

# Severe Service Journal

A Publication of the Severe Service Team at Fisher Controls

Volume 2 Issue 2

June 2002

**RESEARCH • PRODUCTS • NEWS • STEAM CONDITIONING**

## SWIFT, SILENT RESPONSE TO PROBLEM NOISE VALVE

A faulty 12" control valve at Methanex's Waitara Valley methanol plant brought out the best in a New Zealand-United States team of engineers who specified, designed, manufactured, delivered and installed a replacement Fisher Controls valve within nine weeks of the order being placed.

The valve is used in a steam pressure letdown application at the plant. The steam (at 355 psig and 635°F) flows at a rate of 196,000 pounds per hour and the valve controls a pressure drop of 330 psid. A major factor in its operating profile, however, is noise level. The replacement valve would need to use an innovative, noise-control technology to achieve the desired noise level of less than 85 dBA.

To meet those requirements, Methanex opted for a Fisher Controls 12" 300# EWD WhisperFlo valve. "It was the most cost-effective solution," says Methanex engineer Martin Tatham. "We realized that the valve would have to be manufactured from scratch, and Fisher Controls, through its New Zealand representatives (Custom Controls) was able to guarantee delivery to meet a scheduled plant shutdown."

The valve was built at Fisher Controls' Marshalltown plant in Iowa and air-freighted to New Zealand. Tatham says a key specification was the ease of replacement, "We wanted to be able to drop the new valve into the old one's position without having to modify any existing piping or flanges."

To meet the noise requirements the WhisperFlo solution was chosen because of its ability to reduce valve-caused aerodynamic noise by up to 40 dBA. This performance surpasses conventional noise abatement trims by 5 to 10 dBA. This is accomplished by incorporating unique passage shapes with multistage pressure reduction, frequency spectrum shift, exit jet independence, velocity management and a complementary body design.

## FISHER WINS \$1 MILLION ORDER FOR SLIDING PRESSURE CONTROL VALVES

Mitsubishi Heavy Industries in Tokyo recently placed a \$1M order with Nippon Fisher (Tokyo, Japan) for two, 14" ANSI Class 2500# EHDs and two, 8x6 ANSI Class 2500# EHDs to be used for the Tohoku EPCO Higashi Niigata 600 MW Sliding Pressure Modification. The sliding pressure capability will allow the plant to control the load from 100% down to levels of 10%.

Sliding pressure operation allows the main turbine throttle valves to remain fully open during turbine operation. Installing the valves ahead of the primary superheater allows for accurate temperature control prior to the high-pressure turbine inlet. Another benefit is that because of the higher inlet temperature into the high pressure turbine, the turbine outlet temperature is higher yielding better maintenance of hot reheat temperature, dramatically improving the plant heat rate. For this project MHI estimates that the plant heat rate will be improved by at least 0.8%.

These valves are referred to as the BT and BTB valves in a Combustion Engineering (CE) supercritical power plant design. The BTB valve is used to admit flow to the final superheater and controls the plant throttle pressure up to approximately 30% load. The BT valve performs the most critical function in the sliding pressure operation. Unit availability and unit load are fully dependent on the successful operation of these valves.

The two BT valves are designed to provide the best operating flexibility available. Each valve's linear control characteristic must match the other at all lifts as accuracy of flow control is important to system efficiency.

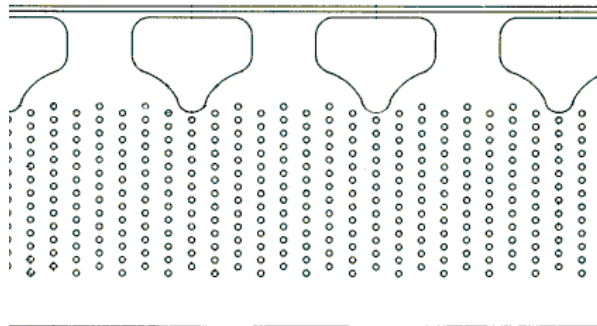
Before a decision was made as to the vendor for these valves, MHI came to the United States to review Fisher's sliding pressure capabilities. Three plants with Fisher valves installed in sliding pressure operation were visited, and the operation of each valve was analyzed.

**FISHER**

  
**EMERSON**  
Process Management

The results of this visit combined with the fact that the Fisher solution provided 20 dB better noise attenuation were major factors in MHI's decision to utilize Fisher technology. The decision was based also upon the fact the EH design was much easier to maintain than other designs and upon Nippon Fisher's startup and after market service capabilities.

For the BT application, Fisher developed a special control valve trim (See Figure 1). The trim is designed to handle conditions of low flow and high pressure drop and also to pass high flow with little pressure drop. Low flow control is accomplished by drilling specially sized and spaced holes in the lower portions of the cage. This feature limits noise generation and protects against damaging vibration. An additional benefit is the reduction of turbulence within the valve, which improves stability of the valve and its mechanical integrity.



**Figure 1:** Characterized Whisper Trim III

Coupled with the noise attenuating portion of the trim are large open windows that allow the passage of high flow rates at low pressure drops. This is especially important as the valves are required to withstand pressures of 3900 psig while taking only a 25 psi pressure drop during normal operation.

Because of the extensive experience Fisher has in sliding pressure operation, MHI will continue to look to Fisher for additional sliding pressure conversions.

### FISHER SHIPS THE FIRST OF FOUR \$1-MILLION VALVES

Fisher Controls recently shipped the first of four large, critical-process, fabricated-body valves. This was a 15-foot tall, 30x34-inch angle valve with 24 inches of stroke (See Figure 2). All four valves will be installed in a facility that produces fabrics, packaging resins and films, and will be used to control off-gas by throttling flow to an energy recovery system or to a vent treatment system.



**Figure 2:** 30x34 FB Valve Ready for Shipment

Because of the flowing media, the valve cage and plug required hard-surfacing to make these components more corrosion-resistant and durable. The F22 valve body was also clad with Hastelloy C for corrosion resistance.

Due to the high pressure drop encountered in this application, damaging noise and vibration was a concern. To counteract these effects, the valves were provided with Whisper Trim III noise abatement trim. This solution provides up to 30 dBA of noise reduction and helps prevent valve and downstream piping damage.

To protect the system from over-pressurization, the valves are required to stroke from open to close in less than two seconds. With 24" of stroke, boosters and additional accessories were required. One problem with stroking valves this quickly is overshoot of the set point. To counteract this, the valve was installed with Fisher's fast stroke accessory package and a double-acting FIELDVUE DVC6000 Digital Valve Controller.

When the valve was tested in Fisher's Marshalltown, Iowa factory, the valve was able to stroke from open to close in less than 1.5 seconds. The valve has had less than three percent overshoot when tested at for a wide range (1 – 75 percent) input step changes.