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Severe Service Journal

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MILLION-DOLLAR ANSWER TO BYPASS SERVICE QUESTIONS

A major, multi-national chemical producer recently commissioned the Fisher Severe Service group to design and manufacture a special-purpose valve for use as a bypass within a turbo expander system.

A typical turbo expander enables the flow energy of a gas stream to be converted to mechanical energy as the gas flow passes across the blades of a turbine. Rapid cooling of the flow stream takes place as the conversion occurs, leading to condensate liquids such as propane, butane, and ethane. These liquids are then utilized within the plant or sold as byproduct.

Service conditions experienced by the bypass valves include an inlet pressure that reaches 1500 psig and an outlet pressure as low as 200 psig. Operating temperature at the valve can drop to –150 degrees Fahrenheit, which is at the top end of the cryogenic range. Valve noise and vibration are threats due to the large pressure drop and large flow rate combination.

The system's high flow rate demanded a large valve size, and the Severe Service group responded with an angle-body valve that featured a 30-inch inlet diameter and a 36-inch outlet. The valve's internal port was 22 inches across, with a total valve stroke measuring 24 inches. Stroking speed was set at 1.5 seconds or less.

The Severe Service group answered the potential noise and vibration problems by installing a Whisper Trim®III cage. The cage is suspended or "hung" within the valve body to allow thermal expansion and contraction of trim parts while still providing tight shutoff.

The threat of corrosion posed yet another design challenge, which was solved by the weld-application of Hastelloy to the interior of the valve body. Also, Fisher welding specialists at the company's Marshalltown, Iowa manufacturing site applied an Ultimet overlay to the bore of the 66-inch long Whisper Trim III cage (CW2W alloy base material.)

The total bypass valve package measured 15-feet tall, weighed approximately 5 tons, and cost over $1-million. Was the Severe Service group's bypass valve a success? Perhaps the answer lies in the chemical company's shipping of valve pairs to its plants in China and Taiwan.

Hydrodome SOLVES CAVITATION PROBLEM AT PLANTATION PIPELINE COMPANY

Plantation Pipeline experienced problems with a rotary control valve at one of its mainline take-off delivery terminals. Cavitation and vibration were battering the valve and its auxiliary operating equipment, as well as the immediate downstream piping. This created concern about the possibility of a significant gasoline release. The damaging cavitation had to be eliminated.

For pipeline ball valve applications where cavitation and noise are a concern, Fisher developed the V260 Hydrodome attenuator. This device, which is installed within the valve, utilizes a series of drilled holes to break up the fluid and stage the pressure drop. This technique avoids damaging cavitation and associated vibration.

The Fisher Severe Service Group worked with Plantation Pipeline personnel and within two days, shipped a Hydrodome attenuator to the site. Once the attenuator was received, technicians from a nearby Fisher Service Company removed the existing valve body, performed the minor machining needed to accept the new part, and delivered the valve back to the site the same day.

Once the valve with its newly installed Hydrodome attenuator was brought back online, the cavitation and vibration problems were eliminated. Because of this success, another Fisher V260 control valve in parallel service was retrofitted with a Hydrodome attenuator.