

Refinery Saves \$9.5M (USD) in Operational Costs in Pressure Swing Adsorption Unit

RESULTS

- 17,648,392 cycles in eighteen months with zero unplanned outages
- \$9,500,000 in operational savings
- 20% increase in refinery operations efficiency



APPLICATION

The PSA unit supplies purified hydrogen by removing impurities from the feed gas used in the olefins unit. Additionally, this PSA unit provides purified hydrogen for other areas of the refinery, including the hydrotreater and hydrocracker, to produce clean fuels or as a clean fuel source within the plant. This unit requires the valves to fully open and close every thirty seconds, resulting in increased wear on valve components.

CUSTOMER

A refinery in Deer Park, Texas outside of Houston, Texas.

CHALLENGE

Before 2018, the valves installed in this application caused six unplanned trips each year. Each of these trips rendered the unit non-operational for two days, resulting in increased costs for purchasing purified hydrogen outside the refinery complex and higher expenses for expedited services, repairs, and parts.

Fifty control valves in this unit cycle continuously to maintain catalyst life and produce purified hydrogen through a timed process. This operation causes increased wear on the internal valve components. Issues seen in this unit included broken shafts, seals, and bearings in rotary valves. The sliding-stem valves experienced broken stems, actuator leaks, and failures in the positioner linkage. Packing leaks caused safety concerns due to hydrogen exposure.

A refinery faced reliability issues and higher maintenance costs for its Pressure Swing Adsorption (PSA) Unit when it became a critical component of refinery production in 2010.

CHALLENGE (continued)

Due to frequent unplanned trips, the site purchased \$500,000 USD of spare valves to make repairs quickly. The PSA unit caused frequent problems with plant operations which resulted in significant expenses. The incumbent valve manufacturer was unable to increase the valves' reliability with design changes.

SOLUTION

In 2018, the site installed Fisher™ rotary and globe valves from Emerson rigorously tested for use in high cycle applications. Fisher™ 8580 rotary control valves were specified with low-friction bearings, reinforced PTFE seals for a tight shut-off, Fisher™ ENVIRO-SEAL™ fugitive emission packing systems, and a two-piece shaft design featuring pins for a tighter connection with the disc.

Fisher™ GX and easy-e™ sliding-stem valves were specified with a spring-loaded seat for tight shutoff, a hard-faced plug for increased wear resistance, and Fisher ENVIRO-SEAL™ fugitive emission packing systems.

All valves use Fisher™ FIELDVUE™ DVC6200 digital valve controllers, equipped with diagnostics and configured alerts, to inform operations about the real-time health of the valves, enabling them to make informed maintenance decisions. The DVC6200 instrument also maintains great accuracy and prevents overshoot on Fisher valves. To remove a mechanical failure point, the DVC6200 utilizes a linkage-less, non-contact feedback array.



Fig. 1. Valves successfully being tested in a laboratory to PSA licensor specifications

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