

Position Monitoring on Flue Dampers

Arc furnaces used to produce steel have large ducts in place to provide a flow of oxygen essential for the melting process and to capture and exhaust the fumes from that same process. These ducts contain dampers that, based upon their position, control the power to the main air fans supplying oxygen to the furnace as well as the amount of suction used on the side drafts of the arc furnace controlling the cubic feet per minute (cfms) of exhaust gasses pulled from the canopies. Knowing the position of these flue dampers is critical to the safe and efficient operation of an arc furnace. Damper position is controlled by large actuators located in an exposed location high up on the exterior of the arc furnace building.

Problems with Existing Technology

The customer was using an angular position monitor with a potentiometer and (2) sets of limit switches to determine the fully open and closed positions of the flue dampers. This system had some inherent problems regarding reliability and calibration. The old system was prone to slippage or loss of feedback due to problems with the magnetic clutch and set screws on the connecting linkage between the monitor and damper. Calibration was overly complicated and time consuming due to the number of adjustments required on the small, linkage set screws. The other major drawback was that all the calibration had to be done in place – 100 feet up in an exposed location on the outside of the building. The environment also caused problems; rainwater and moisture were getting inside the monitor housing and damaging the electronics, requiring frequent repairs, costly system downtime, and a loss of damper position feedback.

Solution

Electro-Sensors provided the SG1000, a self contained position monitoring system. The SG1000 utilizes a 9-bit absolute encoder to accurately determine position and provides a 4-20 mA output signal. The SG1000 is directly coupled to the shaft of the actuator controlling the position of the flue damper and is supplied in a rugged cast aluminum housing that is both explosion proof and waterproof. Calibration is a straightforward process that can be done on the ground before heading outside to install the monitor on the actuator. The SG1000 eliminated the problems associated with the cumbersome mechanical linkages with numerous small set screws, the magnetic clutches that were slipping, and the housings that were unreliable and leaked when exposed to the elements.





Customer's Comment

"...if you replaced the actuator you had to set it up in place, there was no way to calibrate it before you installed the actuator. With the SG1000 you can calibrate it before you install it so that means less time for me to be 100 feet in the air freezing, getting rained on or getting burned up. It only takes about 10 minutes to install and calibrate it now, less down time for me and more time to work on something else. We have 17 of them in service now and I have not had to touch them since I installed them."

Benefits

The customer is very pleased with the SG1000 – It can be installed and calibrated in approximately 10 minutes – the old angular position monitor took up to one hour. The customer now has no problems with mechanical failure due to magnetic clutches or linkages – the SG1000 is directly coupled to the actuator. The housing on the SG1000 is rugged, explosion proof and waterproof, and is better able to withstand the elements in the various exposed locations where it is installed.