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The Severe Service Journal is published quarterly by the Emerson severe service team and is distributed by email. To subscribe, go to www.FisherSevereService.com. The Emerson severe service team provides global customers with Fisher® severe service control valve solutions. Whether it is severe service applications for the power, hydrocarbon, chemical or pulp and paper industry, these technical experts deliver sound solutions to address critical applications for aerodynamic noise, cavitation and out-gassing issues, as well as particulate erosion. Please visit our website or contact your local Emerson sales office for more information.

Need a Special or Custom Control Valve? Look No Further.

Emerson is dedicated to providing its customers with the highest level of service, which means routinely going above and beyond to provide special or custom Fisher® control valves. Emerson routinely fulfills orders which fall into this category by using its multidisciplinary team of skilled application experts and support personnel located around the world. The following are just several examples of the unique applications and orders this group routinely fulfills.

Fisher DST-G Increases Refinery Output by 5,000 Barrels Per Day

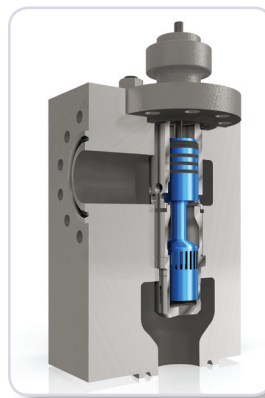
After a major expansion at a refinery in the U.S. Gulf Coast region, operations began a debottlenecking project to further increase total production. The analysis determined that their hot, low-pressure, flash drum level control valve was not capable of the new target flow rate. Although the valve was working satisfactorily after the expansion, the new flow rates projected by the debottlenecking project would force the valve wide open, resulting in poor controllability and a reduction in conversion of gas oil to diesel.

The projected larger flow rate required a valve with more capacity, as well as the capability to eliminate cavitation and the potential outgassing damage when hot gas oil goes through a significant pressure drop. In this case, the level control valve in the refinery's hydrocracker unit experiences pressure drops of 13.79 bar (200 psi) and more. At these pressure drops, the gas oil will flash, cavitate, and outgas. The gas oil is also sour and carries particulate that must pass through the control valve without plugging or damaging the trim.

Refinery personnel worked with Emerson's local business partner, John H. Carter Company, from the beginning of the debottlenecking project. The John H. Carter engineers reviewed the engineering of the critical and severe service valves to determine what changes were required. In several applications, including the level control valve, the engineers employed a special sizing technique to account for the outgassing potential. That special analysis validated the capability of most of the current valves; however, the hot, low-pressure level control valve was selected for upgrade. A new, larger Fisher® DST-G valve was required. The DST-G valve is capable of handling the damaging outgassing service by staging the pressure drop. The valve trim is designed to allow particulate up to 6 mm (¼-inch) to pass through without plugging or damage.

In order to take advantage of their debottlenecking project and realize the full capabilities of their hydrocracker, the refinery needed this valve to be delivered quickly. They utilized the Emerson Instrument & Valve Services center near their refinery to construct the new valve. After installation, the controllability and increased capacity from the new valve allowed the hydrocracker to process an additional 5,000 barrels per day of gas oil. A conservative estimate based on the value of diesel fuel showed the new Fisher valve contributing an additional \$15,000 per day in production. That adds up to over \$5 million per year.

This valve has been in service for one year with no issues.



Fisher® DST-G
Control Valve



Severe Service


EMERSON[™]
Process Management

Fisher® EZ-OVT Control Valve Helped Refinery Meet New Requirements

A European refinery needed to replace critical control valves in two of their continuous catalyst regeneration (CCR) units, which were due for an overhaul. The reason for the overhaul was to replace old equipment and to satisfy newly developed insurance and legislation requirements.

The CCR process is used in the petroleum and petrochemical industries to produce aromatics including naphthenes and paraffins, which are commonly blended with gasoline to improve its octane rating. The CCR process utilizes catalyst fines, such as platinum to induce and speed up the reactions necessary to refine crude components into these desired end products. These fines are contained in the process fluid and can plug valve trim and erode seating surfaces away, comprising the ability of the valve to provide tight shutoff. The customer had been using a UOP licensed process for their CCR units with Fisher control valves since 1969 when the refinery first began operations.

When these valves needed to be replaced, the customer turned to Emerson due to their reputation of being a trusted provider of control valve solutions. The customer selected Fisher EZ-OVT (Over Travel Trim) sliding-stem control valves and Fisher SS-138B rotary control valves, which are specially designed for use in the UOP CCR process and accepted by UOP. The Fisher EZ-OVT sliding-stem control valve features specially designed trim that provides long lasting Class VI shutoff, prevents erosive flow across seating surfaces, and minimizes areas where catalyst fines could collect and cause plugging. The Fisher SS-138B rotary control valve uses a special clearance between the seal ring and ball to prevent catalyst damage and pressure buildup downstream of the valve by eliminating gravity feed of catalyst through the valve.

The customer replaced 25 of the previously installed Fisher control valves with Fisher EZ-OVT and SS-138B control valves. They have been in service since September 2011 with no issues.

Custom Pigging Control Valve



**Fisher®
Large easy-e
Control Valve
With 3.05-Meter
(10-Foot)
Extension Bonnet**

Pigging is the process of cleaning and inspecting pipelines for mineral buildup and damage through the use of cylindrical shaped tools called “pigs.” Several designs of pigs are available for either cleaning or inspection, and each is specially made for the size of pipe it is to be used in. Once the pig is inserted into the pipe through a pig launcher, pressure is raised upstream to drive the tool through the length of pipe. Inspection and cleaning are often done at the same time, but require different pigs.

Cleaning pigs usually have rubber wipers or bristle brushes that wipe and scour buildup on the pipe wall, while inspecting pigs commonly have special sensors for detecting a variety of issues such as pipeline cracks, corrosion, weld irregularities, or the location of a stuck cleaning pig.

The benefits of pigging include improved safety, leakage and spill avoidance, improved batch process quality, and improved operating efficiency. Pig launching and retrieval are controlled by an upstream and downstream valve along with two Y-shaped sections of pipe that are placed between these valves. Both valves modulate the pressure in the pipe to either launch the pig or divert the pig to the downstream section of pipe where it can be retrieved.

A customer came to Emerson for a solution to a unique pigging application. The customer needed a pig launcher and retrieval valve for an underground oil pipeline that would allow top-side packing box access for maintenance. Emerson application experts and Emerson’s local business partner engineers considered a Fisher easy-e™ control valve with a standard extension bonnet. The extension bonnet would locate the packing box above ground for packing maintenance. In this instance however, the valve would be buried 10 feet below ground, which meant a much longer extension bonnet would be needed. The final solution consisted of a Fisher NPS 12 Large easy-e sliding-stem valve with a specially designed 3.05-meter (10-foot) extension bonnet. The customer installed two of these control valves in their pipe with no issues since installation.

Cavitation Eliminated in High Pressure Feedwater Control Valve

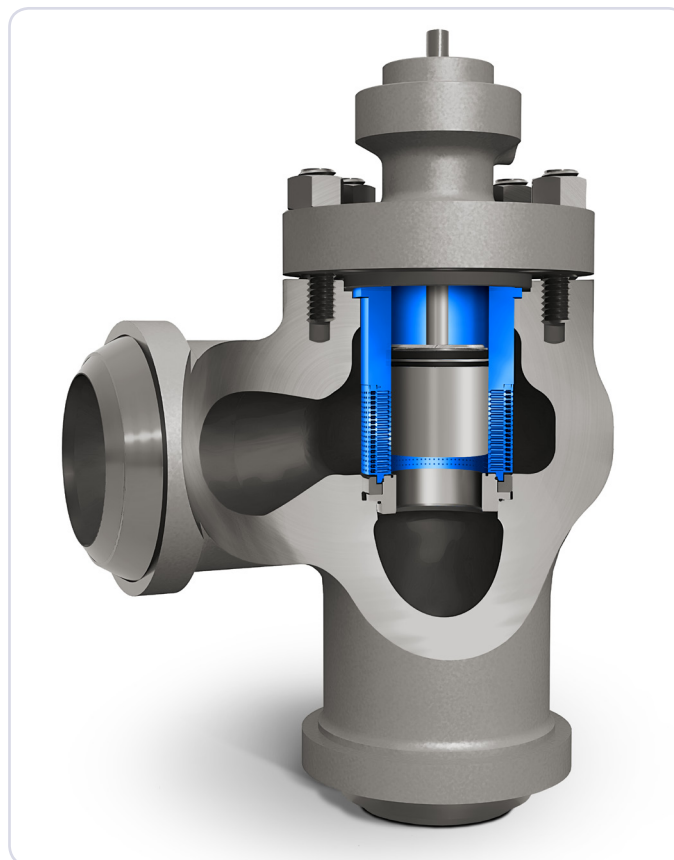
A customer was experiencing excessive maintenance with their Fisher high pressure feedwater valves. Upon further investigation, it was discovered that the original contractor had selected control valves with standard trim and no cavitation protection for either a cold or warm startup.

Since the plant startup in October 2008, the operations personnel had noticed severe leakage through the valves amounting to over \$100,000 in maintenance and trim replacement costs. The plant maintenance manager consulted with Lakeside Process Controls (Emerson's local business partner) to understand the leakage problem.

Lakeside Process Controls personnel worked closely with the plant operations team to understand all operating parameters for these valves to determine what was causing the damage. It was quickly discovered that the valves were experiencing severe pressure drops during startup, resulting in cavitation that then caused the damage to the trim. Unless the cavitation was corrected, these valves would continue to experience damage, continue to leak, and require frequent, costly trim replacement.

To solve this problem, Lakeside Process Controls looked to Fisher Cavitrol™ trim, which uses proprietary pressure staging designs to reduce the risk of cavitation damage. After working with Emerson engineers, a special Cavitrol III 2-stage characterized cage was selected by the customer. This specialized trim could be installed in the existing valve bodies and could utilize existing actuators and accessories, which allowed the trim change to be done in the field.

The customer has been running with this new trim in the #1 boiler feedwater valve since June 2011 and has had flawless startups. Additionally, they have not had any further maintenance costs for this valve since the trim upgrade. The customer appreciates the benefits to their operations and has likewise upgraded their #2 and #3 boiler feedwater valves with this trim.



Fisher® Cavitrol III Trim

Today's Services Require More High Alloy Materials

Valve body and trim materials are being driven towards the exotic end of the range due to the increasingly harsher environments valve bodies and trim components must experience. One of those environments is seawater; offshore oil and gas exploration is increasingly being pursued in hostile environments including the North Sea. In these areas, the sea water not only causes erosion-corrosion but also Stress Corrosion Cracking (SCC), which breaks down valve bodies and trim components even faster.

The once exotic Duplex and Super Duplex materials have been used more and more in these environments due to their excellent seawater corrosion resistance. In fact, Emerson has added these body materials to a full range of control valves specifically designed for optimum performance in seawater environments.

In applications where Duplex and Super Duplex materials are not sufficient, nickel and titanium based alloys have been used with great success. For example, Emerson has shipped sliding-stem control valves as large as NPS 16 in Inconel 625 (Inconel is a trademark of Special Metals Corporation) and up to NPS 12 in titanium.

The power industry has also required more and more of the previously-dubbed exotic materials as standard on control valve bodies and trims. The driving factor in this trend is that power plants are progressively operating at higher temperatures and pressures to improve operational efficiencies. Among the list of such materials is C12A (Forgings: F91 and Pipe: P91), which is used for valve bodies and trim components that experience temperatures in excess of 538°C (1000°F) due to its high strength at elevated temperatures. Emerson recently provided C12A control valves to a power plant for pressures in excess of 289.58 bar (4200 psi) and temperatures of 609°C (1128°F).



For more information on Fisher custom control valves, [click here to view a brochure.](#)

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