High Pressure Hydraulic Oil

Industry: **Power Industry**
Product: **Field Instruments**
RotaMASS Coriolis Flow Meter

Introduction

Flow measurement of high pressure hydraulic fluid to servos to monitor leaks can translate to huge savings. However, measuring these fluids can be difficult due to the high pressures involved and entrained air, moisture and contamination.

Application

A large southeastern power plant measures hydraulic fluid to servos actuating high pressure valves. The purpose is to measure any fluid that may be leaking around the bushing on the servo shaft. As the bushing wears, the flow of hydraulic fluid around the bushing increases and the servo can't develop the required level of torque. Eventually, the loss can become so great that the servo does not have enough torque to perform its function.

By monitoring fluid leakage it can be determined when the servo is in need of maintenance so the bushing can be replaced. Replacing the bushing in a timely manner also reduces wear and failure on other parts in the system that might be damaged were the servo to fail.

Previously a series of glass tube variable area flow meters were used to estimate the bushing wear and the process involved closing valves and comparing pressures with different combinations of servos in line. This was a complex, time consuming and unreliable method of determining the servo's leakage rate.

Solution

As part of a modernization program at the plant, a Yokogawa RotaMASS Coriolis mass flowmeter was installed to replace the variable area flow meters. RotaMASS permits the accurate measurement of mass flow by measuring the Coriolis forces that result from the fluid moving through measurement tubes vibrating at their resonant frequency. When combined with modern digital technology, this measurement principle provides accuracies of 0.1% of the measured value. The Coriolis measurement principle also means that the flow meter is not affected by small amounts of entrained air or fluid contamination.

The RotaMASS unique 'Box in Box' mechanical structure provides dual mechanical isolation from process equipment. There are two assembly boxes in the structure. The outer box attaches the process connection to the meter while the inner box supports and isolates the measuring portion of the meter. The external box is designed to absorb the external stresses from the process pipe and mechanically isolate the internal box from vibration. This eliminates span and zero effects due to process piping.

A unique feature of RotaMASS is its use of heavy wall measuring tubes. This design feature was particularly important in this application because operating pressures ran in excess of 1800 psi. Designs using thin wall measuring tubes lose accuracy when used at high pressures as the tubes expand and become stiffer, which in turn changes the spring constant. This can result in additional inaccuracies of up to 0.4%!

The RotaMASS Coriolis flow meters provided high accuracy, output stability and reliability providing the assurance that the circulating oil systems supplied a continuous, regulated flow to critical parts. RotaMASS not only removed any doubt about the condition of the individual servo bushing, it automated the process. Also, trend data could now be collected and alarms actuated when flow did not meet predetermined levels.