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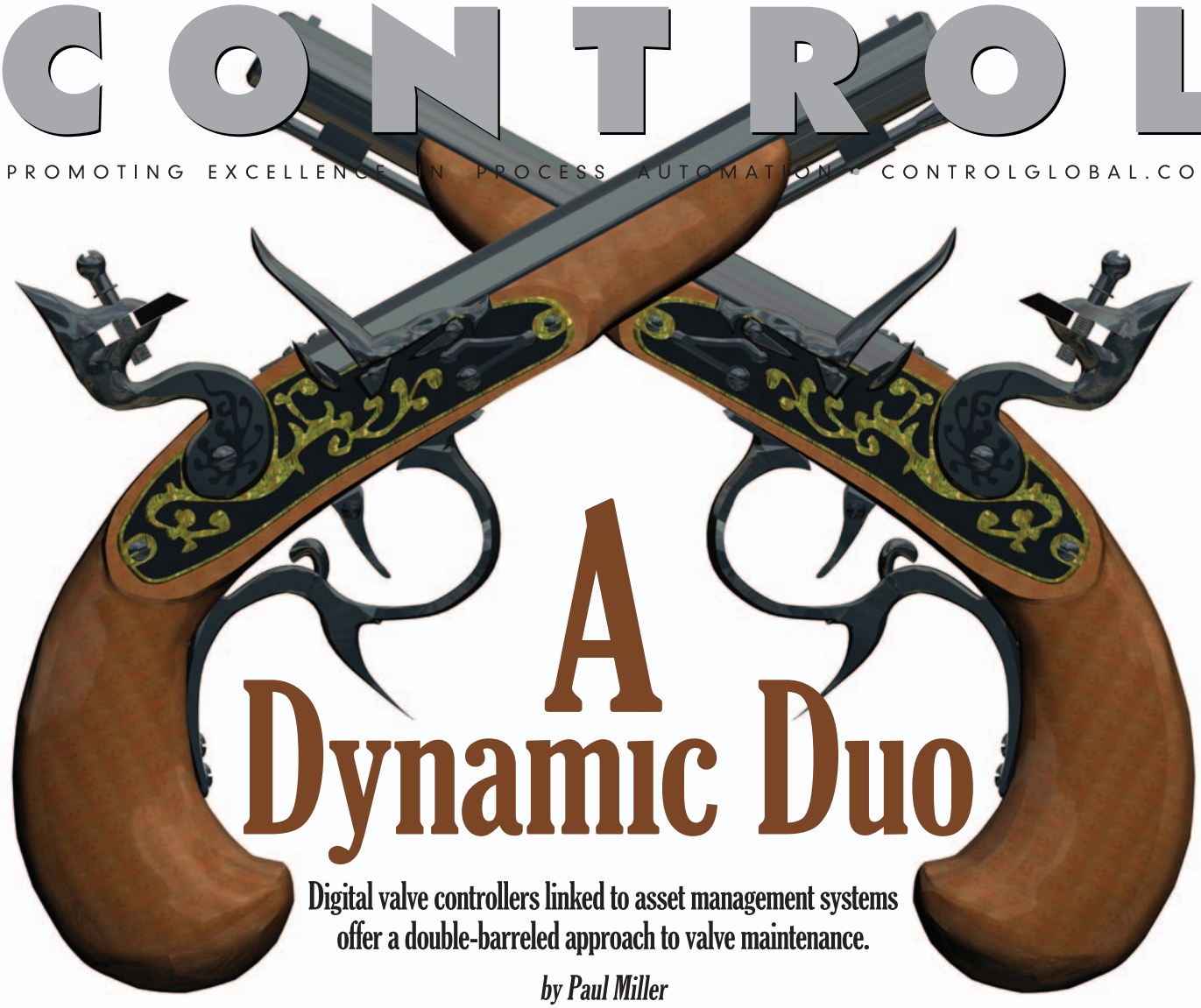

A Dynamic Duo

Digital valve controllers linked to asset management systems offer a double-barreled approach to valve maintenance.

by Paul Miller

"YOU CAN'T MAXIMIZE A PLANT'S EFFICIENCY IF you can't accurately control and effectively manage the final drive elements," says Todd Gordon, computer instrument technician leader at We Energies' Valley Power plant in Milwaukee, Wisconsin.

Gordon is one of many end users discovering the double-barreled capabilities of intelligent valve positioners, a.k.a. digital valve controllers (DVCs), linked to asset management systems to provide that control and management.

"Our I&C personnel use Emerson's AMS device management software (www.emersonprocess.com) installed in a PC to monitor all our HART and Foundation fieldbus devices from a single location," explains Gordon. "This includes 24 Fisher digital valve controllers installed on critical control valves, including a few valves installed in some difficult-to-access locations."

Here's How It Works

"The device management system gathers information from the DVCs while they're operating. These data are stored, organized, and presented on easy-to-understand displays on a PC. Any change in the performance of an operating valve can be spotted quickly after a status alert indicates that certain preset conditions have been exceeded," explains Gordon. "This allows us to predict when a repair or replacement might be necessary with a fairly high degree of accuracy. Not only does this provide an effective early warning system for impending problems, but it also eliminates the need to disassemble, inspect and then reassemble all the valve assemblies during turnarounds. Instead, we can focus our attention on the handful of valve assemblies that actually have issues."

Gordon says the technology also can help determine the root cause of a problem, thus allowing repairs to be performed more quickly and efficiently. In one example, an old soot-blower regulating valve equipped with a DVC wasn't working properly. "Instead of having to tear apart the entire valve assembly to figure what was wrong, we were able to determine that the diaphragm was leaking excessive amounts of air, and needed to be replaced. So instead of tearing apart the valve body and replacing the valve trim, which is an all-day job, we just replaced the leaking diaphragm, which only took a couple of hours."

Most of the DVC-equipped control valves at Valley Power are newer Fisher valves installed during planned turnarounds be-

The Total Refinery, Spergau, Germany, uses intelligent valve controllers and asset management software in critical units.

ginning in the late 1990s. However, Gordon also had the Fisher DVCs installed on several older, non-Fisher control valves that were still viable at the time. "In instances where we have installed a DVC on an older valve, my experience is that it makes a bad valve work better until a replacement can be installed. The nice thing is that we not only succeeded in deferring a capital expense this way, but when we decide the time is right to replace the older valve, we can also transfer the DVC from the older valve to the new valve assembly."

Gordon adds, "Digital valve controllers improve the performance of our control valves to reduce wear and tear. For us, better control also translates into better boiler control and more efficient steam generation. By monitoring valve condition remotely through the DVCs, we also created substantial cost savings by identifying valves that are leaking steam or losing instrument air."

The R.E. Badger water treatment facility, Rancho Sante Fe, Calif., also uses Fisher digital valve controllers in conjunction with Emerson's asset management software. Here, a PLC controls the process, and most of the control valves are pneumatics. In addition to monitoring equipment performance, the asset management system is also used to track flow rates, turbidity levels and chemical consumption.

"When we installed the digital valve controllers on the filter beds, we ran baseline valve signatures," says maintenance supervisor, Elijah Standing Warrior. "When Filter No. 2 experienced turbidity spikes after backwashes, we compared signatures, analyzed the torque trend through the PD tier and realized that the valve's seat was wearing and needed replacement. We were able to execute this fix during the next planned shutdown."

During a major scheduled maintenance shutdown in 2006 at the Neste Oil Naantali special products refinery in Naantali, Finland, the refinery took the opportunity to modernize the automation system, which dated back to the 1980s. In addition to upgrading the control system, the refinery serviced old valves, and fitted them with Metso (www.metso.com) intelligent valve controllers, implemented a Metso FDT-based asset management system for intelligent field devices, plus partial-stroke testing systems for safety valves.

The economic benefits were immediately confirmed. According to Pauli Kaunisto, automation design engineer at the refinery, "With the help of this software, we were able to change the necessary parameters of the field equipment, which saved countless hours—even days—of work."

Kaunisto said that once sufficient valve data has been accumulated from the intelligent valve controllers, "We'll be able to see from the history data how an individual valve has functioned to be able to adjust the performance limits."

At the large, modern Total refinery in Spergau, Germany, the most important factors for increasing plant safety and reliability are online monitoring and preventive maintenance. Here, Total has implemented Metso intelligent valve controllers and asset management software in critical units.

"During the cold season, there's increased risk of operational difficulties or the failure of valves, which can lead to substantial problems," says Bernd Neugebauer, an instrumentation technician at the refinery. "We replaced the analog valve controllers with intelligent digital ones. The adaptive regulation algorithm used by the DVC automatically adapts itself to the prevailing operating conditions. thereby, ensuring optimal regulation quality regardless of environmental influences." ■

Paul Miller is a contributing editor to Control.

Embedded Sensors for Self-Diagnosis

Sensors embedded in valve assemblies can further improve overall valve diagnostics and predictive maintenance and asset management capabilities.

"The information typically provided by intelligent positioners through fieldbus communication system can include number of cycles, total distance traveled by the stem, operating cycle time and actuator pressure," explains Tony George, senior vice president at Richards Industries (www.richardsind.com). "With a baseline 'fingerprint' obtained from the initial operation, changes in cycle time and/or actuator pressure, total number of cycles and total stem travel provide information for required or preventive maintenance. This information can be supplemented by the placement of thermocouples, leak measurement devices, and vibration or audio detection transducers."

Patrick Leask, marketing director at Dresser Masonilan (www.dresserindustries.com), adds, "Some smart positioners are now equipped with sensors for each of the various subassembly's inputs and outputs, thus enabling deterministic analysis of the health of each component. These sensors can measure the incoming signal, the servo to the amplification stage, the output to the amplification stage, and the outputs to the actuator. Also, a travel sensor allows the exact position of the valve to be monitored."

Brian Hoffa, instrumentation product manager at ITT Pure-Flo (www.ITTpureflo.com), says, "The idea of using sensors such as strain gauges or profiling techniques to monitor diaphragm wear is coming along. End users are benefiting from being able to plan when to change diaphragms on the valves accurately, instead of using a prescribed time period that could very well be arbitrary. It's like changing the oil in your car when a light tells you it's dirty, instead of blindly changing it every 3,000 miles."