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FEEDWATER VALVE EROSION ELIMINATED BY CAVITROL® III SOLUTION

The powerhouse at an Alabama pulp and paper mill had experienced repeated erosion and washing issues with a feedwater control valve. Because of this, the plant had to perform repeated body weld repairs and trim replacements, requiring the unit to be brought offline more often than desired.

When the valve was initially installed, it was not supplied with the benefits of any anti-cavitation trim, which was part of the reason for the washing. Because of this, another vendor proposed that installing anti-cavitation trim into the valve would eliminate the problem with the erosion. Addressing the cavitation that is present during startup conditions was only one of the culprits.

The retrofit trim was installed, but the problem continued to occur. Also, because of the higher price of the anti-cavitation trim and the fact that it was not originally specified with the valve, the cost of repair and trim replacement increased.

The Fisher team set off to review the application. After the review, it was determined that much of the valve body erosion was due to what is called an erosion/corrosion phenomena. In pulp and paper mills, it is common to find valve bodies made of carbon steel that experience a fair amount of corrosion over time. This corrosion can be repeatedly washed away in localized areas causing issues with repeated body erosion. This, not cavitation present during startup, was the major cause of body erosion in this application.

The valve was replaced with a valve incorporating a characterized Cavitrol III 3-stage trim. The trim was designed to meet the initial startup demands when there is potential for cavitation and to meet conditions where maximum capacity is desired. The valve body was also made of WC9 chrome-moly material to resist corrosion effects.

Since installation, the valves have been performing as expected with no maintenance required. This is another example of why it is key to understand all of the drivers around an application to ensure that the correct solution is applied.

ADDRESSING DAMAGED WATER INJECTION VALVES WITH DST

Water injection service can prove to be one of the most difficult applications on an offshore platform. The high pressure water is injected into the well to dispose of the water recovered from processing or to help facilitate product flow by displacing depleted product. The water that is injected into the well contains residual components such as sand and other suspended solids. Because of the high pressure drops experienced in these applications, there is the potential for damaging cavitation formation. If uncontrolled, the high pressure drop will yield high velocities that when combined with the entrained particulate can cause extensive erosion damage.

This last point is the worth further discussion. The valves commonly used in this application utilize some manner of anti-cavitation trim to address the potential for damaging cavitation. However, most anti-cavitation trims utilize small passages that can be exposed to plugging and the erosive effects noted above. A recent example of this occurred in a number of offshore platforms in Thailand.

The injection valves used on these platforms utilized a tortuous path construction to address the cavitation potential. However, the trims were not designed to pass the entrained particulate or to withstand the erosion inherent in the process. Needless to say, the trim lasted only a short time before the trim was rendered useless (Figure 1).



Figure 1: Damaged Tortuous Path Trim

To address the issue, the platform has installed Fisher's Dirty Service Trim (DST). DST is specially designed to eliminate the formation of damaging cavitation while allowing particulate up to $\frac{3}{4}$ " in diameter to pass through the trim. By utilizing large flow areas and passage shapes, the potential for localized high velocity erosion is eliminated. The valve also incorporates a protected seating feature ensuring long-lasting tight shutoff.

DST has been used successfully on hundreds of water injection applications. Only by addressing the cavitation formation *and* the potential for erosion can one be sure of the valve placed into this service. Because of the success of DST, the solution will be incorporated on additional platforms with the same recurring issues in the near future.

OPTIMIZED SKY VENT PACKAGE SAVES CONTRACTOR \$750,000

The proper operation of the sky vent application in a combined cycle power plant is critical to minimizing startup times and ensuring proper startup. Because of the high amount of energy in the system, the package also has to dissipate the energy of the system with minimal effects introduced into the outside environment. The overriding effect to combat is noise due to the high pressure drop taken in the system.

The most common approach to address the application is to install a valve in combination with a downstream silencer. The valve and silencer are sized such that the optimal pressure drop is taken across each device to minimize noise generation and equipment size.

With the plant in question, the initial layout for the Hot Reheat sky vent system included a silencer that weighed nearly 17,000 pounds. The weight combined with the limited installation space caused the contractor to look at other alternatives. The list of alternatives was short due to the need for extensive noise attenuation to meet the far field noise requirements.

After reviewing the application with the contractor engineers, a solution consisting of a 12" sky vent valve and a 12" vent diffuser (Figure 2) was proposed. Both the valve and diffuser incorporate the proven WhisperFlo noise abatement trim. WhisperFlo is a multi-path, multi-stage noise abatement technology that can reduce noise by up to 40 dBA, surpassing conventional noise trims by 10 dBA.



Figure 2: WhisperFlo Vent Diffuser

By utilizing the WhisperFlo solution in the vent diffuser, the far field noise requirement was met while reducing the weight of the diffuser to 3500 pounds. This reduced weight drastically decreased the structural steel required to properly support the diffuser. Along with the reduced cost of the structural supports, the installation costs were further reduced. The combined savings achieved by utilizing this optimized arrangement is over \$750,000.

The WhisperFlo valve and vent diffuser package provides the user with the most optimal configuration for vent applications. The valve size is selected to minimize size and optimize noise attenuation requirements and the vent diffuser is selected to minimize weight and overall size while meeting stringent far field noise specifications. Coupled together, the solution can dramatically lower the total installed cost of the vent system.