

Monitoring Sludge in Pumps



Viatran's rugged Model 555 pressure transmitter is built to provide accurate, stable measurement in extremely harsh abrasive environments.

Model 555 has hermetically sealed external controls and built-in calibration signal. It features all welded, watertight submersible construction which is perfect for sludge.

TECHNICAL CHALLENGE

Many municipalities face a similar challenge. They need to monitor the sludge pump discharge pressure. There are several critical and environmental reasons to do so:

- prevent damage to the pipes
- prevent rupture disc from actuating resulting in messy cleanup
- prevent excessive wear leading to high energy consumption

Several cities in the State of California turned to Viatran to provide a pressure sensor that could monitor the sludge in pumps.



Images from the City of Livermore, CA Sludge Line

This sensor needed to provide an accurate and stable measurement in this extremely harsh environment. It needed to be rugged and durable since typically municipalities do not have the financial resources of a private corporation. Of equal importance was a maintenance-free design.

Various mounting options were available to meet the specific requirements of the cities. The options available included pipe saddle on the sludge line, pipe saddle mounted below the digester, pressure transmitter mounted in weld ring.

SOLUTION

Existing solutions consist of an annular ring mounted on the discharge side of the pump. The ring consists of an elastomeric band that is fluid filled transferring pressure to a transmitter or pressure gage. The ring should be used in conjunction with a pressure relief valve to protect the pipes in case of a blockage which can cause an increase in pressure. All solid particles have a specific hardness which contributes to the wear and abrasion of the elastomeric band. With the band being mounted inline with flanges, and its eventual wear, replacement costs are high and downtime due to cleanup and replacement are long. In the event of an overpressure situation the disc in the relief valve will rupture causing sludge to spew out of the pipe onto walls, pipes and the floor. Replacement time for the ring can be up to 10 hours.

Our solution consists of our Model 555 flush mount pressure transmitter, mounted to a pipe saddle and strap. The thick Inconel sensing diaphragm can handle the hardness of the solids providing a more abrasion resistant solution. The Model 555 is completely sealed yet employs magnetically coupled zero and span pots with 4:1 rangeability. With the pipe saddle no flanges are necessary so the transmitter can be easily retrofitted to existing applications. Sludge pipe pressures tend to be around 60 PSIG and with the integral shut-off valve the pipe can be 'hot-tapped' without having to shut the process down with installation times running under an hour. New applications could be engineered with a weld ring allowing for the Model 550 with an Inconel sensing diaphragm to be used.

RESULTS

The cities of Livermore, San Jose, and Oro Loma in California have had units mounted for more than 3 years in sludge lines with no problems. They have both retro-fitted and weld ring installations mounted both horizontally and vertically and the units have proven to be effective and maintenance free.

Other possible applications include fluidized coal beds, and flue gas desulfurization lines in coal-fired power plants, corn starch in food processing, cement manufacturing, and any slurry that tends to be abrasive in nature.



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