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Patrick Schwobe
Principal Engineer,
TLX Technologies

"Our valve is unique in that it features our patented integrated supervision, which is found on all of our actuators and valves for fire suppression."

Head to Head Exclusive

A NEW ERA *in* actuation

Patrick Schwobe, Principal Engineer at TLX Technologies, explains how integrated supervision supports system reliability and regulatory compliance for fire suppression manufacturers

Actuation hardware in fire suppression rarely attracts attention until it fails. Solenoids and valves must open on command, withstand pressures and temperatures and demonstrate to regulators that they are correctly installed and supervised. With NFPA supervision requirements now well established and EN 15004-1 newly revised, regulators are applying sharper focus to releasing devices, particularly where incorrect mounting or tampering could stop a system discharging when needed.

TLX Technologies, a custom electromagnetic and electromechanical device manufacturer with more than twenty-five years in the fire protection market, has targeted this issue with its new Supervised Direct-Acting Solenoid Valve. The UL Recognised design has completed UL 429 and UL 429A testing and provides a solution for clean agent, inert gas, CO2 and hybrid systems that use valve-integrated actuation or selector valves. Its patented integrated supervision is built into the coil assembly, removing separate supervisory hardware and supporting consistent installation practice.

To explore how this valve works, how TLX collaborates with OEMs and how supervision, diagnostics and materials trends are shaping actuation design, IFSJ Editor Iain Hoey sat down with Patrick Schwobe, Principal Engineer, Advanced Product Development.

What makes the Supervised Direct-Acting Solenoid Valve significant for suppression system manufacturers?

It gives the industry another releasing device for clean agent, inert gas, CO2 and hybrid systems that use valve-integrated actuation and it can also be adapted for selector valve usage. Our valve is unique in that it features our patented integrated supervision, which is found on all of our actuators and valves for fire suppression. The supervisory feature is integrated directly into the coil assembly, so there is no need for an additional supervisory component to meet regulatory standards for supervision.

We included a couple of design features to make installation as easy as possible. The coil assembly freely rotates on the valve body. This means that these two pieces can be independently oriented to match the fire suppression system's routing for the wiring and discharge tubing. The coil assembly also has a captured fastener, which prevents the fastener from being misplaced when the coil is removed. It also ensures that the coil is correctly aligned with the valve body. This gives technicians confidence that they've ▸

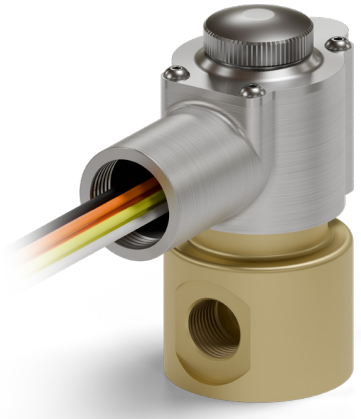
fully seated the coil and that the supervisory feature is working properly.

We also designed the valve to work across systems that use valve-integrated actuation and selector valves. For valve-integrated systems, the valve body includes a normally closed release valve. For selector valve usage, the valve body is replaced with a threaded collar. So, this one solution actually covers a pretty broad range of applications.

"Developing solutions that move away from relying on magnets could provide better stability for the industry."

Could you explain why supervision is now a greater regulatory focus?

Supervision is a feature that ensures a releasing device is correctly installed and also helps prevent tampering. If a releasing device is removed from the fire suppression system, it has to trigger an audible and visual alarm at the fire panel. These alarms only cancel when the device is correctly reinstalled. If the releasing device isn't properly installed, the system can't discharge. The supervisory requirements came about because there were a number of instances where technicians had not properly installed the releasing device. Imagine a scenario where a technician removes an actuator for testing and doesn't get it fully seated on the discharge valve when reinstalling it. That's the very scenario these supervisory requirements are designed to address.



Which technical considerations were key in achieving UL compliance for the new valve design?

There were a couple of key factors, given the characteristics that we were trying to deliver. One was making sure that the supervisory switch for the NFPA and EN standards that's packaged into the coil assembly met UL's requirements. The other was choosing the right seal material because the valve needed to achieve zero leak across temperatures ranging from -20 °C to 50 °C up to a maximum pressure of 2,200 psi (approximately 151 bar). It also had to remain leak free after 100,000 cycles.

How do evolving standards such as EN 15004-1 affect how TLX designs and certifies valves or actuators?

Because we are based in the United States, our main focus has always been on meeting UL, FM and NFPA standards. But we are also members of Euralarm, a European federation that represents the fire protection industry, the Fire Industry Association in the United Kingdom and the China Fire Protection Association, so we are very proactive in monitoring the development of global regulations. That way we can make sure that if our products aren't already going to satisfy those regulations, we can consolidate our efforts to meet those demands.

As it happens, most global regulations don't develop in a vacuum. Regulatory bodies usually consider what other regulators have already done. For example, NFPA was the first to adopt the supervision requirement back in 2016. The EN requirement is virtually identical to the NFPA requirement. And that makes sense. There is no need to reinvent the wheel when there is already a perfectly effective solution available.

How does TLX collaborate with OEMs to integrate valves into suppression systems?

We typically take one of our base designs and modify it to meet the interfacing requirements of our customer's systems. When we

work with UL to gain product approvals, we design the actuator or valve with a customisable mating interface. This way we can accommodate almost any interfacing requirements our customers may have while still adhering to the necessary electrical and mechanical specifications. If there were a situation where they needed something we don't already offer, we could design something new for them from the ground up.

What areas hold the most potential for improved supervision and diagnostics?

The best opportunities are in integrated sensing and real-time data collection for on-site and remote monitoring of system health. Advancements here would allow for better preventative maintenance and even accurate predictive maintenance.

The data that a fire panel monitors is relatively basic. If, for example, the system is monitoring extinguishing agent pressure, it may alarm if the pressure falls below a minimum threshold. But it won't tell technicians where the failure actually occurred and it won't give any advanced indication of a minor leak that could eventually render the system incapable of extinguishing a fire.

Today, it's possible to automatically measure the weight of the extinguishing agent in the cylinders in real time. If the weight falls by as little as 100 grams, technicians can be alerted so they can correct the problem before the system is paralysed.

Technology like this would be especially beneficial in remote locations like offshore oil rigs, telecom shelters and power substations. Systems in locations like these could see significant value added if they incorporated more real-time data collection and monitoring.

What might affect the development of new actuation and valve technologies?

We will need to keep a close eye on rare earth materials because these are widely used for certain components, such as magnets, in actuation devices. These materials have become increasingly valuable as more and more applications use them. The growing demand on these limited resources is driving higher prices.

There are also the complications that come with trade restrictions. These raise transaction and compliance costs for importers and those costs will ripple all the way through the supply chain, ultimately affecting the price of the finished product.

Developing solutions that move away from relying on magnets could provide better stability for the industry.

How can suppression systems address the challenges of lithium-ion battery incidents?

The industry needs to develop an effective extinguishing agent for these fires that complies with the recent ban on PFAS or "forever chemicals." There also needs to be a delivery system to get that agent to the source of the fire. Let me explain.

Here in the United States, local fire departments are starting to adopt a policy of letting electric vehicle fires burn themselves out rather than trying to extinguish them. This is because it's almost impossible to

extinguish one of these fires with water and using water creates a toxic runoff because of the heavy metals and other dangerous substances that are released when a battery goes into thermal runaway.

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There also has to be a way of delivering the extinguishing agent directly to the individual battery cells, which are the source of the fire. Most batteries, whether they are for passenger vehicles or large battery energy storage systems, are encased in an enclosure which protects the battery cells and houses other critical components. Spraying an extinguishing agent on the outside of the battery pack is like spraying water on the roof of a house when the stove is on fire. Suppression systems need to be designed into the battery packs so that an extinguishing agent can be applied directly to the battery cells if a thermal runaway event occurs.

China has a mandate beginning in July of 2026 that says EV traction batteries can't catch fire or explode during thermal runaway. It will be interesting to see how the industry responds to that development. ■