

Leading Refiner in the U.S. Reduces Slowdowns with Improved Pressure Technology on Coke Drum

RESULTS

- Reduced risk of plugging, slowdowns
- Reduced electricity consumption and maintenance by eliminating heat tracing and capillaries
- More than \$20K saved per year in transmitter and seal replacement
- 60% cost savings for installation alone

APPLICATION

Delayed coker drum pressure monitoring

CUSTOMER

Leading refiner in the U.S.

CHALLENGE

A leading refiner and distributor of oil needed to accurately and reliably monitor pressure coker drum charge lines to give early indication of plugging.

Heavy liquid residual flow from the bottom of the fractionator is heated in a coker furnace to recover higher value components before being sent to the coker drum. There, further “cracking” at high temperatures and low pressures recovers any remaining gaseous products while petroleum coke solidifies at the bottom of the drum. “The residual flow on the charge lines is difficult to measure because it is at such high temperatures coming out of the coker furnace,” said the Instrument Technician at the plant. “It is anywhere from 450-700 °F.”

Fill fluids that can handle the high temperatures at the process seal don’t perform well at ambient temperatures. Accuracy and response time degrade as the fill fluids cool along the capillary lines leading back to the sensor. This leads to poor indication of plugging, and must be corrected by applying a heat trace to the fill fluid along the capillary line.

Unfortunately, the refinery had a hard time controlling heat tracing. “We had about 15 feet of capillary on each measurement application,” said the customer. “The challenge was to keep heat tracing at a constant temperature and protect the transmitter from overheating. We burned up two to three transmitters each year due to the heat trace becoming too hot.”



“We are now replacing the coke drum pressure monitoring devices for all of our coke towers with the Thermal Range Expander.”

Instrument Technician

Leading refiner in the U.S.

Heat tracing could also fail on the low side, significantly reducing accuracy and response time of the measurement and heightening the risk of plugging. Plugging would not only affect the throughput of the coker unit, but the whole refinery. It runs at 105% of capacity, so any slowdown directly impacts the bottom line.

A solution was needed for all ten coker towers, which netted over 150,000 barrels/day in production. These same lines needed to be monitored when the drum went offline and were “steamed out” prior to removing the solid coke from the bottom of the drum.

SOLUTION

The refinery replaced existing pressure transmitters with the Rosemount 3051S pressure transmitter paired with the Rosemount 3051S Thermal Range Expander. The Thermal Range Expander employs two fill fluids in a single system. The fluid at the process seal is rated for high temperatures, and runs a short distance to an intermediate seal with a second fill fluid rated for ambient temperatures. This second fill fluid then connects to the process sensor.

This eliminates the need for heat tracing altogether. “There are no longer any measurement swings due to heat tracing issues,” said the instrument technician. “We have much higher reliability in our coker drum charge pressure measurement, which has reduced our risk of plugging.”

Transmitters are also protected, and the refinery has eliminated the need to replace two to three transmitters per year due to high temperatures, saving more than \$20,000 annually.

“We also eliminated all the time it took to maintain the heat tracing,” he continued, “not to mention the cost of installation every time we changed out the capillaries, as well as the electricity consumed. We saved in power consumption and maintenance, both ongoing and every time we installed a new seal. We are now replacing the coke drum pressure monitoring devices for all of our coke towers with the Thermal Range Expander design.” He also added, “Our account manager brought this solution to us; we now view Rosemount as a solutions partner.”

The refinery realized a 60% cost savings for installation alone by replacing each transmitter and heat-traced capillary assembly with the dual-seal system. The reliability engineer has timelier and more accurate information to prevent process slowdowns, and the Inspection Group has better information to reduce maintenance and improve safety.

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