

Pole position

Although control valve, actuator and positioner technologies develop only relatively slowly, there have been significant advances in the last few months that offer practical, diagnostic and cost/benefit advantages. Brian Tinham looks under the bonnet



Control valves, actuators and positioners aren't exactly renowned for their rapid pace of technological development. So it's easy to be fooled into believing that what was appropriate yesterday is still so today and likely to remain the same well into the foreseeable future. But that's not necessarily the case, and plant engineers who assume the status quo are probably missing some useful tricks.

Indeed, just in the last few months, there have been significant advances in everything from intelligent electro-pneumatic positioners – yes, pneumatics are fighting back – to good old rack and pinion actuators. Manifold block miniaturisation, for food and pharmaceuticals, has also seen significant improvement and even smaller capacity ball valves have not been immune from innovation. And that's not to mention new services around maintenance spares availability and diagnostics or the march of digital fieldbus-based monitoring and control.

Take positioners, for example, which ensure precise valve actuator control, and hence prevent unstable loops downstream and upstream, as well as undue wear on the valves themselves. ABB's latest EDP300 electro-pneumatic device, launched in Europe on the run-up to Christmas, may not be revolutionary, but it certainly promises higher levels of actuation and control performance. It also looks set to offer plant engineers that take the plunge a valuable reduction in energy usage and hence also carbon footprint.

Real cost savings

As Jo Kilbride, ABB's product manager for valve automation, puts it: "What's unique about this positioner is its significantly increased air capacity in one model – from 1.4 bar to 10bar and with overpressure up to 12bar. Our previous units maxed out at 6 bar and, while other manufacturers do offer higher capacities, they require different spool valve arrangements, so more spares."

Just as important, it's almost certain that users of this positioner will be able to harness smaller, lower cost actuators than standard specifications would demand to achieve the force and torque

requirements. Clearly, that means lower capex, but there are also plenty of opportunities for cutting opeX. Kilbride claims lower steady-state compressed air consumption and more tightly optimised positioning performance – so avoiding energy waste and overshoot respectively.

"It's not uncommon for engineers to size their valve actuators around the capabilities of the positioners," explains Kilbride. "This unit starts at 1.4 bar, but can deliver right up to 50kg/h pneumatic air at 10 bar. In some cases – for example, on fast acting valve duties – that may make volume boosters obsolete. Also, because of their pressure range and 12 bar over-pressure capability, they may well not need pressure regulators on the instrument ring main either."

As with most positioners, and I to P converters before them, this device is claimed to work with any control valve type and any pneumatic actuator – single or double acting, rotary or linear, fail in place or fail safe – from any manufacturer. And that includes ABB's rival Emerson. ABB's existing auto-stroking functionality, says Kilbride, also makes set-up a straightforward push-button job from the HMI on the positioner front panel.

Pressure diagnostics

And get this: while it's clear competition for Emerson's DVC 6000 digital valve controller, there is also the promise of ABB's advanced pressure diagnostics. That threatens to turn the tables somewhat on the electric versus pneumatic actuation debate, putting cheaper pneumatics potentially back in the driving seat, with fieldbus-accessible diagnostics covering not only the control devices and valves themselves, but also, to some extent, the process.

But it's not only about smart positioner developments. John Hancill, marketing director of Emerson's valve automation division, makes the point that even rack and pinion actuators, historically seen as just the muscle, are donning the mantle of critical components. Why? Quite simply, because precision and reliability matter – with plant managers increasingly understanding the value of quality, in terms of reliability and reduced spares, and their impact on lifecycle costs.

"As the big plant boys carry on



farming out

maintenance to third parties, they are taking more interest in the costs and looking into buying better equipment," explains Hancill. "Hence, for example, we offer air-operated rack and pinion actuators, but also our FieldQ fully integrated valve automation system, with the actuator, solenoid and switchbox built in.

"So there are no design and administration costs at the front end, no tubing, wires, connectors etc to assemble [plant technicians just pop it on top of the valve and the job's done] and fewer SKUs on the shelves."

Turning to valves, even ball valves are seeing new attention, as industries ranging from food to pharmaceutical, biotechnology, medical and water treatment make subtly different demands of the old



Left and above: valve smart innovations from Burkert
Below: ABB's EDP300
Below left: Fisher Control Disk

New services support plant engineers under pressure

Aside from advances in raw valve and controller design, services, too, are advancing – mostly to match the requirements of an industry that needs to cut costs further, while simultaneously improving product quality.

Trevé Tagg, instrument and business unit manager at instrumentation and controls giant Emerson, points to the company's quick shipping service, for example. Whereas that used to cover process transmitters, spares and the like, it has now been extended to include control valves and actuators.

Why? Because the pressure to bear down on site spares is spreading. "So now we offer sliding stem valves up to six inches, rotary ball valves up to 10 inches and butterfly valves up to 12 inches, all on three-day lead times," states Tagg. Admittedly, those are for standard carbon or stainless steel, but compare that with lead times normally measurable in weeks.

But it's not just about hardware: cutting costs has long since also affected people – and hence the ever widening skills gap on plant. Reversing that looks increasingly unlikely, so among Emerson's answers is a service that builds on its instruments' built-in diagnostics.

"Where the skill is no longer present on site to understand the implications of valve diagnostics, we are offering to release that value by working with end users to identify the critical valves, in terms of plant efficiency and availability. Then we either install digital positioners or use what they have and our flow scanner to analyse valve condition. It's all about improving uptime by helping them to see whether there is a breakdown coming – and to plan for it – or that a valve doesn't need to be pulled for inspection, because it is functioning well."



Above and right:
Emerson Fisher
GX valves, with the
firm's Fieldvue
diagnostics

workhorses. Among the most recent from Burkert UK is a range of 2/2 stainless steel units (2652 and 2655) for gaseous and liquid media, available as manual or complete units, with quarter turn, single or double acting pneumatic rotary actuators, and facilities for low cost control via NAMUR pilot valves or the company's side control positioner.

"Our ball valve/actuator/positioner combination provides process users with a compact, modular system for fluid control at a very competitive cost," insists Neil Saunders, sales manager with Burkert UK. Given this type of valve's fundamentals – such as full flow characteristics and high viscosity, temperature and pressure handling – the firm could well be onto a winner.

Less is more

But ball valves are not the only game in town when it comes to industry-driven developments. As it happens, Burkert has also turned its attention to miniaturisation of diaphragm valves and manifolds. Its Robolux valve and custom valve block technology claims to remove dead legs, minimise hold-up volumes and reduce process times, making it ideal for pharmaceutical plants, where fast flow shifts without cross contamination are critical.

The company makes the point that, to date, the alternative of closely welded cluster arrangements – even those employing the shortest possible tangents and optimised valve positioning for draining and cleaning – leads to greater hold-up volumes than the

Words from the wise

A few words from the wise: pneumatics are making a resurgence against electric actuators, primarily on price/performance; and Profibus fieldbus technology remains dominant, certainly in the water industry. So says Mark Cargill, principal electrical engineer with Costain MWH, currently seconded to Severn Trent Water.

"I have used many flavours of valve control over the years and, while most in the water industry are electrically actuated – using Rotork and Auma, for example – pneumatic actuators are making a comeback," he says. "They are significantly cheaper and, although you may not get quite as much information in terms of diagnostics, they're perfectly good for open-close and modulating control, with position feedback. Also, with improved oil- and water-free compressor technology, you don't get the problems of the bad old days. And they are ideal for high speed operations – for example, on reverse osmosis plant automation."

What about digital versus analogue plant wiring? "My preference is fieldbus," he answers. "The savings are significant – around 25% on installation and cabling costs. I would normally choose Profibus, because the technology is pre-eminent and covers all the bases, from motor control to actuated valves, instrumentation and hazardous areas. There's also a high-speed industrial Ethernet version, Profinet, with the advantage that you can remotely monitor plant networks. So it's the best on the market for industrial requirements."

Cargill also states that using fieldbus technology is relatively easy. His only caveat: "You do need to understand the limitations. Fieldbus is a communications system and, just as you wouldn't buy a £1,000 DVD player and then hook it up with a piece of wet string, you need the right cable and installation methods. Apart from that, it's less complex than a conventional system and cheaper overall, when you consider the size of panels, cable trays, connections etc of the alternatives. All you need is the right training and software tools."



industry wants, due to the pipe lengths and tee-pieces involved. Conventional valve clusters also militate against fast and accurate flow shifts, which are important for process efficiency, because of their impact on product yield and batch control efficiency.

Robolux reduces the number of valves, diaphragms, pipe fittings and welds to half or less, via a patented dual process switching function design. A spokesperson describes the centrepiece as building two seats into a single body, with a single diaphragm and actuator. "The actuator has independent pistons – one for each seat – offering a compact, multi-port valve requiring about 40% less space than traditional valve manifolds," he explains.

And here's the comparison: if four DN25 diaphragm valves are welded up in a typical steam cross configuration, internal volume is 90ml held in the pipe section between the four valve seats. Replacing that with a Robolux valve, the total inner space volume becomes just 22ml – meaning less installation space, but also less flushing agent and less time for the CIP (clean in place) routines. **PE**