

High pressure and erosion jeopardize safety and profits in water cutting application

Challenge

As the only isolation valve between the pump discharge and cutting tools in a delayed coker unit, tight shut-off is essential. Water cutting valves handle suspended coke fines in recycled feed water under high pressure of 3500 to 5000 psi that erode components.

In 2011 a major South American oil and natural gas plant suffered significant damage to the coke drum in their delayed coker upgrader unit that created financial and safety problems. This damage was caused by leaking valves, which leaked shortly after installation, and were repaired at least annually.

When in the closed position to isolate, the valve—a competitor’s 6-inch, ASME 2500 Class valve originally sold as part of the pump package—leaked large amounts of water through the valve’s packing onto coke drums, causing the drum to buldge and deform. This, coupled with the country’s high humidity, caused the thermal insulation on the coke drum to fail. Coker drums reach 925° F (496° C), and the heat from the uninsulated drum was suffocating to plant employees. The leaking water also produced an unsafe environment on the upper deck, and dripped on to instrumentation and wiring on the lower deck creating a safety hazard.

By 2014 it was recognized that ongoing maintenance to these valves was not a viable solution. Potentially, three months of lost production in a single train can accumulate \$9M, or \$100K per day, in lost production revenue, while drum repair costs \$4M. Personnel safety costs are even higher.

Solution

In early 2016 the plant replaced the leaking valves with MOGAS 6-inch, ASME 2500 Class, model CST-1 valves. This industry-proven valve is engineered specifically to perform in slurry and high erosion applications, and features:

- a tracking seat design for true bi-directional shutoff that prevents slurry build-up behind downstream seat
- leak-free Grayfoil packing and a pressure-energized stem seal that prevents solids accessing stuffing box
- HVOF chrome carbide-coated seats prevent erosion
- Belleville springs that maintain correct seat position for absolute sealing
- Mate-lapped ball and seats with wider sealing surface for absolute shut-off

Results

Almost three years later all MOGAS valves continue to reliably perform as promised under the PERFORMANCE GUARANTEE program. Employee safety and operational efficiency allow the plant to perform profitably, and plant engineers and operations staff have confidence in future uninterrupted production.

Conditions

Application:	Water Cutting Pump Isolation in Delayed Coker
Temperature:	150° F (66° C)
Pressure:	4,205 psig (290 bar g)
Valve Model:	CST-1
Valve Size:	6 inch (150 dn)
No. of Valves:	9



Leaking water from a competitor's valve caused damage to the coke drum's thermal insulation.

“MOGAS valves absolutely isolated our high pressure cutting operation where other valves leaked.”

Senior Plant Engineer