

Capacity Improvement Realized in Propylene Compressor Using Fisher® Optimized Antisurge Valves

RESULTS

- Fisher optimized antisurge valves have improved compressor performance, resulting in a naptha cracker capacity increase of 8.4%.
- Fisher optimized antisurge valves provide a more stable response for better controllability, reliability, and reduced startup time.



APPLICATION

Antisurge valves on a four-stage propylene compressor.

CUSTOMER

Major producer of oil and gas, petroleum refining and marketing, petrochemicals, and textiles.

CHALLENGE

Spread over 700 acres is a large manufacturing complex consisting of a naptha cracker feeding downstream fiber intermediates, plastics, and polyester plants. The cracker was designed as a 750 kilo-tons annually (KTA) unit in 1997 that ultimately achieved a capacity of 830 KTA.

A de-bottleneck project was undertaken in 2005 to increase its output to 875 KTA. To achieve this, the furnace capacity was increased and the cracked-gas turbine was up-rated from 43 MW to 50 MW.

These changes required more refrigeration capacity from the existing propylene refrigeration compressor, a four-stage unit that was running very near to the stonewall limit. The turbine, however, had additional power available for the increased load.

It was decided to up-rate the compressor rotor without making changes to the casing for an estimated seven percent capacity increase. This would require the upgrade or replacement of existing Fisher compressor anti-surge valves due to increased flow rates.

The biggest challenge was going to be getting the additional capacity out of valves that were already designed to the upper end of their capacity. Replacement of the valves would result in significant additional removal and installation costs.

Fisher® optimized antisurge valves are an engineered control valve package specifically designed for compressor anti-surge applications.



SOLUTION

A detailed review of the new operating requirements was conducted jointly by the compressor controls manufacturer and Emerson severe service engineers. It was determined that the first and second stage valves could be retrofitted with custom designed internals to meet the performance and capacity requirements. The third stage valve would be replaced to address the increased capacity. The fourth stage valve was found to be adequate even for the increased flow conditions.

The performance of the existing valves was also under consideration, especially the overshoot during opening which caused some instability in the system. To solve these problems, the Fisher optimized antisurge system was utilized on all four valves to improve system performance. The system incorporates special valve technologies including multi-stage, noise attenuating Whisper® trim and FIELDVUE®-ODV tier controller designed with special antisurge-specific control and tuning algorithms.

RESULT

The Fisher optimized antisurge system has resulted in valve performance that is better integrated with the compressor control system. Improved compressor performance has resulted in a naphtha cracker capacity increase of 8.4%.

The new and revamped antisurge valves have a more stable response for better controllability and reliability. Compressor overshoots have disappeared along with the unstable operating region encountered during process upsets. Installation of Fisher optimized valves helped the company to maximize throughput and improve their bottom line.

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

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