

Reliable switching valve for delayed coker services

The delayed coking unit sees some of the most severe conditions in a refinery. The unit processes heavy oils or residuum, and depending on the residence time in a valve, the residuum will solidify and cause coke build-up in the valve body.

For years, a delayed coking unit in a heavy oils processing plant in mid-west US accepted as 'normal' from their existing switch valve OEM the issues in their switching operation, such as:

- sticking valve
- coking up valve body
- excessive steam usage
- undependable deliveries
- lack of service support

These on-going issues reduced their efficiency, and were a continuous downtime threat to their daily production of 12,000 bbl/d.

MOGAS was approached to provide solutions to their switching problems because of the success the plant was having with MOGAS severe service valves at that coke unit, such as overhead vapor and coke drum feed isolation.

Challenge – Thermal Expansion

Cycling every 11 hours in a thermal cracking switching process of up to 925° F can cause valves to lock-up due to thermal expansion. Thermal excursions happen quickly, and the valve does not have time to convert to equilibrium in such short cycles. Thermal gradient can cause uneven distortion, which can create high friction on the seats, resulting in lock-up.

Solution

MOGAS' DV-4 switching valve is designed with an encapsulated seat and Belleville spring. These allow the seat to float more freely in the valve body and to maintain contact with the ball without increasing friction between the ball and the seat.

Challenge – Torque

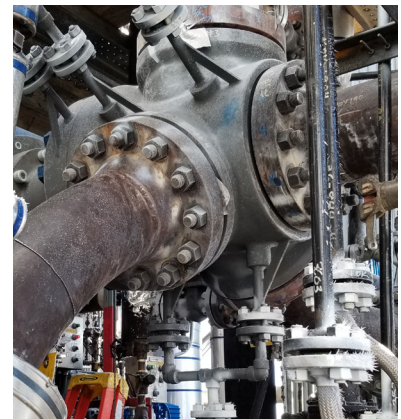
Coke build-up in the valve body typically causes torque increases within six months after installation.

Solution

The DV-4's patent-pending bonnet reduces the area for coke build-up. This resulted in the actuator to be set at 40-50% of the maximum torque rating. The DV-4 has not experienced recordable torque increases since installation.

Conditions

Application:	Coke Drum Switching Isolation
Temperature:	925° F (500° C)
Pressure:	83 psig (5.7 bar g)
Valve Model:	DV-4 Switch Valve
Valve Size:	8 inch (200 dn)
No. of Valves:	2



Two 8-in DV-4 switching valves recently installed in a US delayed coker unit operate at 11-hour cycles, a feat only achieved in a couple of units worldwide.

(continued)

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Challenge – Maintenance

Emergency service and repair can be required to the switch valve due to process upsets. If there is a need to repair or service a switch valve, most have to be taken out of line.

Solution

The DV-4 is a top-entry switching valve simplifies repair and trim replacement with a cartridge-type seat system. This allows the valve to be serviced in-line, saving cost of crane and manpower, and reduces downtime.

Challenge – Steam

Switching valves for the delayed coking unit on the market today require a purge, which is usually steam. If the purge fails, process fluid can enter the valve body cavity and solidify, preventing the valve from operating. In many refineries, steam is not available in abundant supply, so reduction of steam consumption is important.

Solution

MOGAS has developed a valve seating technology that will not allow process fluid to enter the valve body cavity when the valve is in the fully open or closed positions. The steam consumption is near zero when in the open or closed positions. Typical steam consumption of the MOGAS switching valve—with steam 30 psi above process pressure and at 400° F—is 680 to 805 lb/hr, which is 20–40% lower consumption than typical switching valves in service today. Additionally, the DV-4 uses Belleville springs, not prone-to-fouling bellow springs that require additional purge inlets.

Result

Although the MOGAS DV-4 switching valves have been installed for six months, comments from plant turnaround planners were that the installation went “very well” with no piping modifications, and that there have been “no operational problems” since installation. Additionally, it was noted that the 11-12 hour cycle between switching was considered “very aggressive” and “top of industry” by a delayed coker licensing company, where the MOGAS valves are performing as intended.



MOGAS' Engineering Technology group designs valves in partnership with end users and licensors. And, when you select MOGAS products you get timely access to our knowledgeable and experienced service team, anytime, anywhere.