2024 Trends in Fluid Power

AI, smart manufacturing, electric vehicles, and product specification highlights industrial shift

Matthew Jaster, Senior Editor

Anticipation vs. reaction is the name of the game in fluid power, hydraulics, and pneumatics. The organizations embracing mechatronics, digital toolsets, AI and the electrification movement will be in a much better position moving forward. Here are a few of the trends/technologies to consider relating to fluid power and motion control today:

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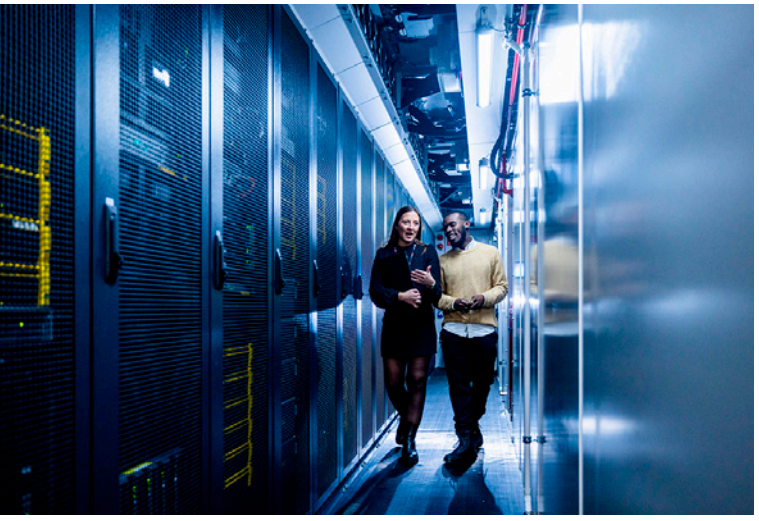

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1. Strategic Partnerships

Strategic partnerships between Danfoss/Google, Sony/Honda, and Formlabs/AWS hint at the changing face of manufacturing. It's no coincidence that tech companies are collaborating with manufacturers to optimize work processes to enhance productivity.

Danfoss and Google recently announced a partnership to make use of the latest advances in artificial intelligence (AI) and promote energy efficient solutions in data centers.

Under the partnership, Danfoss will use Google Cloud's generative AI capabilities to optimize the customer experience, streamline internal work processes and improve productivity across the organization. This can be done, for example, by using gen AI to collect and surface information, automate knowledge, generate product descriptions, and create solutions with chatbots in e-commerce.

"This is a great example of a partnership utilizing each other's strengths and using technology to optimize the customer experience, increase productivity and reach sustainability goals. Danfoss is a leader in energy efficiency, and these solutions help support Google's 2030 goal of running our data centers on carbon-free energy 24/7. We're happy to deliver AI innovation through Google Cloud, enabling businesses like Danfoss to operate in new and smarter ways," said J.P. Clausen, vice president of data center innovation at Google.

Danfoss is working with Google to implement sustainable cooling systems for data centers and to design systems that reuse the excess heat produced by data centers. Danfoss Turbocor compressors (*danfoss.com/en/products/dcs/compressors/turbocor/*) provide highly reliable, highly efficient solutions when expertly applied by OEM partners and are being installed by Google to improve the energy efficiency and decarbonize heating and cooling systems in data centers.

Meanwhile, Danfoss' heat reuse modules will make it possible for Google to capture and reuse heat produced by data centers, providing a renewable energy source to supply heating on-site and to neighboring commercial and residential buildings, communities, and industries that need heat for their processes. Going forward, Danfoss' expertise in decarbonization solutions will be used to an even greater extent to advance data center sustainability in Europe, North America, and beyond.

"At Danfoss, we want to revolutionize how we build and decarbonize data centers together with our customers. When we partner up across industries, like we have done with Google, we accelerate this development towards building better and more sustainable data centers - using technologies available today," said Jürgen Fischer, president, Danfoss Climate Solutions.

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2. Value-Added Part Sourcing

For OEMs of agriculture, construction, mining, oil/gas, off-road, forestry, and heavy-duty trucking equipment, there can be thousands of parts to integrate into a single vehicle. These parts include the hydraulic components that provide the force or power for lifting, pushing, digging, dumping, and braking. Because of their complex machining needs, OEMs rely on preferred suppliers of hydraulic parts and assemblies to design and manufacture these critical components, which must be high quality, cost-effective, and delivered on time to remain competitive.

The existing process typically requires working with multiple vendors based on their specialization and the value-added services they provide from coatings to assemblies. Establishing these trusted relationships and orchestrating parts needs across multiple vendors takes time, consuming considerable organization resources and adding costs to OEM production.

The OEM's expanding demand for supplier support has resulted in manufacturers positioning themselves to be one-stop parts shops, offering a menu of complementary parts spanning different materials such as metal and plastic. A consolidated offering can help streamline parts sourcing for OEMs and provide better support to them as their product needs evolve.

The OEM's expanding demand for supplier support has resulted in manufacturers positioning themselves to be one-stop parts shops, offering a menu of complementary parts spanning different materials such as metal and plastic. Courtesy Premier Hydraulics.

Premier Hydraulics produces standard hydraulic fittings, valves, manifolds, hose connectors, and flanges in large quantities. In addition, the company specializes in custom-engineered products, meaning it can create assemblies or sub-assemblies with combined components.

"OEMs today want quality parts at a competitive price that are delivered on time. Beyond that, many also want value-added services like expert engineering, design support, and the ability to provide custom parts such as manifolds, flanges, valves, and fittings in various materials. Depending on how it is designed, the custom component can become a part of a kit, sub-assembly, or assembly of complete product," said Dinitrise Hicks, sales manager, Premier Hydraulics, Farrell, PA.

According to Hicks, OEMs often request custom parts, such as hydraulic fittings, that vary from SAE standards in size, thread size, pitch, or materials. Custom parts may also be necessary if OEMs require a unique part function or part combination.

According to Hicks, a common question asked by OEMs of their parts manufacturers is, "Can you make this part?" Often behind this question is an OEM's perception that the parts vendor can only work with one material or provide limited or no value-added services.

To meet OEM's need for value-added custom parts, Premier Hydraulics dramatically expanded its capabilities after the company was acquired in late 2022 by PTR Group, a leading contract manufacturer of components and subassemblies.

PTR Group has embarked on a strategic campaign to acquire companies offering complementary parts manufacturing differentiated by material and product type to broaden the breadth of their overall parts portfolio. As a result of their acquisition strategy, PTR Group now offers OEMs a wide range of parts, including metal components and subassemblies. They can also custom manufacture precision thermoplastic injection mold tooling, zinc die-cast mold tooling, and molded plastic components.

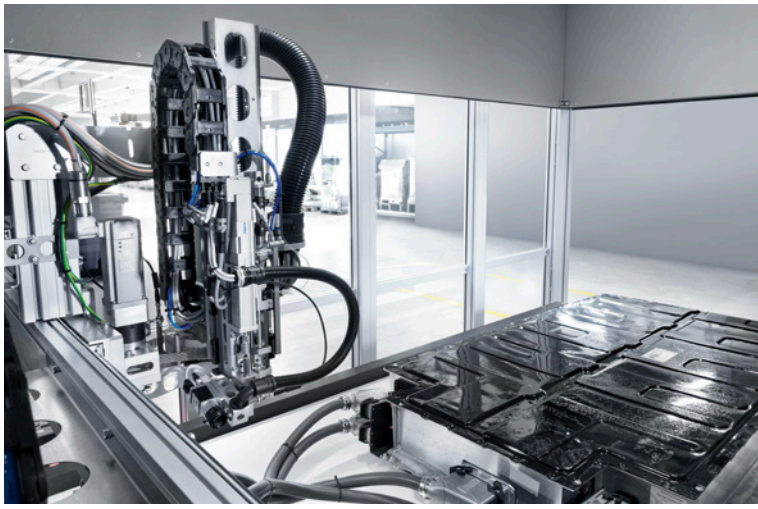
Within each of these areas, PTR Group can offer OEMs a range of complementary value-added parts and services that go beyond just manufacturing. This includes in-house part and tool design, tool build, complex assembly, and testing.

These acquisitions indicate the imperative to enhance manufacturing operations, thus maintaining competitiveness in the global fluid power, hydraulics, and pneumatics markets. (Information provided by Del Williams, technical writer, Torrance, CA.)

ptrgroup-mfg.com

3. E-Mobility and Electrification Solutions

Element—a global provider of testing, inspection, and certification services in London—is partnering with a major manufacturer to test EV battery cooling plates and their associated tubes, lines, and connectors. The manufacturer will receive reliable data that will help them to refine and rewrite internal procedures which primarily includes thermal cycling and pressure pulsation. During these tests, coolant is circulated through the plates at varying temperatures and pressures while a range of environmental extremes, including external temperatures from -30°C to over 100°C are applied simultaneously. Element will also supply the manufacturer with data regarding the performance of the plates upon startup, as technicians evaluate flow characteristics of the coolant through the plates using typical flow rates at low temperatures.



HAHN Automation Group utilizes Festo's electric and pneumatic technology to enhance the company's e-mobility solutions.

In addition to their specialized battery cooling systems, hybrid and electric vehicles share some fluid systems with traditional internal combustion engines, including hydraulics systems for brakes, transmission and steering fluid systems, and cooling systems for radiators. The components of an EV differ from those of an internal combustion vehicle; EVs also tend to be significantly heavier and have a different weight distribution. This can affect the functionality of other fluid systems in the vehicle, such as hydraulic steering and brake systems, requiring that those systems be redesigned. For many vehicles, especially novel vehicles, full vehicle lab testing is required to understand how systems affect one another, and how this might impact handling, safety, and longevity.

Additionally, electric vehicle manufacturers depend on the safe and flawless functioning of batteries. HAHN Automation Group has therefore developed a battery tester that carries out a complete test of the mobile energy storage units fully automatically. This innovation includes a 3-axis gantry for optical and leak tests, consisting of electric drives from Festo,

The HAHN Battery EOLT is a complete solution for testing battery packs. All relevant test scenarios for 90 percent of all battery packs available on the market can be implemented on the end-of-line test system because the system can be easily scaled to many sizes. HAHN Automation Group offers everything from a single source: from power electronics and test equipment to test software and automation.

"Thanks to its vast expertise in testing technology, the company helps define the best test strategies to optimize cycle times and ensure the targeted product quality," said Christian Bubat, global business development manager at HAHN Automation Group. The company worked with the

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Production Engineering of E-Mobility Components (PEM) chair at RWTH Aachen University on the development.

How exactly does the testing work? The axis gantry moves and positions two sensors along all edges of the battery pack to detect any leaks from the battery housing and cooling unit. The camera checks that all plates and stickers are fitted correctly and that the battery pack is processed properly and detects any mechanical damage. A battery management system test checks the communication and evaluates the sensors.

"As in many previous automation projects, it has been proven that Festo is the right, globally reliable partner in electric and pneumatic automation technology," added HAHN's Head of Development, Martin Sulzbacher.

Thanks to the long-standing partnership, they have been familiar with Festo's automation products for a long time and can use them in a precise and specific way. With online product finders, intelligent engineering software and engineering tools, HAHN Automation Group designers can find the right products for the development of new machines and systems reliably, quickly and without time-consuming calculations.

hahnautomation.com

4. Scalable IIoT Solutions

Festo and Siemens announced their latest partnership at last year's Hannover Messe. Festo joined Siemens Industrial Edge Ecosystem where customers can purchase numerous apps from different providers. The integrated IoT solutions based on these apps offer customers greater productivity, flexibility, and sustainability.

Siemens launched the independent, cross-vendor app store for industrial customers in October 2021. This marketplace is based on the Siemens Industrial Edge platform. It uses edge computing to process data right at its source, such as on an industrial PC in machines or plants. Festo is offering data-driven AI solutions from the Festo Automation Experience (Festo AX) portfolio on the marketplace.

"This gives Festo an additional sales channel for industrial customers in the areas of mechanical engineering and production," said Oliver Niese, digital business at Festo. "Users benefit from the opportunity to purchase apps from different providers in a single place, to install them and run them at the machines on the shop floor."

Another customer benefit is the wide range of software components that can be integrated into production in a standardized way. IoT solutions can even be scaled across lines and factories, thus considerably reducing manual software maintenance.

"At Siemens, we want to add even more partners to the Industrial Edge Ecosystem, especially those in the field of automation," said Rainer Brehm, CEO of factory automation at Siemens. "A larger selection increases flexibility for our customers, who can build individual IoT solutions from Siemens and partner modules (Industrial Edge apps and devices). We create the greatest value for our customers when we work together across company boundaries."

Festo launched its Industrial Intelligence portfolio with the Festo AX Data Access connectivity solution, which feeds data from Festo components into Siemens Industrial Edge to supply analysis applications with data. Customers can build a monitoring solution based on the data and thereby improve maintenance processes, lower their energy consumption, and improve quality. Additional industrial apps from Festo are expected to be available on Siemens Industrial Edge, such as AI-based wear prediction for pneumatic drives.

Festo AX Industrial apps like AX Data Access are building blocks that can be combined with other applications from Festo, Siemens, and third parties to form larger solutions. They enable production employees to independently build digital solutions for optimizing productivity. The partnership allows Festo and Siemens to support their customers on the path to becoming more sustainable, more flexible, and highly efficient.

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PTE

Festo AX provides a blueprint to increase productivity, reduce energy costs, prevent quality losses, optimize the factory floor, and create new business models. Photo courtesy of Festo.