure they could meet the varied requirements of the different applications which exist within the off-highway equipment sector. Because of the wide array of duty cycles in this market, it was necessary to develop electric motors capable of meeting various applications’ torque, speed and power requirements.

Unlike passenger cars, off-highway equipment does more than just drive so there are different functions that need to be addressed said Kielbassa. As such, four electric motors with different diameters have been developed covering a power range of 20-200 kW with peak power of 400 kW. Nominal torque provided by the motors goes up to 1,050 Nm and maximum torque up to 2,400 Nm.

The motors are highly configurable to meet various application requirements. The length of the motors can be changed to suit specific machine needs—without additional costs to customers as it is a

configuration change, not an engineering one, he explained.

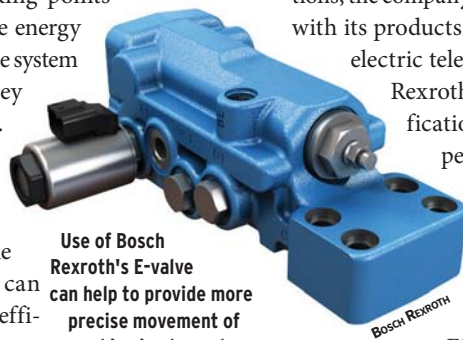
Changing the length of the motor provides the same impacts on torque and power as would changing the diameter of the motor. “We can also change the winding configuration of the stator by changing the number of windings and the wire diameter,” said Kielbassa. “That way we can change the nominal speed of the motor and change the electric power of the motor so that in the end, we are able to offer more than 80 different motor variants to the market.”

Making the electric motors configurable in this manner ensures they perform at their optimal working points and maximize energy efficiency of the system into which they are integrated. Use of slightly over- or undersized

motors, on the other hand, can bring down efficiency because the motors are not optimized for the system, and this could have a negative impact on total cost of ownership for an OEM’s customers.

Scalability applies to the eLION portfolio’s inverters as well. Kielbassa said there will be three different power classes available—80, 160 and 300 A—which support DC bus voltages from 400-850V. The inverters also include an application-specific high-overload capability of up to factor 2.5 for a maximum of 10 seconds. This prevents the customer from oversizing the machine’s electrical system and allows use of the overload capability when high torque is needed for just a limited amount of time, he explained.

Electrical and functional safety is also built into the components to ensure they perform as designed and do not cause technical issues for OEMs or their customers.



Use of Bosch Rexroth's E-valve can help to provide more precise movement of machine implements.

Additional Technologies Benefit Overall Performance

While eLION is comprised of various electronic components, other Bosch Rexroth technologies will work in tandem with them to help provide a fully optimized machine. These include hydraulics, software, and gearboxes. As Peter Fischbach, Electrification Sales and Product Management at Bosch Rexroth, said during EMPAC, the combination of these new electronic components with hydraulics really makes the difference in how a machine performs.

To test and evaluate the eLION components and how they work with other solutions, the company equipped a telehandler with its products. The Rexroth battery-electric telehandler enables Bosch

Rexroth to see how its electrification and other products perform for the machine’s driving and working functions. This helps to ensure they will meet OEM customers’ requirements.

Fischbach noted that despite the telehandler being converted to a fully electric power system, hydraulics were still needed for the implement. Bosch Rexroth integrated its eOC (electronic Open Circuit) hydraulic pump which is software controlled and driven by the eLION electric motor. Software control helps to optimize efficiency, noise and create a dynamic system he said.

He also said the pump is connected directly to the motor without shafts or bellhousing which offers many design advantages for OEMs such as a reduction in hoses routed through the machine.

Inclusion of the company’s E-valve aids with precise control of the telehandler boom. When the boom is lowered, no energy is produced, said Fischbach, benefiting operational efficiency of the machine.

The eLION portfolio also includes 1- and 2-speed spur gearboxes, the eGFZ 9100 and eGFZ 9200, which work in



Bosch Rexroth

Software control provides more dynamic control to optimize performance of the eOC (electronic Open Circuit) pump.

conjunction with the electric motors to optimize performance and efficiency. Equipped with its own cooling system, the gearbox is able to manage the temperature of the oil inside of it to ensure optimal performance.

The gearboxes can be provided in different ratios and assembled together with the eLION electric motors. They can be used to drive one or two axles using just the one motor, helping to provide efficient operation without a lot of space claim, which is important with electric machines.

With the GFZ 9200 2-speed gearbox, higher traction force can be achieved by pairing it with the electric motor. A specially designed clutch within the gearbox provides smoother gear shifting which helps to improve comfort for machine operators. Dr. Christof Lamparski, VP of Engineering, Gearboxes and Accessories at Bosch Rexroth, said during EMPAC that the absence of friction in the eGFZ gearboxes enables efficiency of 97%.

Market Drivers Necessitate New Electrification Solutions

The off-highway mobile equipment market is expected to continue transforming and become more connected, automated, and electrified said Kielbassa. “By 2030, we expect [around] 30% of off-highway applications will be electrified based on different topologies,” he said.

Because of the company’s deep understanding of drivetrains and working

hydraulics as well as the off-highway applications in which its technologies are utilized, Bosch Rexroth was able to “derive what electric products are needed to realize a highly efficient drivetrain,” said Kielbassa.

In addition, he noted the fact Bosch Rexroth has been supplying electric drives and controls for factory automation over the past 40 years which adds to the expertise it

could bring to the new eLION product line. As such, the company not only knows how to develop an electric product portfolio but also knows how to industrialize it.

Kielbassa said Bosch Rexroth chose to develop electric components in the 700V range because the commercial vehicle market is moving toward the use of higher voltages. Many manufacturers started at 400V but have moved to 700 and even 800V or higher depending on the application and size of the vehicle or machine, bringing about a need for more high-voltage components in the market.

Advantages to being in the 700V range are the ability to maximize energy efficiency of the entire electrical system and lower charging times for the machine’s batteries said Kielbassa. He also noted that anything above 100V is considered high voltage, therefore requirements for electrical safety are the same no matter the voltage level which benefits product development.

The company has and will continue conducting customer pilot projects with the new electrification components, and expects to begin production in 2023. **P&M**

OEM Customer Demonstrates Capabilities of eLION

Heavy equipment manufacturer Sennbogen is one of the customers which have piloted Bosch Rexroth’s eLION electrification portfolio. The OEM used eLION components to design a diesel electric 40-ton material handler.

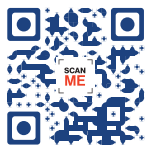
The machine features a downsized diesel engine combined with a generator to power the electric motor in the traction system. Some hydraulic components were eliminated, mostly from the drivetrain, though some are still used in the machine and connected to the diesel engine. According to Peter Fischbach, Electrification Sales and Product Management at Bosch Rexroth, the diesel-electric design enabled a 30% efficiency increase when the material handler was used in real-world working conditions.

In addition to the fuel consumption savings and other efficiency gains, noise levels were also reduced which can benefit the operator as well as others on the work site. Use of Bosch Rexroth software provided smooth and dynamic acceleration to the machine, said Fischbach, further benefiting performance and productivity.



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Mobile Hydraulics Market Rebound in 2021 Leads to **POSITIVE FUTURE**



Continued growth in the material handling and construction equipment sectors are benefitting the mobile hydraulics market.

by Sara Jensen

Agricultural equipment is a key utilizer of hydraulic components. The industry is experiencing challenges due to supply chain issues, but is expected to remain a valuable market for mobile hydraulics.

this time EMEA's share of agricultural machinery production declined as well, but the boom in the material handling sector in that region is benefitting the hydraulics market.

"EMEA's declining share of the agricultural machinery market is not due to a decline in machinery production in EMEA, but rather the rapid growth of agricultural machinery production in APAC (Asia-Pacific)," said Brianna Jackson, research analyst at Interact Analysis, in an interview with *Power & Motion*. "Within APAC, the agricultural industry is being increasingly mechanized to boost crop production to support a larger and consistently growing population."

According to the report, APAC has shown impressive growth over the past 20 years and accounted for 50% of the mobile hydraulics market in 2020. Growth in this market is expected to stabilize as it matures, reports Interact Analysis. APAC is expected to remain in positive territory in 2022, but growth will decelerate as the construction sector in this region begins to slow down.

"Over the past two decades, APAC as a region was able to establish itself as a manufacturing powerhouse as manufacturing operations from Europe and America were offshored in efforts to reduce production costs," said Jackson. "The growth of APAC-based vehicle

OEMs has also boosted the demand for hydraulics within the region. Additionally, APAC-based vehicle OEMs have increasingly shifted away from sourcing components from foreign companies giving boon to domestic suppliers."

Interact Analysis' report shows EMEA and the Americas both rebounded in 2021 from the contractions seen in 2020. The research firm expects this rebound to continue into 2022 as order backlogs are met.

Research conducted for the report indicates growth in the Americas will increase exponentially as major infrastructure projects go into effect around 2026 due in large part to the infrastructure bill passed by U.S. President Biden in 2021.

Key Sectors Driving Growth for Mobile Hydraulics

Heavy-duty mobile equipment applications such as construction, agriculture and material handling are strong market segments for hydraulics. Even with increasing electrification in these and other markets, hydraulic components will remain vital because of the force they can provide which is necessary in these heavier-duty applications.

In its report on the mobile hydraulics market, Interact Analysis outlines how these segments performed in 2021 and expected performance in the coming years.

Material Handling

According to Interact Analysis, the material handling market will see strong growth through 2026. This sector accounted for 25% of the market in 2020 and is expected to increase its share

After contracting slightly in 2020, the global mobile hydraulics market recovered in 2021, reaching a value of \$18.7 billion reports research firm Interact Analysis. The market achieved a compound annual growth rate (CAGR) of 5.2% between 2019 and 2021. Further growth is anticipated in 2022 and beyond.

Interact Analysis' latest report on the mobile hydraulics market, released in the spring of 2022, shows a boom in the material handling sector—due to the increase in ecommerce and general economic activity—was the strongest driver for the mobile hydraulics market's recovery. Increased demand for construction equipment benefited the market as well.

Rebound of Global Economy Benefits Hydraulics

In 2020, the mobile hydraulics market in EMEA (Europe, the Middle East and Africa) contracted 9.7% and the Americas 3.2% due to economic downturns caused by the COVID-19 pandemic. During

to 28.8%. Material handling is forecast to experience a CAGR of 8%, outpacing the growth of the overall market which is set to achieve a CAGR of 5.3%, reports Interact Analysis.

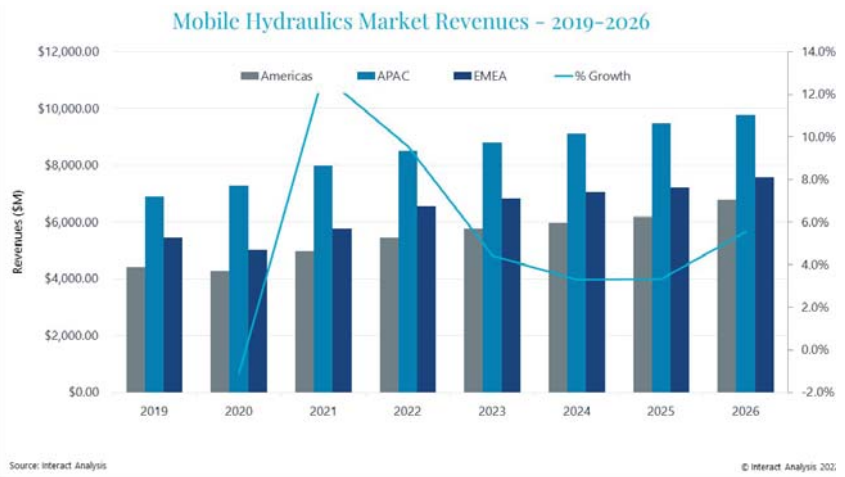
Jackson said the rapid rise of e-commerce is a key driver for the growth of the material handling market in EMEA. This in turn has increased its role as a user of hydraulic components, benefiting manufacturers and suppliers in that region.

Forklifts account for the majority of vehicles produced and sold in this sector, she said. "As a result of the rapid growth of e-commerce, the warehouse and logistics sector has exploded. Traditionally forklifts are a vehicle more heavily used in manufacturing, but as e-commerce has increased the number and square footage of warehouses, more forklifts are being used in the warehouse and logistics sector."

In November 2021, Interact Analysis released updated data on the global forklift market corroborating Jackson's analysis. The research firm foresees a positive long-term outlook for the market driven in large part by e-commerce, electrification and digitization.

Forklifts make it easier to move more material and goods, helping to improve the productivity and efficiency of operations. They are also seen as easier applications to apply electrification and automation technology, which will help further enhance productivity and efficiency.

These vehicles are also a key user of hydraulic components; their continued



market growth will therefore benefit the mobile hydraulics industry.

Construction

Infrastructure projects around the world have helped keep demand for construction equipment strong. Investments in infrastructure, like the U.S. infrastructure bill, are expected to continue at a positive rate in much of the world. This will benefit the mobile hydraulics market as construction equipment is one of the top industry sectors in which hydraulic components and systems are utilized.

In a press release from May 19, 2022, the Association of Equipment Manufacturers (AEM) said its members are reporting every construction equipment category remains strong. There are increases across the board for all products in 2022 compared to 2021, stated AEM in the release. It also noted the 12-month outlook appears positive with a slight decline expected for

total heavy/light equipment.

The association also reported in December 2021 that its members anticipated rising demand for construction equipment in 2022; at that time 44% said they anticipated demand to be above normal.

Europe's construction industry association CECE (Committee for European Construction Equipment) takes a monthly barometer of the industry based on input from those in the sector. Its most recent in May showed industry sentiment remains high, although its business climate index continued a modest decline.

Like many industries, those in the European construction equipment market are concerned about supply chains and input costs which have posed challenging for manufacturers of all types. CECE reports the industry sees North America as the most promising market followed by Germany, France, Italy and the CEE



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markets (EU member states part of the former Eastern bloc) in Europe.

Although the construction equipment sector has been strong in APAC due to rapid expansion of construction projects led by China, Jackson said deceleration—also led by China—is likely in the near future.

“Currently, China makes up around half the global construction sector within the mobile hydraulics market. As an industry, the construction sector is integral to the Chinese economy. The construction sector has historically been upheld by governmental investment in infrastructure as well as an investor-friendly lending environment,” she explained. “However, going forward as lending standards have tightened and demand for real estate has also taken a dive, construction starts have slowed which will likely cool down growth for the construction sector within the mobile hydraulics market.”

Agriculture

Agricultural machinery is another strong market for hydraulics. The sector saw positive activity in recent years in many regions of the world due to the need to continue providing food for a growing global population. Many regions of the world are also increasing their use of machines in place of human labor, further benefiting demand for agricultural equipment.

In AEM’s December press release reviewing the heavy

equipment outlook for 2022, 65% of respondents to its fall member survey indicated they thought demand for agricultural equipment would be above normal levels.

While 2022 started positively for the market, supply chain challenges are having a negative impact. AEM’s most recent tractor and combine report shows U.S. tractor and combine monthly unit sales declined in May, although sales in Canada remained in positive territory. Total farm tractor sales in the U.S. declined 14.5% and combine sales were down 12.7%. The only sector of the market with positive sales in May were for two-wheel drive 100+ hp machines, which grew 13.9%.

According to Curt Blades, senior vice president, industry sectors & product leadership at AEM, supply chains are the primary challenge for the agricultural equipment market at the moment. He also noted in AEM’s press release announcing its May agriculture machinery figures that 2021 sales were well above historic trends, which should be kept in mind when looking at 2022 figures.

Despite the most recent declines seen in the U.S. and EMEA’s previously noted reduced share in agricultural machinery production, overall this segment is expected to remain a key sector for the mobile hydraulics market, as there will continue to be demand for this equipment to help feed the world.

Current and Future Market Outlook

In general, the mobile hydraulics market is performing well and is expected to continue doing so even if at a slower growth rate. After the speed at which the global economy recovered in the second half of 2020 and throughout 2021, many experts believe market conditions will remain positive, but growth rates will slow. This is the case for mobile hydraulics as well as the markets it serves.

In the National Fluid Power Association’s (NFPA) most recent fluid power market data released in early June, growth trends continued although a shift to a slowing growth rate began in April 2022. Shipments for mobile hydraulic components declined in April compared to the previous month reported NFPA.

As with the many industries it serves, the mobile hydraulics market is also being impacted by supply chain challenges, geopolitical issues—such as the conflict between Ukraine and Russia—as well as inflation and other market factors.

Jackson said extended lead times, sky-rocketing raw material prices and a skilled labor shortage are among the supply chain factors negatively impacting the mobile hydraulics market. “Lead times are up across the board for most vendors, with lead times past 52 weeks in some cases as many vendors continue to deliver orders that were placed over a year ago,” she said. “Many of the vendors we spoke to [for the report] initially expressed that they expected supply chain issues to resolve in the latter half of 2022/early 2023.

“Sky-rocketing raw material prices as well as the semiconductor shortage are driving up production costs which in turn have been passed on to customers,” she continued. “Steel, aluminum, and iron ore prices have surged since the onset of COVID. The



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price of aluminum surged 50% between Q3 2020 and Q3 2021 while the price of iron ore increased by a similar magnitude within the same timeframe. Commodity prices will likely remain elevated for the foreseeable future as Russia's war on Ukraine continues to wreak havoc on the supply of raw materials and the cost of energy soars."

Interact Analysis foresees the average selling prices for mobile hydraulic components increasing between 1.6 and 2.1% annually through 2026 due to the rise in material costs. Jackson said price increases will likely slow down after 2023 but remain on an upward trajectory. "Over the long term, newer, more expensive hydraulics technology will begin substituting traditional hydraulics technology. As this happens, we expect rising average selling prices."

Among these newer technologies will be further integration of electronics and

software with hydraulics to make them more efficient, and due to the push toward further electrification.

According to Jackson, while conducting research for the mobile hydraulics report she and her colleagues found electrification was not increasing demand for hydraulic alternatives at the rate they anticipated. Cost remains a higher priority than efficiency for many OEMs, and uptake of alternatives such as electromechanical components is therefore slow. Part of the reason for this is a reluctance to change vehicle architectures.

"Improvements to hydraulic architecture are being overlooked by vehicle OEMs, yet, without these improvements, full electrification for off-highway vehicles will be virtually impossible," she said.

However, OEMs are expected to begin putting more emphasis on efficiency in the coming years which will lead to the use of newer hydraulic technologies.

Jackson noted hydraulic pumps show the highest growth rates "across all regions and sectors with an overall CAGR of 3.8% in the total global market." She said this is due to pumps being the least likely to be displaced as hydraulic architectures evolve.

"Modifying hydraulic architecture for pumps means making them smarter and able to withstand higher pressure," she explained. "Decentralizing hydraulic architecture could boost the pumps market as this would call for individual actuators to be controlled by their own dedicated pump."

Jackson concluded that in 2023, growth in the mobile hydraulics market will decelerate to 4.4%. "This will primarily be due to the supply chain stabilizing. To a lesser degree, higher interest rates may also cause the market to cool by causing businesses to reduce capital expenditure. We expect the next lull in the market to last from 2023-2025." **P&M**

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1. Detection Sensors can be Used In Multiple Applications

The Contrinex C23 standard and clear object detection sensors are mini rectangular photoelectric sensors for use in limited-space applications and are available in diffuse, diffuse with adjustable background suppression, retroreflective and through-beam models. Sensor housings have an IP67 enclosure rating and are ECOLAB-approved for use in hygienic areas. The Contrinex TRU-C23 UV photoelectric sensors are designed for detecting transparent objects, such as those made with plastic or glass. Since transparent materials absorb large amounts of polarized UV light, it is very easy to set the threshold at which these sensors switch. Select models are IO-Link compatible, providing continuous diagnostic information and easy remote sensor mode selection along with accurate object detection data. All sensor outputs are complementary, allowing them to be used as a light-on or dark-on sensor.

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2. Palletizer System Allows for Variety of Vendors, Uses

OnRobot Palletizer is a complete collaborative palletizing solution designed to take the physical and financial pain out of palletizing processes. The system allows an application-first approach to collaborative automation by letting users choose a palletizing system that works for their specific application needs, thanks to its space-saving footprint and ability to handle many different types of boxes,

packages, patterns, pallets and stacking heights. Compatible with collaborative robot and light industrial robots from the Doosan, FANUC, OMRON, Techman and Universal Robots brands, the OnRobot Palletizer is available as a complete out-of-the-box system or as individual components to create a mix-and-match solution. The OnRobot Palletizer includes four new hardware and software products.

OnRobot Palletizer
powermotiontech.com/21245399

3. Autonomous Transport System Offers Safe, Compact Solution

The MP1000R is a flexible and scalable solution which can replace manual forklifts and tuggers in manufacturing spaces, leading to improved efficiency and helping protect workers from potential injury. By using the ROKIT Locator Software, the MP1000R is able to navigate autonomously in highly dynamic environments without additional infrastructure.

When used for industrial material handling tasks, forklifts and tuggers are often involved in thousands of warehouse accidents each year, some of which can be fatal. The MP1000R can safely and autonomously transport finished goods, raw material components and work in process on pallets or shelves within the factory or warehouse, with flexibility similar to human-operated pallet jacks, forklifts or tuggers. Its compact size and zero turning radius make it ideal for operating in tight spaces or down to aisle widths of 1,400 mm (55 in.). Its fully loaded moving speed of 1.5 meters per second makes it perfect for moving pal-

lets and shelves between warehouses or automatic storage and retrieval systems (AS/RS) to production areas or shipping docks. Its location accuracy of ± 10 mm enables materials feeding to the production line, work-in-progress (WIP) transfer and finished goods transport.

Bosch Rexroth
powermotiontech.com/21245426

4. Development Platform Has RF, Optical I/O Connections

A 12-slot, 3U Development Platform aligned to SOSA 1.0 and CMOSS features high-speed RF and optical I/O connectivity on a number of key SOSA profiles and supports both IO-intensive and compute-intensive processor slots, two switch slots and one PNT slot as part of the test solution. In addition to the 12 payload slots, the new platform also provides two VITA 62 power slots. The unit is built on an Elma Type 39 84HP-wide E-Frame chassis that provides open access for testing and troubleshooting, further facilitating rapid application development. Dual high-wattage VITA 62 3U VPX pluggable power supply modules; a network timing card with radial support for IEEE 1588 precision timing and synchronization; and a 4590a 1/10/40GigE Ethernet switch with copper and fiber ports from Interface Concept round out the options available with the new development platform.

Elma Electronic Inc.
powermotiontech.com/21245591



5. Friction Bearing Joints Provide Variety for Packaging Solutions

Friction bearing universal joints are available in a variety of sizes, styles and materials, giving packaging equipment designers the widest range of standard universal joints to choose from. Components are manufactured to tight tolerances for higher accuracy, torque capabilities and durability when compared to commodity-style universal joints. Components are selectively heat-treated and ground for higher strength compared to competitor friction-bearing universal joints, giving them a precise and prolonged life. Single universal joints are best suited for space-constrained applications with angular misalignment up to 45 deg. Double universal joints are designed for applications with a wide distance between shafts or those in need of extreme angular misalignment accommodation up to 90 deg. The friction-bearing universal joints from can be equipped with nitrile boot covers for abrasion and oil resistance.

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6. Additive Material Offers Strength in an Eco-Friendly Footprint

The PK 5000 is an eco-friendly, powder-based additive material engineered to deliver improved strength, chemical resistance and resilience in comparison to general-purpose nylon materials, such as PA 12. This patent-pending material has been formulated to support highly demanding automotive, consumer electronics, defense, medical and industrial manufacturing applications. This new material features a unique combination of chemical and mechanical properties, such as high-impact strength, high-abrasion resistance and improved elongation over other nylon materials to withstand functional testing and use. The PK 5000 has high-barrier properties and low-moisture absorption, which may be critical for ensuring the quality and resilience of certain parts and products exposed to fuel and water. The polyketone resin used to make PK 5000 is an eco-friendly, low-carbon material that is made from carbon monoxide. The ability to leverage carbon monoxide, which is a leading cause of atmospheric pollution, may reduce overall carbon footprint.

Jabil Inc.
powermotiontech.com/21245757

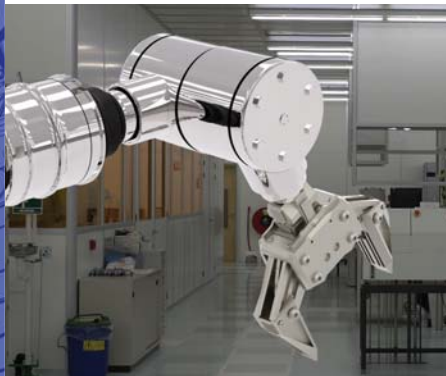
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GEMELS NORTH AMERICA	22
HBC-RADIOMATIC, INC.	27
HEINRICH & CO KG	7
HYDRAULEX GLOBAL	37
IFPE INTERNATIONAL FLUID POWER EXPOSITION	33
MANULI HYDRAULICS AMERICAS INC	19
MOCAP	26
MOTION INDUSTRIES	5
OP SRL	23
TOMPKINS INDUSTRIES, INC.	IFC, 28
VELJAN HYDRAIR PRIVATE LIMITED	1
WILKES & MCLEAN	26, 36

Robots Improve Cleanliness in Manufacturing Operations

Use of robots is on the rise in applications requiring a high degree of cleanliness to improve productivity and minimize contamination of sensitive components.

by Sara Jensen



According to analysis released by Reports and Data in late 2021, the cleanroom robot market will increase at a compound annual growth rate (CAGR) of 12.1% through 2028. This will enable the market to reach a value of \$12.06 billion.

Use of robots is increasing in these applications as manufacturers look to adopt more automation and improve the cleanliness of their operations. Reducing the amount of people working in the area reduces the chances for contamination and the need to conduct cleaning which can improve productivity.

Reports and Data also notes the growth of medical and consumer electronics driving the need for robots to meet the needs of highly sensitive applications and stringent cleanliness standards.

Deployment of robots in general has grown over the past few years. A May 2022 *Insider* article reports orders for robots increased 40% in the first quarter of 2022 and were up 21% in 2021. A key driver for this is the tight labor market which was exacerbated during the COVID-19 pandemic.

Jerry Perez, executive director – Global Accounts at FANUC America Corporation, agrees the pandemic helped drive growth in robotics, including for cleanrooms, not only to aid with labor but

also the rise in e-commerce which took place during that period, as well as the need for medical supplies such as test kits.

He said during a webinar panel discussion with *Power & Motion* that FANUC has experienced record growth in the past two years and economists are projecting continued growth for robotics over the next decade.

How Robots Can Benefit Cleanliness

Removing the human factor is the key advantage to deploying robots in cleanroom and other applications requiring a high degree of cleanliness, said Perez. Doing so reduces the chances of particles and other contaminants from causing potential issues.

Perez also noted the ability to reduce the amount of sanitization equipment that may be needed on site, which helps to reduce overall production costs as well as time spent cleaning.

To ensure the cleanliness of the robots themselves, the design of the robot is an important factor. As such, companies like igus are developing components which are durable and eliminate the need for lubrication.

Dylan Pollack, robotics product

WATCH AND LEARN MORE!

Register for our webinar, "Robotics Use Growing in Clean room Applications", featuring a panel discussion with Dylan Pollack, robotics product specialist at igus, Inc., and Jerry Perez, executive director - Global Accounts at FANUC America Corporation at powermotiontech.com/21243502.

specialist at igus, Inc., said during the *Power & Motion* webinar that many of the components developed by the company for robots are lubricant free and feature a high level of corrosion resistance. Doing so minimizes the amount of maintenance necessary on the robots, which not only benefits productivity but also keeps people from entering the cleanroom environment and causing potential contamination issues.

The needs of the application will determine the design of the robots utilized. For particularly sensitive applications the robots and their components may be specially sealed and equipped with stainless steel hardware, noted Research and Data noted in its press release announcing the release of its cleanroom robot market report. The research firm also noted a focus on ease of use when developing robots for these types of applications to ensure they can easily be integrated into operations and maintained.

Pollack said igus offers robotics components with chemical-rated resistance and FDA (U.S. Food and Drug Administration) approved bearings, which can be beneficial for use in robots for various applications requiring a high degree of cleanliness.

Research and Data is forecasting North America and Asia-Pacific to be the regions with the highest growth rates for robotics in the coming years. North America had the largest revenue share in the global market in 2020, which is expected to continue as more companies look to update and automate processes.

Perez concluded by noting the cleanroom robot market is a mature one. So not only will there be growth from new applications in which the robots can be used, but also replacement of older technologies with new, more advanced robot designs which will benefit the market and those who supply components to it. **P&M**



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