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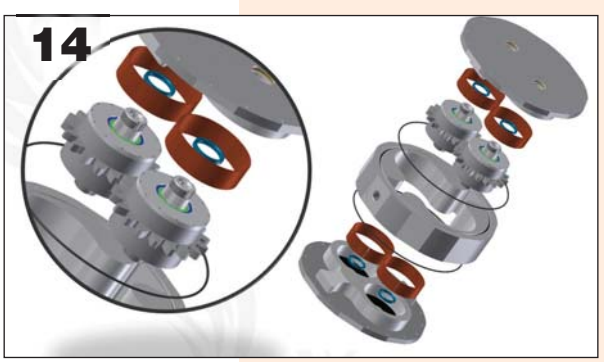

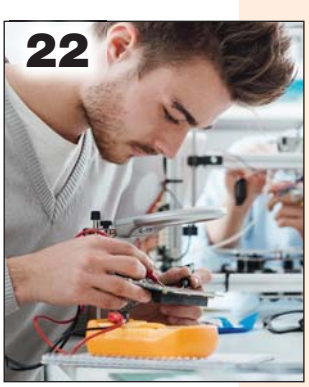

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How Future Emissions Regulations Could Impact Fluid Power

On Aug. 25, the California Air Resources Board (CARB)—an agency which oversees air pollution control efforts in California which often influence those in the rest of the U.S.—announced the approval of the Advanced Clean Cars II rule which will accelerate zero-emission vehicle (ZEV) sales by 2035. The new rule sets up a roadmap for 100% of new car and light truck sales in California to be ZEVs; this includes plug-in hybrid electric vehicles (PHEV).

So how will this impact fluid power manufacturers? Well, greatly is the most likely answer. This new CARB rule and other similar types of regulations aim to increase development of alternatively powered vehicles as a means of helping reduce carbon emissions which will improve the environment and human health. And replacing internal combustion engines (ICE) with battery- or fuel cell-powered systems requires changes to many aspects of a vehicle, including hydraulic and pneumatic components.

In general, the shift to electrification and other alternative power sources will present several opportunities for the fluid power industry. There will remain a need for more traditional hydraulics and pneumatics technologies in many cases. But there will also come a need for the industry to re-evaluate component and system designs.

As electrification increases in almost every application, it will be important for manufacturers to ensure they are developing solutions appropriately. This was a key point made by Mike Terzo, CEO of Terzo Power Systems and member of *Power & Motion*'s Editorial Advisory Board, during the Sept. 1 (NFPA)/FPIC quarterly seminar focused on electrification in off-highway equipment.

In his presentation, Terzo noted how the correct approach needs to be taken when designing an electric-powered machine to ensure optimal benefits. This includes a possible redesign of the hydraulics. He said there can be extensive efficiency losses if the hydraulics system is kept the same and only the power system is changed.

Overall, he said there is optimism for fluid power in electrification if components and systems can be designed appropriately. The greater utilization of hydraulics on machines the better the use case for electrification there will be said Terzo.

Read an extended version of this editor's note at powermotiontech.com/21250000. And let us know what role electrification is playing in your company or design process. What further education is needed in the industry to aid the transition to electrification? What are the biggest challenges still ahead? Email me at editor@pmtmag.com or reach out to us on social media.

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NFPA Launches Electrification of Fluid Power Task Force

Industry members will work together to determine technologies and design impacts of electrification on fluid power components and systems.

by Sara Jensen

The National Fluid Power Association (NFPA) has launched a task force focused on electrification in fluid power which is having a large impact on the industry as well as those it serves.

"We all know that electrified off-highway machines is having a big impact on our industry," said Eric Lanke, President and CEO of NFPA, during the association's recent Industry & Economic Outlook Conference (IEOC) where the new task force was first announced. "And we all are wrestling with some of the confusion that still surrounds electrified terminology and different technologies in the marketplace. So, we view this taskforce as central to both our mission of strengthening the fluid power industry and as part of our commitment to updating the technology roadmap for our industry every other year."

Mike Terzo, CEO of Terzo Power Systems and member of Power & Motion's Editorial Advisory Board, will chair the task force. Terzo has several years of experience working on the electrification of hydraulic systems, particularly in heavy-duty applications and which is a key focus for his company.

Terzo will work together with Lanke and other members of the task force "to help us define the most common electrification architectures that are coming onto the market," said Lanke. Additionally, he said the group will describe the likely impact of those architectures on the fluid power industry and its various products, as well as explore strategies for effectively marketing fluid power products in this evolving space.

Currently there are about 40 people signed up to participate on the task force, said Lanke, and anyone with an interest in joining is welcome to do so. Those who are interested in participating can contact Lanke.

Goals for the Task Force

On September 1, the first meeting of the new task force was held following the NFPA's quarterly Fluid Power Industrial Consortium (FPIC) seminar. During this meeting, objectives for the task force were discussed which included exploring various industry myths, trends and buzzwords and how, if at all, they apply to the fluid power industry.

S. Jensen

Understanding how electrification could impact fluid power system designs will be vital as construction equipment and other machines move to battery-electric and other power systems.

Looking at the myths and trends will help to determine what information may be lacking in the industry. For instance, it was brought up there is not as much understanding regarding thermal management as there should be, making it a topic the task force wants to ensure it evaluates and informs the industry about.

Overviewing the buzzwords related to electrification also provides an educational opportunity. Terms like range anxiety, PEV (plug-in electric vehicle), well to wheel and others are often heard or read in relation to electrification but not everyone in the fluid power industry necessarily understands what they mean. By looking at which of these terms are most applicable and offering definitions, the task force can provide hydraulics and pneumatics professionals with a glossary of key terms they may need to know and understand when working in the electrification space.

A key objective for the task force is determining the definition of electrification for the fluid power industry. As was expressed during the meeting, it can sometimes be too broad a term which includes incorporation of electronics and software for performance enhancements. It was noted these are aspects of the process but it may be necessary to narrow the definition further to ensure the evolution in power sources—to batteries, fuel cells and other alternatives—currently taking place in the industry is included.

Once the task force is able to define electrification, it will be better able to determine the rest of its discussion points and information to share with the fluid power industry.

Ultimately, the goal of the task force is to get industry input on what is currently taking place regarding electrification and help educate fluid power professionals about this growing trend so they can appropriately design solutions for the market.

The task force plans to meet virtually once a month and is aiming to present its findings to the industry in the form of a white paper tentatively scheduled for publishing in March 2023, just in time for International Fluid Power Exposition (IFPE). P&M

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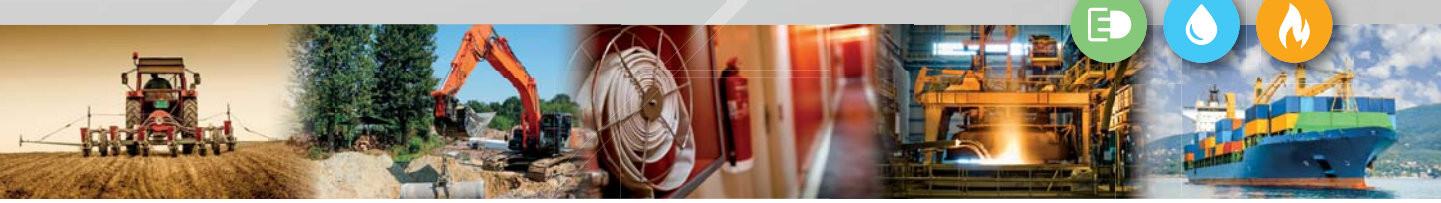

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New IFPE and CONEXPO Awards Program and Arbor Day Partnership Launched

AEM has introduced a new technology awards program and a partnership with the Arbor Day Foundation for the 2023 edition of IFPE and CONEXPO.

by Sara Jensen

Organizers for IFPE and the co-located CONEXPO-CON/AGG have added two new features to the 2023 show — a partnership with the Arbor Day Foundation and an awards program.

Through these initiatives, the events aim to provide an enhanced experience for attendees and exhibitors. Launching the awards program helps to highlight the latest technological innovations in the industry while partnering with the Arbor Day Foundation provides an opportunity to participate in sustainability initiatives that will benefit generations to come.

Arbor Day Foundation Partnership Aims to Reduce Environmental Impact

By collaborating with the Arbor Day Foundation, show owners the Association of Equipment Manufacturers (AEM) are hoping to help offset the carbon footprint created by a large tradeshow like CONEXPO and IFPE. The organizations plan to plant over 130,000 trees, one for every show registrant according to AEM, in U.S. forests with the greatest need.

In addition, attendees and exhibitors can make additional contributions to the tree planting efforts when they register for the show or on the show grounds at a special booth. A dedicated website has also been established for anyone to make a donation at any time.

"The opportunity to plant trees in conjunction with one of the largest trade shows in North America will have an incredible impact on our reforestation efforts," said Dan Lambe, Chief Executive of the Arbor Day Foundation, in AEM's press release announcing the partnership. "We know that trees are a key part of the solution to some of the biggest issues facing our planet, and partners like CONEXPO-CON/AGG and IFPE can help us achieve the scale necessary to drive meaningful impact in the places that need it most."

According to AEM, the partnership with the Arbor Day Foundation is just one of the ways the association is working toward improving the sustainability of the event. AEM notes in its press release announcing the Arbor Day Foundation partnership that reducing the carbon footprint of the show as

well as the industry is an important focus. Educational sessions at CONEXPO 2023 will include 13 focused specifically on sustainability topics such as tracking emissions, recycling and carbon neutrality.

"Our show is about finding solutions to challenges," said Dana Wuesthoff, CONEXPO-CON/AGG Show Director. "More and more, our attendees and exhibitors are challenged to think of the greater good in their business practices. Teaming with an organization like The Arbor Day Foundation provides an opportunity to not only impact the CONEXPO-CON/AGG & IFPE led reforestation project, but it also provides another connection for our exhibitors and attendees to work with to help navigate and align their business strategy and sustainability efforts in their communities."

Inaugural Next Level Awards Honors Advanced Technologies

AEM has launched the Next Level Awards program for CONEXPO and IFPE 2023 as a way to celebrate accomplishments exhibiting companies have made in developing next level technologies, products and services which can help advance the construction industry. Ten finalists will be selected and highlighted during the show; attendees will be able to vote at CONEXPO and IFPE on what they deem as the Contractor's Top Choice.

All CONEXPO and IFPE 2023 exhibitors in good standing who have created products for the construction industry are eligible to participate in the awards program. Per AEM, products must meet one of the following characteristics:

- Addresses a common industry need in a unique and innovative way.
- Benefits the industry across multiple applications for industry-wide adoption.
- Positively impacts the safety, sustainability, and workforce of the industry.

Applications are currently being accepted and can be submitted through November 30, 2022. Rules, regulations and further information can be found in exhibitors' CONEXPO and IFPE dashboard.

Products will be judged by a panel consisting of various member of the Associated General Contractors of America (AGC). The panel will select the 10 finalists who will be able to include recognition of their nominated product at their booth. On-site voting will allow show attendees to see the products in person, enabling them to make a more informed decision on which product to vote for as the winner.

"We are excited to recognize the innovative construction products that are taking the industry to the next level," said Wuesthoff in AEM's press release announcing the launch of the awards program. "Exhibitors, large and small, have an opportunity to be recognized for driving ideas and developing products or services to advance the industry. This is an exciting edition to CONEXPO-CON/AGG and IFPE and we strongly encourage exhibitors to enter." **P&M**

IDEA AWARDS WINNERS SELECTED

Hägglunds Fusion Drive System from Bosch Rexroth voted as Big IDEA winner by readers.

THE VOTES ARE IN, and readers of *Electronic Design*, *Machine Design* and *Power & Motion* have selected the 2022 IDEA Award winners. Readers chose the top products in eight categories and the single product with the highest number of votes overall received the Big IDEA Award. This year's recipient is the Hägglunds Fusion Drive System from Bosch Rexroth.

The 2022 IDEA Award winners are:

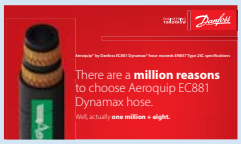
BIG IDEA: Fluid Power Components
Hägglunds Fusion Drive System
BOSCH REXROTH

Automation & Controls
AV/AES Valve System With Integrated OPC UA
Emerson

Design Software
Altimade
Altium LLC

Cloud Computing
Allen-Bradley ASEM 6300 Industrial Monitors
Rockwell Automation

Electric Drives
eLION Motor-Generators
Bosch Rexroth



Fluid Power Components
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Danfoss

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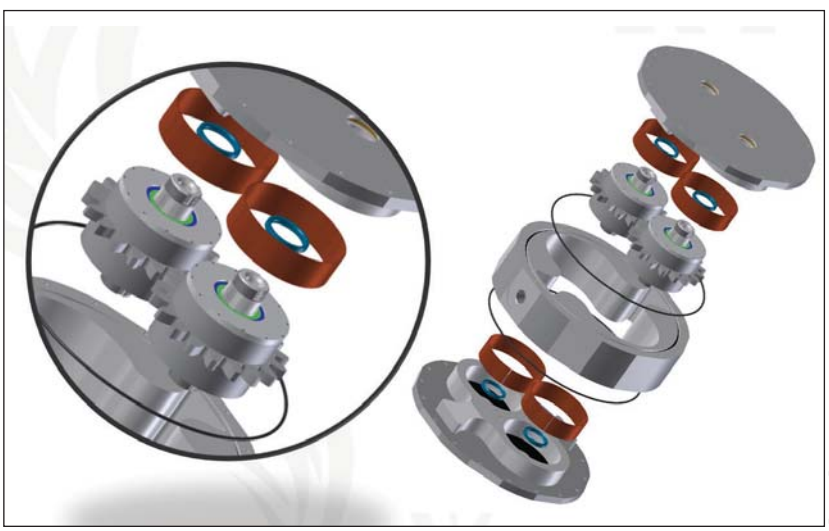
ELECTROHYDRAULIC SYSTEM Improves Efficiency Through Use of Drive-Drive Design

Project Phoenix's Independent Electrohydraulic System utilizes drive-drive motor technology to provide efficiency and precision improvements over traditional hydraulic systems.

by Sara Jensen



PROJECT PHOENIX

After eight years of development, Project Phoenix LLC is ready to bring its Independent Electrohydraulic System (IES) to the market. IES is an intelligent electrohydraulic solution designed to replace traditional hydraulic control systems.

In essence, it is a servo-driven, drive-drive hydraulic gear pump with integrated electronics and software which is designed to provide a 15× improvement upon traditional hydraulic systems currently available in the market.

The IES is comprised of the following components:

- one e-pump,
- two e-valves,
- one e-accumulator,
- a motion control package,
- a power supply, and
- one Energy Regeneration and Storage Unit (ERSU).

The system is compactly designed with the majority of the components installed within the pump housing which provides mounting flexibility.

It features "fly-by-wire" control technology which means everything is electronically controlled explained Tom Afshari, chief design engineer at Project Phoenix, in an interview with *Power & Motion*. There is no hydraulic line feedback, everything is controlled by electronic signals. "The hydraulics are completely segregated from the control loop which is 100% electric," he said.

This enables high-performance responses within the system as well as built-in redundancy to optimize operation.

New Motor Design Improves Precision and Efficiency

According to Afshari, the IES came about after the company invested in transverse flux motor technology. This high torque motor type provides high power at low rpms, typically around 900 rpm. He noted it is also a reverse motor in which the stator is the core of the motor and the rotor is on the outside diameter.

While working with the transverse flux motor, Afshari said he began thinking about how it could be utilized in the field of hydraulics. During his years of working in the hydraulics industry he heard from people that hydraulics is powerful but not precise. But he knew the industry could do better to improve the precision of hydraulics; once he saw the capabilities of the transverse flux motor Afshari said he knew that was the solution.

The IES features two of these high-torque motors integrated inside the e-pump casing, and their rotating outside diameter is what creates displacement said Afshari. The e-pump is described by Project Phoenix as a positive-displacement external gear pump. It is a drive-drive hydraulic pump powered by the integrated motors which are directly connected to spur gears.

Afshari said this design enables a transition from fluid power to motion control. New software algorithms were developed and work in tandem with the motors to provide more precise control of gear teeth movement.

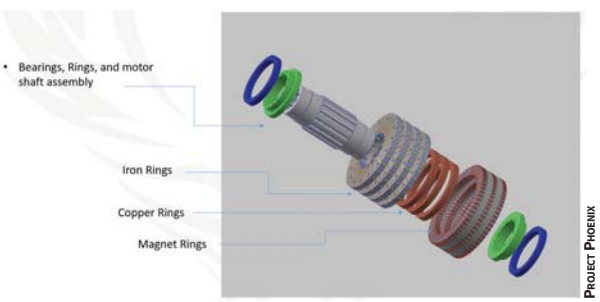
Using these algorithms allows the synchronization of the motor and gear movements to ensure consistent pump efficiency. Afshari explained that in a traditional system one motor-gear combination essentially runs the other and as pressure goes up, the main motor pushes the other so hard that wear and tear begins to occur, as well as other potential issues. But by going to a drive-drive system instead like the one utilized by the IES, that push of one motor-gear unit on another is eliminated and the motors equally contribute to the creation of displacement.

The motors are synchronized at about 5 Nm. If they go below this force level due to

contamination, viscosity drop, or another issue the pump automatically indexes itself to return to an appropriate working force said Afshari.

There are many efficiency gains which can be achieved with the IES. Its slip coefficient, for instance, is under 5% equating to 90-95% hydraulic efficiency at the pump he said. While pressure drops or other phenomenon are common with pumps used in the field, "port to port you have a significant improvement in efficiency," said Afshari. "Mechanical losses are put back in the system as energy savings due to the gear systems not rubbing or pushing each other [but instead being] independently driven."

Redundancy is another benefit offered by the chosen motor design. If something happens to one of the motors, the other can continue running the pump for a limited time which helps to reduce unplanned downtime.



PROJECT PHOENIX

A view of components within the Independent Electrohydraulic System.

Built-In Intelligence Benefits Performance and Maintenance

Electronics built into the IES—including pressure, flow and temperature sensors—as well as the software algorithms developed by Project Phoenix help to provide improved control of the system and its various components.

"That creates this very clean, very simple loop of information cycling through the system, and keeps giving the motion controller which runs the pump enough information to make determinations on how adjustments need to be made," said Afshari.

He explained that it is a closed loop communication system in which substantial amounts of information and data are being shared both within the IES and with other machine systems. This provides improved performance and maintenance capabilities. For instance, during testing the company found it could more accurately move hydraulic cylinders using the IES because of its built-in electronics and algorithms. And it can do so in a smoother manner than traditional hydraulic pump systems would.

This is possible because of the ability to control the pressurized fluid coming out of the pump, said Afshari. "We measure and know the flow, viscosity, pressure and temperature; everything is calculated and based on that can determine the appropriate displacement to move the cylinder."

Multiple IES can be used in series or parallel as well. Doing so is an easier setup for design teams because the pump is able to automatically determine if something is not configured or working as it should whereas with a traditional hydraulic system when it is set up incorrectly catastrophic failures can occur.

The IES, on the other hand, is able to provide an alarm and let users know what the issue is—such as pressure dropping on one pump but increasing on another which alerts them to the fact the ports are wrong. "It is very easy to determine what you are doing right or wrong because of the amount of data built into the system," said Afshari.

He noted the majority of the alarms the Project Phoenix team has seen with the system are from cavitations, wear and contamination. "The system is very sensitive. If suddenly there is a shaved metal piece which enters between the gears, an alarm goes out that something is out of balance."

One of the pumps the company has been testing has 6,000 hours on it and there are no marks on the gears, said Afshari. But if you were to look at a traditional hydraulic pump after 6,000 hours it would be a different story.

The pump's ability to improve precision and alert users the moment an issue is detected helps to reduce wear, and thus maintenance. How much lower maintenance will be is yet to be determined because the pump will need to be run 200,000-300,000 hours based on the work done so far. "6,000 hours would be just right for a traditional hydraulic system to measure the wear," explained Ashfari. "We cannot measure anywhere within this timeframe right now."

He said the pump housing will always have wear because it is usually made from a softer metal, but the core of it will remain intact.

In addition to the intelligence built into the IES, it can collect data as well throughout its operating life building up further performance metrics. With this information users can be more proactive with their maintenance. Should there be a potential issue, Afshari said users can look up the collected data to determine what is happening without having to stop the working machine to do so. This helps to minimize downtime, particularly in critical applications such as military or autonomous vehicles.

A Variety of Applications and Use Cases

Afshari said the IES can be used in applications where direct-drive hydraulic or other fluid driven systems are typically used—everything from prosthetics to the brakes in a car to the flight control system of a space shuttle.

As an example, he noted the benefit of using the IES for leveling systems whether in a car, ambulance or other application. Today, these use hydraulics, but if a leak occurs the system can lose its balance. The IES, however, is constantly adjusting itself to ensure it is performing correctly so even if a leak were to occur the leveling system would remain balanced, said Afshari.

The IES could also be beneficial for use in electric-powered applications as it can easily be plugged into a vehicle or machine's electronics system.

Project Phoenix plans to debut the IES during the 2023 International Fluid Power Exposition (IFPE). P&M

Present Opportunity for Pneumatics

Growing use of robots and cobots in manufacturing operations will benefit pneumatics suppliers whose solutions can provide a simple, cost-effective option for end effectors.

by Sara Jensen

Use of various types of robots and cobots are growing to help overcome the lack of skilled labor in the manufacturing industry.

Use of robots and cobots in manufacturing and other applications continues to grow. While not a new concept, they are still considered an emerging trend said Donna Ritson, president of DDR Communications, during her presentation at the National Fluid Power Association's (NFPA) 2022 Industry & Economic Outlook Conference (IEOC).

This is due in part to the exponential growth seen in recent years for use of various types of robots as companies look to automate processes and overcome labor challenges. With this growth have come opportunities for component suppliers such as fluid power and motion control manufacturers as their products are often utilized within robots.

According to the results of a recent study conducted by DDR Communications on robots and cobots for PMMI—a global resource for the packaging and processing industry— and the NFPA, there are several opportunities for fluid power manufacturers in this sector, particularly for those who develop pneumatic components.

Pneumatics Offer Benefits and Challenges

For the PMMI study, Ritson's company conducted 135 interviews and surveys with companies across the consumer packaged goods (CPG) industries which utilize a variety of production tools, including robots. Discussions were had with companies large and small within the CPG industries, as well as with robot manufacturers, suppliers and integrators to get their perspective on the state of the industry.

These discussions included learning more about the opportunities for pneumatics in the industry, of which there appear to be many. A key area robotics experts pointed to was the benefits of using pneumatics for end of arm tooling, said Ritson. "They are cost effective, easier to use, simpler to troubleshoot, lightweight [and] powerful," she said, adding, "Pneumatics are a key component in robotic end effectors."

Ritson added the use of pneumatics in robots can go beyond the typical applications of gripping, holding or moving something. They can also be used for driving, welding or boring tools at the end of a robot and other applications which are not "your typical lift, move, handle applications," she said.

While there are benefits to utilizing pneumatics for robots, one of the challenges expressed by the robotics experts Ritson's company spoke with is the limited access to compressed air. As robots begin to be used in more places around a manufacturing facility, they may be put in locations where there is no air supply, which could be a hinderance to the use of pneumatics.

Another challenge is the lack of familiarity with pneumatics technology; many companies are used to systems run on electric which requires pneumatic suppliers to educate customers on the role their technology can play. Per a quote Ritson showed during her presentation which came from the study, "Electrical control technologies are just more well known than the intricacies and challenges that you have with pneumatics."

Additional challenges pointed out by robotics experts include the need for a wider range of pneumatic solutions for cobots and robots as well as the limited safety features currently available to enable their use alongside humans. There is also a lack of qualified people capable of operating, troubleshooting and maintaining robots and cobots. Many facilities still have older equipment which their employees are used to, so it will be necessary to properly train people as newer technologies like robots are installed.

When to Use Pneumatics

To further understand how pneumatics can be used in robots and cobots, Ritson said her team asked the robotics experts how to go about choosing them over a servo-electric solution.

If a simple pick and place application, then pneumatics are the better choice. This is because of the benefits pneumatics offer regarding simplicity, sequential operation and safe operating modes. Pneumatics are also considered a workhorse which suits this type of repetitive work.

Servo-electric, on the other hand, is better suited for those applications where energy savings is desired or sophisticated motion paths will be utilized, or there will be a need to teach or guide the robot where to go.

Determining the appropriate solution requires asking customers the following questions, said Ritson:

- Is the task repetitive?
- Does the application require high accuracy and reliable repeatability?
- What type of an environment is it in?
- What operator skill level is needed?
- What other areas of operation is this going to impact in the future?

> As machine learning and artificial intelligence (AI) advance, the industry will move from programming to teaching a cobot or robot how to move.

Because robots and cobots are becoming more ubiquitous to overcome the lack of skilled labor in manufacturing, the robots deployed need to be simple and easy to use, which makes pneumatics the answer in many instances, said Ritson.

She also noted an aspect which came up during discussions with robotics experts was the need to find labor on the design and engineering side for robots and the components within them. Along with this is the need to ensure end of arm tooling (EoAT) is designed correctly—which goes hand in hand with the need to know how to choose between pneumatics or servo-electronics. "That is a significant aspect that we continue to hear over and over," she said regarding the need to design the EoAT in a manner to realistically assign it a task and then help that task come to light.

Areas showing the best promise for robots equipped with pneumatic components include processing as well as primary and secondary packaging applications which are all growing.

According to some of the robotics experts, pneumatic cobots are starting to enter the market which allow force and speed to be controlled through software configurations. This will bring about new possibilities and applications, said Ritson.

Robots Implementation and Design to Remain Areas of Growth

The lack of skilled labor in manufacturing will be the key driver for the continued growth and implementation of robots in the coming years. According to Ritson's study, three out of five CPGs predict they will increase their use of robotics in the next five years.

Cobot usage is predicted to increase two-fold during that timeframe, she said. "[CPGs are] looking for these to replace labor, be mobile and be flexible, achieve faster throughput and to have a pick, place, sort type of application."

Labor challenges are driving the need for automation solutions like robots, but it is also important for CPGs and other manufacturers to justify the business case for implementing these technologies. As such, it is important for robotics manufacturers and component suppliers to ensure optimal design, programming and services.

There are various ways manufacturers source their robots and EoAT designs. Per data shown by Ritson during the IEOC:

- 40% purchase the robot from a robot manufacturer but design the EoAT in-house,
- 28% custom design and integrate a total solution for the entire robot in-house, including the end effector,
- 14% do a combination of some design in-house and rely on the robot and EoAT supplier for some assistance,

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Pneumatics provide a simple, powerful and cost-effective solution for end effectors on cobots.

- 9% design the robot in-house but outsource the design of the EoAT, and
- 9% outsource and buy existing robots from a certified integrator to assist with design all the way to the end effector.

She also shared that 18% of OEMs consistently outsource the EoAT design to a specialized supplier. All of these design cases provide potential opportunities for pneumatics suppliers whose components could be utilized in the robots.

Everyone Ritson and her team spoke to agreed that programming of robots is becoming easier. This is due in part to an increase in open, universal programs and easier to use software. As one SME said, software from different suppliers communicate well with one another but it would be helpful if there were a common language used to ensure proper communication between software programs.

As machine learning and artificial intelligence (AI) advance, the industry will move from programming to teaching a cobot or robot how to move. This will help make them easier to integrate into a facility and get up and running.

To enable the adoption of pneumatics in robots and cobots, Ritson said the robotics experts said there were several functional improvements necessary including:

- More seamless integration of pneumatic control components; less programming, more teaching.
- Integration of pneumatic controls into the cobot—regulators, valves, feedback loops—to achieve plug-and-play compatibility.
- Ability to move heavier payloads —faster.
- Broader range of support for robotics.

What Lies Ahead?

Ritson said many of those surveyed agreed the adoption of AI will be key in the future for the continued implementation of robots. Both AI and self-learning will be important to managing various types of applications and making corrections on the fly.

Integration of vision systems, particularly 3D vision, will be beneficial as well. This will enable better visibility of the manufacturing facility and people and objects around the robot.

"They are going to be smarter. They are going to more configurable," said Ritson in regard to robot designs in the future. In addition, "they are going to have adaptive intelligence, real-time reaction and tactical sensing."

These advanced features and many others will be possible through the implementation of AI, machine learning and vision systems. And with these technologies the robots will be able to learn the maneuvers they need to make and adapt when necessary. "Vision systems are going to open up a lot of opportunities for robots overall," said Ritson. And it is very likely end effectors will have some form of pneumatics on them in the future.

According to the vice president of engineering at a large OEM Ritson's team spoke to who is the robotics expert at his company, pneumatics is the preferred power source for the end-effector tools because pneumatics is cost effective, lightweight and powerful which makes it a natural match for robots offering EoAT variety.

In general, the growth for pneumatics in industrial manufacturing will be in cobots as they move into non-traditional areas, said Ritson, and pneumatics and compressed air technology is going to have to follow. Packaging, food and beverage, warehousing, autonomous vehicles, construction and agricultural harvesting are just some of the markets in which this growth will take place.

For the first time in recent years, non-automotive applications comprise the greatest market share for robot installations. This is expected to continue in the coming years across the globe. Currently, China and Japan are the leaders followed by the U.S. But by 2024, the market is expected to reach 500,000 robot installations in a single year across various industries and North America is likely to account for the largest portion of this growth said Ritson.

As more companies install robots at their facilities, they will be looking to their suppliers for guidance on which types to utilize as well as best practices for implementation. These companies will also be looking for a partner who can help to provide integration, training and service support, which could provide pneumatics suppliers an opportunity to differentiate themselves in this growing market. **P&M**

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How to Reduce Expensive Fluid System Leaks and Emissions

While they may range in severity, leaks can result in inefficiency and potential danger to the team and the environment.

by Randy Rieken

It is easy for certain sounds, sights and other ambient environmental conditions of a chemical processing, oil and gas, or other industrial facility to become second nature. The distant hiss of a compressed air line, small droplets beneath steam tubing or a faint whiff of gas may be so common that it barely registers with plant employees. That does not mean, however, that they should not be addressed.

In fact, these sounds, sights and smells are indications that something is wrong and could reflect inefficiencies in the fluid system. No matter the severity of the problem, it is important that the leaks be addressed as quickly as possible.

Typically, there are three specific types of leaks:

Real Leak: A leak resulting from the failure of a pressure barrier to contain or isolate a system fluid from the surrounding environment. This occurs due to cracks in the material or gaps between sealing surfaces.

Virtual Leak: A release of internally trapped fluid into a fluid system due to material outgassing, absorbed or adsorbed fluids, entrapment in crevices or dead legs.

Permeation: A passage of fluid into, through and out of a pressure barrier that does not have holes large enough to permit more than a small fraction of the molecules to pass through any one hole.

Whether the leaks are real, virtual or permeating, they can often go undetected. Leaks frequently happen at connection points in the fluid system and may be a simple nuisance—but they can also cost money and provide potential hazards for employees and the environment.

As regulators strengthen what constitutes an emissions violation and investors start taking environmental concerns more seriously, operators are increasingly required to reduce the possibility of even small leaks to nearly zero. It is crucial to understand the different leaks that may occur in industrial facilities and have strategies in place to limit them as much as possible *(see figures below)*.

Identifying and Fixing Common Leak Culprits

In most cases, leaks occur at fitting and valve connections and may go undetected if they are not regularly monitored.

In the case of fittings, improper installa-

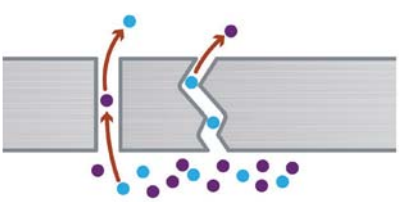

Figure 1: Real Leaks can occur when there is a crack in material or gaps between sealing surfaces.

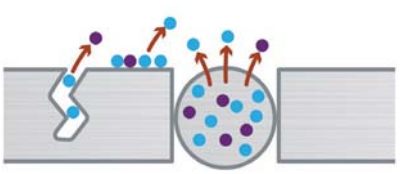

Figure 2: Virtual Leaks cause internally trapped fluid to be released into a fluid system.

SWAGELOK COMPANY

Figure 3: Using high-quality components can be used to fix process-equipment leaks and offer significant operational benefits.

common type of small-bore fittings—have been found to leak more frequently than certain types of mechanical grip tube fittings, which create longer lines of sealing contact between their ferrules and the tubing. By selecting and specifying higher-performance tube fittings throughout applicable fluid systems, operators can be more certain of leak-tight performance.

Meanwhile, valves offer fluids more opportunities to escape the system, making the selection of high-quality components even more important. Valves are made up of multiple individual parts, including a stem, seal, handle and more, each of which may represent a potential path for fluids to escape. Valves are also dynamic—frequent opening and closing can cause wear to some parts, which over time can lead to greater leak potential.

Proactive Leak Detection

Partnering with the right supplier who can supply leak-tight components is crucial. With the right expertise, suppliers may also be able to advise on system design that includes fewer potential leak points. Additionally, they may be able to help identify and address leaks through a leak detection service, which can help systems perform more reliably and efficiently and reduce overall energy consumption and emissions during regular facility operation.

Leaks cost money, so each day they are undetected or unaddressed, it lowers facilities' profit margins. That is why it is important to monitor potential leak sites aggressively and fix them as quickly as possible. Using high-quality components produced by a reputable supplier can help eliminate unnecessary leaks and lead facilities ever closer to becoming leak-free operations.

This article was written and contributed by Randy Rieken, Market Manager, Swagelok Company. P&M

Read an extended version at powermotiontech.com/21250431.

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How to Safely Work with HIGH-VOLTAGE SYSTEMS

Although standards for high-voltage systems used in heavy-duty mobile applications are limited, there are steps which can be followed during the design process to ensure safety.

by Sara Jensen

As electrification increases, safety has become a critical factor which must be kept in mind. This is particularly true when working with the high-voltage systems being used in larger mobile applications such as heavy-duty trucks and off-highway equipment.

High-voltage systems—typically those operating around 400V—are utilized for many reasons. In addition to providing the power necessary for larger applications, higher voltages can help improve efficiency and charging times as well.

However, there are currently no safety standards in place for engineers to follow when developing and integrating high-voltage systems. According to Mike Terzo, CEO of Terzo Power Systems and member of *Power & Motion*'s Editorial Advisory Board, there is a lot of information for the automotive industry—which operates at lower voltages—but not as much for higher voltages and in particular for off-highway equipment applications. "There are some significant differences between automotive electrification and off-highway electrification," he said during a *Power & Motion* education session on best practices for working with high-voltage systems.

Terzo also noted that much of the literature which does exist for automotive, and that is slowly coming out for off-highway applications, is geared toward servicing electric vehicles. While important, there is also a need for safety information related to the design side.

Although standards do not yet exist, understanding high-voltage systems and some best practices for working with them can help to ensure safety.

Know Your System Architectures

When working with customers on their electric vehicle or equipment designs, Mourad Chergui, senior product manager at Delta-Q Technologies, said in an interview with *Power & Motion* that one of the first steps is determining what voltage level is needed for an application.

Doing so is important not only to ensure the appropriate power supply for an electric vehicle but also for component and safety system selection. Chergui said that while higher voltages can provide more performance and efficiency in many applications, there are also higher costs for the components and enhanced safety levels required which all should be taken into consideration as well.

For its eLION high-voltage electronic components, Bosch Rexroth chose 700V as the operating voltage due to the heavy equipment industry moving toward higher voltage ranges. Matthias Kielbassa, VP Electrification Off-Highway Mobile Machines at Bosch Rexroth, said during the company's Electrified Mobile Product & Application Conference (EMPAC) at which the product line was introduced that the company saw the technological trends occurring in the commercial vehicle segment. While many applications started at 400V, there has already been a shift toward 700V and higher.

Thus, it was important to develop a product line which meets the industry trend of higher voltage ranges. He also explained that once above 100V, a system is considered high voltage. "That means all requirements with regards to electrical safety are exactly the same" no matter what voltage you use over 100V.

Understanding the system architecture—is it low or high voltage and is it an AC or DC system—that will be worked with is important to ensuring safety as well. Alternating current (AC) and direct current (DC) are the two methods used for current flow in electronics. Both are equally dangerous, and therefore safety precautions should always be taken when working with either, but there are some significant differences in their architectures which are important to keep in mind, said Terzo.

Bosch Rexroth

Functional and electrical safety were a focus during the development of the eLION high-voltage component portfolio.

AC systems are always grounded to earth, he said. "When you touch something, basically you're touching a higher potential, and the ground is always a lower potential. So that is going to go through your body and induce current," he explained. "Anywhere you are standing, you basically have one touch point to create a complete circuit in AC."

When looking at DC systems, it is first important to note whether it is a low- or high-voltage system as Terzo said there is a distinction between the two. Low-voltage DC systems, usually 12 or 24V, have an architecture similar to that of an AC system in which the vehicle chassis is grounded. High-voltage DC systems, on the other hand, are completely isolated and so require two sources of contact. "And those two sources have to have a potential voltage difference to induce that current through you," he said.

While 12 and 24V nominal systems are well understood at this point, Terzo said there is confusion for many engineers working with systems in higher voltage ranges as there is not quite an industry consensus on what is considered high voltage.

For industrial applications, the Occupational Safety and Health Administration (OSHA) in the U.S. has specified a threshold of 42.4V as the point at which it is not safe to touch any system components and use of protected and isolated connectors is required.

But on the vehicle side some in the industry say 48V is the threshold, leading to confusion for many. However, there is almost unanimous agreement that anything over 60V is the rate at which it is never safe to touch system components.

Terzo said his company works under the assumption that anything over 42V is high voltage and is treated as such when it comes to design and safety procedures. Doing so ensures consistent best practices are followed no matter what type of system is being worked on.

Understand and Use Safety Features

High-voltage electric power systems have certain features included to ensure safety. One such feature is the high voltage interlock loop (HVIL), a wire which goes through all of the components in a high-voltage system.

If anything is disconnected from the system, it will break the HVIL signal which causes the vehicle's electronic control unit (ECU) to shut off the mains contactor and disconnect the high voltage explained Terzo. By immediately notifying the system and disconnecting the high voltage, the HVIL helps to ensure any sources of danger are removed.

The pre-charge system is another important safety feature which Terzo said must be taken into consideration when working with high-voltage systems. "One of the reasons that I always bring

DELTA-Q TECHNOLOGIES

Overall…people should use common sense when working with high-voltage systems. They should treat everything they work with as a dangerous, high-voltage component and wear appropriate safety gear like glasses.

[the pre-charge system] up is because it presents a significant safety issue on how we're designing systems and how we're implementing them into the field," he said.

Essentially, the pre-charge system prevents a large inrush current from moving through the power system when it is turned on which could otherwise cause a lot of damage and a dangerous situation for those working with the system.

"So, what we do is implement a pre-charge circuit which allows us to control the amount of current going in through a pre-charge resistor; it slowly fills up the capacitor to get up to the voltage, then we can open our mains and we have a really safe completed circuit," explained Terzo.

Another important element of the pre-charge system is the bleed off resister. This component helps to safely bleed off any voltage which may remain in the system even after it is disconnected. Due to the high levels of capacitance in high-voltage systems, Terzo said there can be a lot of voltage which remains after disconnection. As such, use of a bleed off resister as well as continuously monitoring system voltage is critical to ensuring safety when developing and working with high-voltage systems.

He also noted the importance of appropriately sizing the bleed off resister. In off-highway applications there is a desire to quickly bleed off any remaining voltage. However, if bled off too quickly, energy may be wasted which would not benefit performance of the final system and vehicle design. "There are a lot of design issues that go into 'how do you start up and then bleed down the high voltage in your system,'" he said.

Apply Common Sense and Invest in the Right Tools

Terzo said his company follows automotive safety standards to an extent but has adapted some of those and learned more applicable best practices for high-voltage applications over the past 10 years of development work.

One of the key lessons his engineering team has learned is to break everything into smaller circuits and do incremental tests. This helps to ensure parts do not blow up or get damaged in other ways. Investing in the right equipment is important as well such as equipment to supply high voltage in a controlled manner. "The tools get exponentially more expensive, but they are exponentially more critical during the development path," he said.

Use of safety interlocks and different connections to power supplies and power loads are among the protocols Terzo said his company followers. "We have redundant safety interlocks so if they ever get lifted up, they cause a trip which turns off the high-voltage power supply," he explained. "And we try to isolate everything."

When conducting testing, it is done in an enclosure to ensure there is minimal

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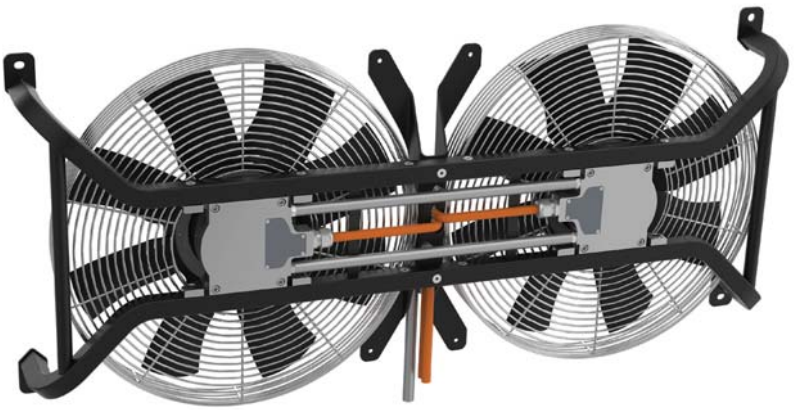

HORTON INC.

Horton is developing a high-voltage cooling system for use with heavy-duty vehicles powered by batteries or fuel cells.

exposure. In addition, every part of the system is wired to sense what is happening in the different circuits to ensure performance and safety.

Overall, he said people should use common sense when working with high-voltage systems. They should treat everything they work with as a dangerous, high-voltage component and wear appropriate safety gear like glasses.

Practice Open Collaboration

Chergui agreed with Terzo there is a lack of standards for high-voltage systems and their use in off-road equipment. He said Delta-Q and its parent company Zapi Group—which supplies powertrain components for electric vehicles—are working to establish their own guidelines to aid development efforts with OEM customers.

"We already have some experience with 400V, but [are also moving] to 800V," said Chergui. "We are collaborating with various OEMs to actually understand what their needs are."

He also noted that companies supplying high-voltage components are limited compared to those offering low-voltage versions. Because of this, he said more openness and communication between OEMs and suppliers will be important to expanding not only availability of high-voltage systems but also development of safety processes.

Terzo said it is important for the industry to share information since electrification is still so new for many. There are companies who are not as willing to discuss what they are working on but he believes it is important to do so in order to help the industry progress.

Fernando Pulido, product manager at Horton Inc.—which is currently developing a high-voltage cooling system—said in an interview with *Power & Motion* the move to electrification and high-voltage systems is a new endeavor for many OEMs and their suppliers. As such, everyone is learning and working together to best determine how to proceed in this space.

He said it is important for Horton and other manufacturers to be a participant in this transition. "The more you participate and help shape the specifications and requirements moving down the road, the better your chances to reserve a seat at the table."

Pulido said having a high level of cooperation with OEM customers and sub-suppliers is beneficial. Honesty is important as well. Issues may arise or things done in the past

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Standardization of voltage classifications is one of the first aspects Terzo said needs to take place. There is still debate among many as to what is considered low or high voltage.

may no longer be necessary so it will be vital to challenge previous norms and have honest conversations during the development process.

Both Chergui and Terzo believe there is a need for industry standards to be developed beyond those available for automotive. Associations, safety agencies, government and members of the industry itself should all step in and begin the work to establish guidelines manufacturers can follow. Chergui said he believes such standards will come in time.

"Standards always lag the industry," said Terzo. "I think it is important we try to change that because standardization should come earlier in the process. That would accelerate everything and provide a much safer environment."

When standards are eventually developed, Terzo said the industry could piggyback off of some of the automotive industry's best practices. This would include use of common colors, logos and labels to signify any dangerous parts.

Standardization of voltage classifications is one of the first aspects which he said needs to take place. There is still debate among many as to what is considered low or high voltage. But if the industry can come to a consensus, then it can be better equipped to handle future development efforts and the creation of safety procedures. **P&M**

ADDITIONAL SAFETY INFORMATION

While safety information for working with high-voltage systems is more limited than that for low-voltage and automotive applications, Mike Terzo, CEO of Terzo Power Systems, provided the following as good resources for design teams.

- Battery Safety Initiatives for Electric Vehicles from the National Highway Traffic Administration (NHTSA)
- Fundamentals of High Voltage xEV, Safety, and PPE from SAE International
- High Voltage Training for Future Mobility from DEKRA
- High Voltage Vehicle Safety from SAE International

The latest technologies and equipment for the construction and mining industries will be on display at bauma 2022.

Messe München

bauma 2022

to Highlight Key Technology Trends for Construction and Mining Equipment

Automation and electrification are among some of the top technologies component manufacturers and OEMs are set to launch at bauma 2022.

by Sara Jensen

One of the world's largest trade shows for the construction and mining equipment sectors, bauma, is taking place Oct. 24-30, 2022 in Munich, Germany. In addition to a wide range of new off-road machinery, the show will also highlight a variety of fluid power, motion control and other technologies used within these machines.

Hydraulics components and systems in particular will be well represented during the event as their use remains vital in construction and mining equipment. Mobile applications will continue to be a growth area for the hydraulics industry with many countries around the world investing in infrastructure projects. A recent report from Interact Analysis indicates growth in mobile hydraulics will continue in the coming years, although it will likely be at a slower rate due to supply chain and other economic factors.

bauma is considered one of the largest shows in the construction and mining industries not only for its sheer size but also the number of companies from around the world which exhibit at it as well as the amount of attendees it draws. Show organizer Messe München states on the event's websites the show will encompass 614,000 sq. m of exhibition space for over 3,000 exhibitors from 58 countries.

New Technologies to be Launched

Hydraulic, electronic and other component manufacturers plan to introduce new products during the show.

Walvoil Exhibiting Update to Adaptive Load Sensing Technology

At bauma 2022, Walvoil, part of the Interpump Group, plans to showcase an updated version of its Adaptive Load Sensing (ALS) technology. The ALS helps to reduce energy through the use of software and electronic control for hydraulic pumps and valves.

Also on display will be the new EPX Series of directional control valves which use meter out compensation technology to recover wasted energy. This energy can then be reused to help improve system efficiency.

The two technologies can be used together to achieve up to a 20% reduction in energy consumption, benefiting overall efficiency for machinery into which these hydraulic system technologies are integrated.

Liebherr Components to Highlight Hydraulics, Digitization and More

The components division of heavy equipment manufacturer Liebherr intends to exhibit a variety of products, many of which will showcase advancements in digitization and alternative energy.

Among the digital technologies on display will be Liebherr Components' camera monitor and surround vision systems which use sensors and software to improve visibility around machinery. An integrated digital wear measurement system will also be exhibited for the monitoring of slewing bearings, known as Bearing Clearance Monitoring (BCM). A force measurement sensor for hydraulic cylinders will be on display as well.

The BCM is able to measure bearing wear in axial and radial directions as well as tilting clearance said Liebherr Components in a press release about the technology. "A distinct disadvantage of all common wear measurement methods is the necessity for service technicians to mount dial gauges or other measuring devices directly on the slewing bearing in the danger zone under the excavator or other machines," explained Wolfram Halder, product manager of the slewing bearings business unit in the Liebherr Components' press release. "The Liebherr BCM system makes this unnecessary, as the measuring devices are already permanently installed on the bearing."

In addition, the BCM eliminates reliance on external service providers to measure bearing clearance as a sensor is integrated into the bearing which communicates to a gateway where the data is stored and accessible via an app by machine owners.

On the hydraulics side of things, Liebherr Components plans to exhibit its range of axial piston pumps, the LH30VO series, which now includes a nominal size 100 pump as well as those in sizes 28, 45 and 85. This will provide additional options for OEM customers. A modular system of controllers is available for the pumps to help improve their performance and efficiency.

TTControl Introducing New ECU

TTControl plans to expand its family of TTC 2000 Series ECUs (electronic control units) with the introduction of the TTC 2030. This family of ECUs provide different size options but with the same modular building blocks, making it easier for OEMs to customize and quickly bring to market their new machine designs.

The new TTC 2030 features a large internal memory to aid with automation and operator assistance systems which OEMs are integrating into their machines. The ECU also enables transmission of sensor data via CAN, Ethernet and SENT (Single Edge Nibble Transmission) communication interfaces, providing greater flexibility for customers.

"The construction equipment industry is greatly increasing automation and efficiency for its customers," said Arno Purkrabek, team leader, Product Management at TTControl, in the company's press release announcing the launch of the new ECU at bauma. "Only with the highest performance and a large set of interfaces, including high-speed Ethernet communication, can this transformation be successful. The software reuse, scalability and modularity supported by the TTC 2000 Series help machine builders meet these challenges in the most efficient way."

ZF to Exhibit Safe, Efficient and Electrified Solutions

Technology company ZF Friedrichshafen plans to showcase various components and system solutions which it said in a press release about its attendance at bauma will aid with the reduction of emissions at construction sites while improving productivity and safety.

These will include products to enable electrification of machines such as the eTRAC electric drive system. This driveline system includes electric motors in three voltage options. It can be combined with other components such as axles and inverters to provide OEMs with a full system solution. eTRAC also includes electric central drives which can be adapted to meet the needs of medium- and large-sized equipment. An electric PTO is available to accompany these drives to operate a machine's working hydraulics.

The bearing clearance monitoring system uses an integrated sensor to monitor wear as well as directions and clearance of bearings in heavy equipment. Information is stored and accessible via a mobile app.

ZF noted in its bauma press release that efficiency will play just as integral a part in decarbonization efforts as electrification or other alternative energy systems. As such, the company continues to make improvements to so-called conventional technologies. Its ERGOPOWER powershift transmission, for instance, can help provide a fuel savings of up to 15%.

In regards to safety, the company is working to bring many technologies developed for the passenger car and commercial vehicle segments to construction and other off-highway equipment applications. One example is radar-based environment perception technology which will better enable machine operators to see people and objects in their vicinity.

Yanmar Introducing Electrification Strategy

Equipment and engine manufacturer Yanmar has announced it will introduce its strategy for electrification of off-road machinery during bauma 2022. As part of this strategy, the company aims to be an all-in-one systems integrator offering engineering, design and manufacturing of electric powertrains. It now joins a continually expanding list of engine manufacturers, including Cummins and Briggs & Stratton, who are adding electric power systems to their portfolio.

In April 2022, Yanmar acquired majority ownership of battery technology company ELEO Technologies B.V. whose modular batteries it felt would help with its own electric power system developments. ELEO is now building a new battery production plant to help increase capacity and meet growing demand for battery systems.

During bauma, Yanmar will feature an electrified demonstration vehicle which shows how its technologies for electrification can be deployed. It will be powered by an electric drive and 48V batteries with fast charging capabilities said Yanmar in its press release announcing the electrification strategy debuting at bauma. Additionally, it said the vehicle demonstrates the company's ability to be a system integrator capable of equipping machines with all necessary components for electrification. **P&M**

Read more about the technologies and trends at bauma 2022.

bauma 2022 to Highlight Key Technology Trends for Construction and Mining Equipment: powermotiontech.com/21246274

bauma 2022: New Construction and Mining Technology Launches: powermotiontech.com/21246637

1. 3-Phase Filters Have EV, Battery Uses

The FMAC NEO and FMAD NEO 3-phase filter families now meet IEC 60204-1 specifications. Downsized for smaller footprint, without any compromise to performance, the two new filter series are suitable for use in energy applications such as EV fast charging and battery storage, as well as industrial applications in general. Designed for 3-phase or 3-phase with neutral applications, the FMAC NEO and FMAD NEO series are ENEC and UL approved for rated currents 16 to 230 A at 300/520 VAC 50/60 Hz at an ambient temperature of 50°C. Standard versions are designed for industrial applications with leakage currents of <13 mA.

Schurter
powermotiontech.com/21251322

2. Safety Switches Provide Hazardous Equipment Protection

When used in conjunction with a properly designed safety system, SSP safety enabling switches provide the operator with a special control mode for tasks such as maintenance or debugging of hazardous equipment. These switches consist of a spring-return three-position (N.O.-N.C.-N.O.) grip button that must be maintained by the operator in the middle position for the machinery to continue operating. In addition to the grip button, models are available that include a built-in E-stop button, LED indicators, additional pushbuttons for auxiliary functions or an activity sensor to detect when the switch is in its home position.

AutomationDirect
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3. Inductive Proximity Sensors Detect Actuating Parts

The new IRC40 Inductive Proximity Sensors were designed as a durable solution for daily indoor and outdoor applications. They ensure accurate detection of actuating parts, such as skid conveyor positioning, step detection on escalators and material positioning on conveyor systems. The IRC40 Series sensors are resistant to extreme operating conditions such as exposure to a wide range of temperatures, frequent high pressure and washdown cycles. They offer flexible adjustment and adaptability for any application due to the 5-position sensing face. The sensors can be installed quickly without any tools, thanks to their push-lock system of the mounting bracket. Main technical features include a rotatable sensing face in five different positions without the need of additional tools; four corner visible LEDs with diagnostic functions; an extended sensing distance of 22 to 40 mm; and IP68 and IP69K protection against high pressure and high temperature washing cycles. The IRC40 Series Inductive Proximity Sensors are ideal for conveyor systems, production lines and escalators.

Carlo Gavazzi
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4. Seals Reduce Contamination Possibilities

The ES series features large cross-sectional O-rings, minimal leak points and proven poppet designs. All mounting hardware is outside of the flow path for the ES, and no internal parts are threaded during assembly to reduce the possibility of contamination. The ES series features a compact footprint and exceptional leak resistance. Other features include a use life of more than 1 billion cycles, a 0.01 atm sccm leak rate, no anaerobic sealant and multiple low flow ranges.

Clippard
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5. Transport System Now Provides Contactless Power, Data

No Cable Technology (NCT) is an extension of the eXtended Transport System (XTS) product line. NCT provides contactless power supply and synchronous real-time data communication directly to XTS movers. This solution enables individual movers to serve as mobile handling and processing stations, essentially turning the intelligent transport system into a powerful, highly flexible multi-robot system. The modular XTS solution has been expanded with NCT to include a special motor module as well as electronics that mount on the movers. The hardware required for the transmission technology is fully integrated into the motor module, so the system does not sacrifice any existing functionality or expand equipment footprint. No additional connections or supply lines are needed.

Beckhoff
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"Making Automation Easy Starts With the Design Process"

Festo's Dr. Ansgar Kriwet talks about why automation is complicated, and how design teams can improve the experience.

By Bob Varva

At the celebration marking Festo's 50th anniversary in the United States, Festo board member Dr. Ansgar Kriwet made what might be considered a provocative statement: "Automation is too complicated."

Kriwet has the background to evaluate the state of automation. After studying mechanical engineering at the University of Aachen, he spent several years as research associate at The Institute for Machine Tools and Production Technology in Berlin, followed by the Institute for Management and Technology in Berlin.

In 1995 Kriwet joined Festo and has been responsible for the product strategy for several divisions. In 2009 he was appointed to the Management Board of the Festo AG being responsible for Region and Sales Europe, followed by the responsibility for Global Sales in 2013.

Power & Motion Senior Content Director Bob Vavra discussed with Kriwet the aforementioned statement at the Festo event, along with its implications for future automation innovations.

Bob Vavra: Why do you feel automation is too complicated?

Ansgar Kriwet: I do compare the industrial automation world with the consumer world. In the consumer world, automation used to be difficult as well in the past! Think of your own experience when installing a newly bought PC, say, 20 years ago. You would better reserve a weekend to read operating instructions, get all the various cables, download all the different drivers and make everything work together. Today, you switch on and the system more or less configures itself. In the industrial automation arena, we are still living in the past—setting up a system and making it work is hard work of trained specialists. We need to improve that.

BV: How much of this question is based on human limitation and how much is based on automation complexity?

AK: This has nothing to do with automation complexity; it is entirely due to the lack of focus that automation suppliers are putting on the subject of simplifying the user experience. Powerful automation devices do not need to be difficult to operate. Think of your mobile phone: This device has three cameras, more computing power than the space shuttle, 50 time more memory than my first laptop and still comes without any operating instructions—because nobody needs one.

Dr. Ansgar Kriwet

Festo

BV: Are manufacturers using automation correctly? And do they expect too much from automation?

AK: Manufacturers of machines are focusing more and more of their development effort on the core process that makes their machine different. This can be a welding process, a filling process, a testing process, etc. Therefore, they need companies like Festo that support them in the automation of those processes in an easy and intuitive way so that they can use their energy on what makes them unique: their core process.

BV: The companion idea to that is, what can companies such as Festo do to take the complication out of automation?

AK: Making automation easy starts with the design process. Festo is offering a lot of easy-to-use software tools that allow the design engineer to quickly determine the right motion technology (pneumatic or electric?), the right sizing of the components to optimize energy consumption, the right accessories and mounting kits, and allow them to generate pre-assembled CAD models that can be imported easily into their machine design software.

We continue to support the purchasing process by an easy-to-use online shop with lots of supporting functions or alternatively direct EDP integration. In the setup of the machine, we support with assembly services and explanation videos. Operation is supported by simple user interfaces and maintenance support software. We take simplicity very seriously!

BV: What do your customers need to do to raise their level of automation literacy so that this isn't all a solution at the supplier end?

AK: Innovation in the industrial automation space is moving ahead quickly. Our customers need to know enough about new developments like Industry 4.0, cloud connectivity and artificial intelligence to understand whether or not these technologies are useful for them to solve specific problems in their production.

The technologies are never a goal in itself, they are only a means to an end. Nobody needs Industry 4.0 for the sake of itself. It is only a tool—i.e., to reduce energy consumption, optimize machine performance or improve part quality. Festo Didactic is globally the biggest provider of industrial automation training courses and training equipment. We do invest a lot to keep our customers up to speed regarding the progress in automation. P&M

This article appeared in Machine Design.

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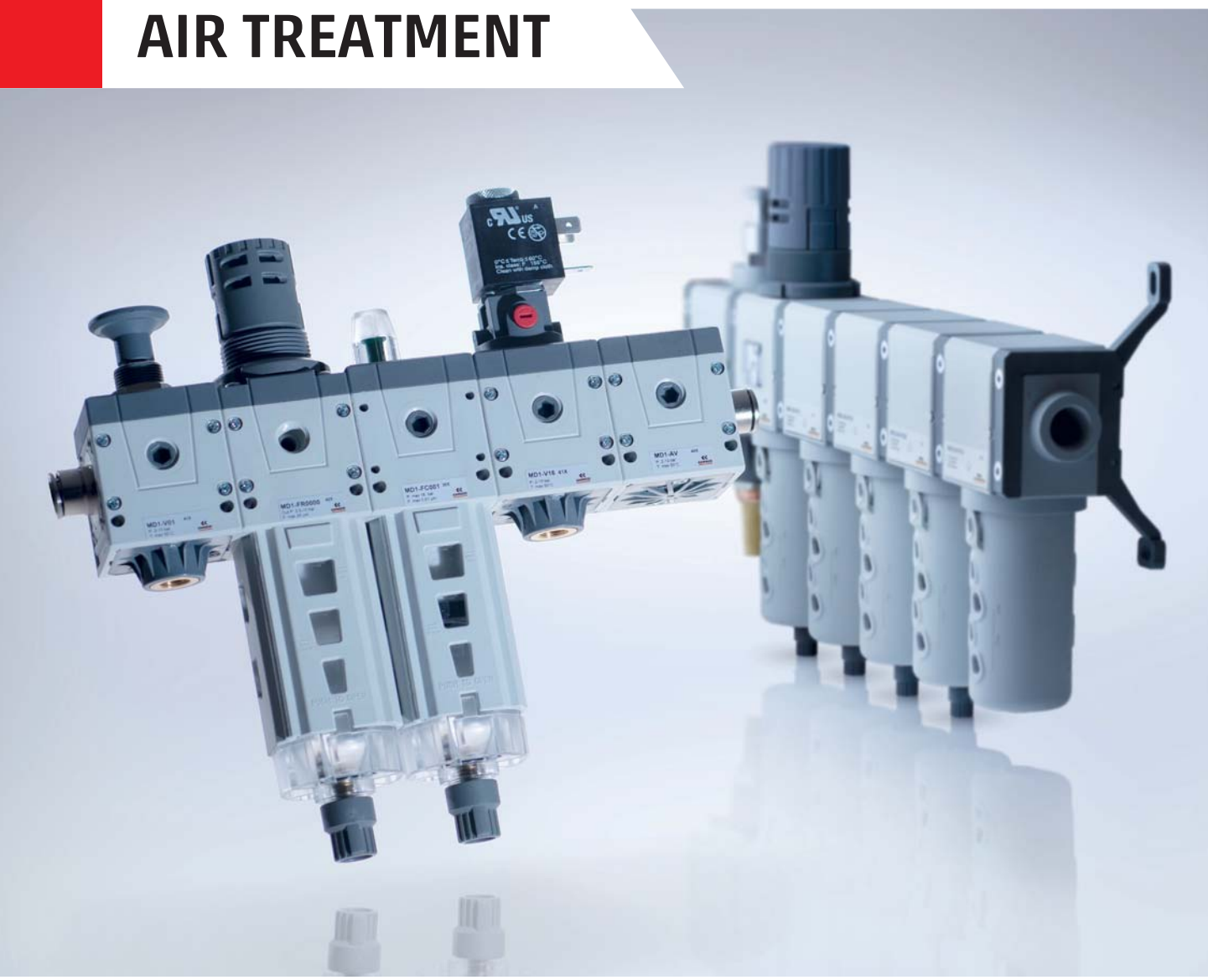
Automation

AIR TREATMENT



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