

Valve Maintenance Requirements Reduced in PSA Units by Using Fisher® Valves

RESULTS

- Scheduled valve maintenance was extended from 13 months to more than 24 months with the Fisher valves, saving over \$100,000.
- Throttling valve actuator repair was reduced from three to four times per year to less than once every two years with the Fisher valves.



APPLICATION

Control of hydrogen within a PSA unit.

CUSTOMER

Major oil and gas producer and refiner.

CHALLENGE

Refiners use PSA (pressure swing adsorption) units primarily to deliver high purity hydrogen to the refinery. The PSA units at this refinery operate on a 24/7 schedule. PSA switching valves cycle about every six minutes with an annual cycle service ranging from 50,000 to 200,000 cycles. Reverse flow conditions can exist, and tight shutoff is required to maintain PSA unit efficiency. Valves need to have accurate intermediate open positioning and require fast stroking speeds.

The OEM control valve manufacturer recommended routine maintenance every 100,000 cycles or approximately 13 months of operation time on the PSA valves. This consisted of changing out all soft parts, including O-rings in the piston actuator and a PTFE disk in the seat ring. The cost to maintain each valve assembly every 100,000 cycles was \$3,333, including labor costs, or approximately \$100,000 for the 30 valves on the PSA skid.

Additionally, the main throttling valve needed repair three to four times per year to replace the O-ring in its actuator piston and sliding block assembly. The valve operated every two minutes and cycled with all six beds.

The high cost of maintenance led refinery personnel to seek a better solution. A payback analysis indicated that a control valve capable of 500,000 cycles in PSA service without maintenance would have payback of 3.2 years. They turned to Emerson to see if such a valve existed.

Fisher® valves for PSA service are designed and tested to meet the highest of reliability standards.



SOLUTION

The Emerson local business partner, in cooperation with Emerson factory engineers, analyzed the application and recommended Fisher® GX globe valves for throttling and Fisher A41 high performance butterfly valves for isolation on the PSA units. Actuators would be a spring and diaphragm design compared to the piston actuators used on the OEM valves. The new valves also would use the FIELDVUE® DVC6000 positioner with performance diagnostics. The GX valve was specified with ion-nitrated plug/stem.

RESULT

Emerson factory engineers ran cycle tests on the GX globe valves and A41 butterfly valves at their PSA testing facility in Marshalltown, Iowa, to prove the durability of the valve assemblies. Refinery engineers then decided to install five valves on one skid for further testing. The valves were cycled under normal process conditions for a period of approximately 24 months. During the 24 month period and 200,000 cycles of service, there were no critical maintenance issues and no observable leakage. Based on this experience, all 30 existing valves on the PSA units were replaced with Fisher valves and actuators. Further testing is ongoing to verify that the Fisher valves are capable of achieving the customer's goal of 500,000 cycles without maintenance.

For more information on severe service solutions, visit www.fishersevereservice.com.

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