Actuated Ball Valves: Not Always Your Best Bet

Here's why Y-pattern valves might offer a better option

By Paul Ainsworth

Over the years, the ball valve has played a major supporting role in food manufacturing plant utilities: steam, water, and CIP chemicals. Invented for use in firefighting systems aboard U.S. Navy vessels, the ball valve was designed for nearly instantaneous on/off, high-pressure/maximum velocity fluid flow with little or no pressure drop (zero restriction).
But as anyone who has used actuated ball valves for a while knows, these valves are notoriously high maintenance with relatively short lifetimes. Employing dynamic shut-off, where fluid pressure forces the ball against the valve's seat, creating a seal that stops fluid flow, a ball valve's seals experience severe wear and tear.
As an actuated ball valve is repeatedly opened and closed, its seals (typically of Teflon) constantly rub against the valve's inner surfaces and wear down over time. Add particulates, and the seals wear that much faster. Eventually, the seals fail and start to leak, necessitating costly, time-consuming maintenance and downtime.
Under perfect conditions, you can expect up to 100,000 cycles from an actuated ball valve. But if you're dealing with "dirty" steam or liquid, expect this cycle life to be significantly reduced. The combination of the particulate-laden steam/liquid and high temperatures can quickly degrade valve seals and other components, often limiting ball valve life to just a week or two.

Cost-Reducing Alternative

To overcome the ball valve's shortcomings while retaining key benefits, manufacturers have experimented with other valve designs. The most successful of these is the Y-pattern or angle valve. The Y-pattern valve's design is so sound that over the years, scores of other valve manufacturers have produced their own versions.
The piston-driven Y-pattern valve permits flow rates nearly equal to those of ball valves. Keep in mind that most ball valves aren't "full port" in design with the aperture through the ball itself slightly narrower than the diameter of the pipe attached to the valve. At the same time, Y-pattern and ball valves differ significantly. Where the valve types differ most are in the areas of maintenance and valve life. While actuated ball valves are built around dynamic shut-off, Y-pattern valves employ static shut-off.

Controlled by a pneumatically operated single- or double-acting actuator and spring assembly, a Y-pattern valve's piston is raised to open flow and lowered into the valve seat to stop (isolate) flow completely. As the Teflon seal at the piston tip relies on static spring or air pressure to maintain contact with the seat, a Y-pattern valve and its seals don't experience the wear and tear of actuated ball valves. The resulting benefit is that a Y-pattern valve's expected lifetime, on average, is 5 million cycles.
In addition, the valve's angle design permits swift fluid shut-off, eliminating water-hammer shock to pipes and equipment &#151 a problem with ball valves. By using Y-pattern valves in place of ball valves, the reductions in maintenance time and equipment replacement costs add up to significant numbers.
Further, it's important to note that not all actuated ball valves come with live-loaded stem packing, as do most Y-pattern piston valves. Live-loaded stem packing, with a spring incorporated to maintain pressure on the packing, compensates for wear caused by valve actuation.

Hard-to-Beat Combination

As stated earlier, the Y-pattern valve's angle design allows a flow rate nearly equal to that of ball valves. A Y-pattern valve can handle virtually any application within these parameters. And in terms of initial pricing, Y-pattern valves match up well against ball valves, and the long-term savings are substantial.
As you consider valve choices for your next utility application, make sure the piston-driven Y-pattern valve is part of the equation. The Y-pattern valve is a hard-to-beat combination when it comes to cycle life plus low maintenance requirements and cost. It's a valve type that will certainly create a positive impact on your bottom line.

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