No compromise
Profiling the new valve that combines and enhances traditional technologies for optimum use

THE SHUTTER VALVE

All new magazine covering fluid handling technologies, operation and maintenance across the chemical, petroleum, food and beverage, pharmaceutical and water/wastewater sectors
Man-made valves have been around for thousands of years. The first examples were discovered in Roman and Greek ruins and were used to regulate the flow of water in aqueducts and public fountains. Modern valves were developed in the years following WWII as industrial productivity grew rapidly and more efficient facilities were required. Many new valve types were put forth; the cream that rose to the top consisted of ball and butterfly valves. Ball valves allow unobstructed flow and high pressure sealing capability but are not well suited to partial open positions due to very high turbulence. The violent, unstable pressure forces of turbulence lead to damage of the valve’s mechanical components as well as the supporting infrastructure (pipes, connectors, etc.). This valve type can also be bulky, heavy and expensive to manufacture. Butterfly valves provide better dynamic flow control and the more expensive models can even seal very high pressures. However, these valves provide an obstruction to the fluid passing through it, reducing the efficiency of the entire system. The large central disc also creates massive turbulence which is detrimental to long-term reliability, while also consuming large amounts of power when it opens and closes. Furthermore, the valve is not piggable, or easy to clean, given the disc in the centre. Industrial operators often must reluctantly choose between which features they need most, inevitably leading to compromise and, sometimes, improper selection.

Valve reliability has also become ever more important due to financial pressure in the current economy, further creating a need for a better valve. Noticing the differences between the two most prominent industrial valves and the compromises that they caused end users, Kyle Daniels, founder of Clarke Industrial Engineering, developed the Shutter Valve, an industrial valve that combines the advantages of the ball and butterfly valves and expands on them.

The Shutter Valve is quarter turn, fully piggable, opens full bore and can be specified to 3-A sanitary Clean-In-Place (CIP) capability. The valve is also designed to fully conform to industrial standard ASME B16.34. It has a basic minimalist design of three interlocking petals that are supported by a compact, simple mechanism. This design gives it the ability to seal at very high pressures like a ball valve. However, unlike the ball valve, it has a compact design that can be disassembled by a trained technician in 15 minutes or less in most instances for field maintenance or repairs.

The compact body of the valve is designed to handle all standard size flanges and pipes. It also maintains the same standard face-to-face dimensions of the ball or butterfly valve, allowing the end user to replace their existing valves without any adjustments to their current system (‘plug-and-play’).

With its modified design based on a mechanical iris, it enables the end user to control flow by moving the petals into any position needed. Flow can be restricted from a fine mist all the way to a full stream like a fire hose and everything in between. This allows the end user to precisely control their operations.

At full open, the Shutter Valve has 0% pressure drop (delta-P) and because there is nothing that is constantly in the flow path when open (like a disc of a butterfly valve for example) cavitation, water hammer and overall wear and tear are lowered. The flow characteristics of the Shutter Valve are ideal for control valve applications due to the precision aperture control capability and the petal designs.

Another attribute of the low cavitation in the Shutter Valve is that very little noise is generated by the valve in partial open positions. Low noise provides a safety benefit for anyone who works in facilities as well as improving valve and pipe life through reduced high frequency vibratory modes.

Altogether, the Shutter Valve, an evolution of the iris valve, is ideally suited to industrial customers that require the unobstructed flow and sealing capability of a ball valve with the precise flow control and low noise of the butterfly valve. Combined, these features lead to low cavitation, reduced turbulence, high reliability and lower cost actuators through reduced torque requirements.

With tri-clamp sanitary flanges fitted to the valve body, the valve is presently operational at a major Fortune 500 company in its toothpaste production facility. The system utilizes a 100 psi pump and 1” diameter steel tubing that is fully pigged and sterilised once per day.

The operation previously required two valves per position: a butterfly valve to control process pressure, and a ball valve substituted in its place during the pigging and cleaning cycles. The Shutter Valve allows them to maintain one valve per position, with improvement in process control, cost and man-hour reductions and improvement in batch quality and production volume.

The industrial manufacturing segment is growing rapidly and the demand for industrial valves is expected to rise by 5.1% per year through the year 2017 according to Freedonia Group statistics. With the ever growing pressure for modern industries to generate more product, while using less power and less space, the Shutter Valve is expected to play a major role in shaping the demands of the industrial valve market.

For more information:
This article was written by Kyle Daniels, CEO & president, & Ryan Werner, sales manager, Clarke Industrial Engineering. Visit: www.clarkeindustrialengineering.com