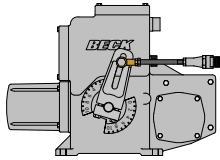


Philadelphia Refinery improves Heater Safety on its Low-Sulfur Gasoline Units by Upgrading Actuators



Pennsylvania U.S.A.

Sunoco's Philadelphia refinery, now owned by Philadelphia Energy Solutions, identified an opportunity to improve operating efficiencies and safety of their low-sulfur gasoline (LSG) production units. Furnace draft pressure is important for optimal combustion, emissions control, heater life, and safety. Since furnace draft is controlled by a stack damper, the actuator which operates the damper must position accurately, and reliably. Pressure excursions, either positive or negative, can lead to severe problems in the process heater. Sunoco's evaluation of the existing pneumatic actuators uncovered positioning problems. Dennis Royal, an E&I Reliability Engineer with Sunoco, detailed the problem:

"The pneumatic actuator on a Heater Stack Damper provides variable torque to achieve the % Open set point. However, the torque required is not uniform in the damper's range of motion. There are points of high "stiction" (static friction) in the travel of the damper. As the damper hits these points of stiction (caused by binding & thermal expansion), the damper position stops until the required torque is met.

If an operator slowly increases the signal, the actuator correspondingly, opens. However, the actuator/damper will abruptly stop when it hits a point of "stiction". The pneumatic positioner senses the deviation from the set point and responds with increasing torque. Once the actuator delivers enough torque to overcome the "stiction", the damper breaks free and overshoots the set point, and then hunts for the correct position."



Figure 1

Beck 11E-309 Rotary Actuator on Heater Stack Damper located ~110 feet off the ground. [Hazardous Location Rated Class I Div 2]

In addition to the stiction that Dennis describes, Sunoco also determined that the pneumatics periodically drifted in the range of 5-6%. The problems were overcome with a constant torque Beck actuator. The Beck actuators have eliminated the drift, and provide better airflow control. Dennis Royal stated that *"The performance of the new damper actuators is exceptional. The operators now have precise, accurate and repeatable control of the damper position. We await a future shutdown to perform a similar replacement."*

Increasing the efficiency of a process not only leads to energy savings, but also has a positive impact on equipment life, equipment reliability and the environment. All of which lead to a healthy and safe work place.



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