

Large Refinery Improves Safety in On-Line Spalling Process of Coker Furnaces Using Rosemount Dual Vortex Meters

RESULTS

- Implemented Safety Instrumented System efficiently and cost effectively by adding flow measurement redundancy with a single vortex meter body
- Replaced existing meters without having to modify piping
- Followed licensor specification for utilization of vortex meters to meet wide turndown requirements



APPLICATION

Delayed cokers are used in refineries to thermally crack other unit residues to upgraded product streams. As a byproduct, a solid concentrated carbon material, coke, is produced.

The heavy residues are heated at high temperatures (875 –940°F/ 470-505°C) in the furnaces. The heat is used to crack these heavy residu into smaller gas and liquid products. The goal is to crack residue in coke drums and not in the furnace, so high velocities of fluid flows are utilized to minimize the residence time in the furnace. However, coke formation can still occur on the furnace tube walls. Periodic decoking of the furnace tubes is required to remove the coke deposits to maintain furnace capacity and efficiency. There are only a few decoking methods that can be used to clean furnace tubes in the coker.

On-line Spalling is one of those decoking methods and is advantageous because the furnace tubes can be cleaned during operation and eliminates the need to shutdown the process to clean the tubes. During On-line Spalling, steam and temperature is used to remove coke deposits from the inside of furnace tubes while thermally contracting and expanding the coils.

A large refinery in the US utilized a licensed On-line Spalling process for their delayed coker heaters. The licensor recommendation was to perform the On-line Spalling operation every 2 months.

The refinery had 3 fired heaters in the coker with 4 feed lines each that the Spalling operation was performed on.

CHALLENGE

Measuring the steam flow in the Spalling process was challenging due to the wide turndown requirements. The turndown requirements were minimum steam flows of 600-1,000 pounds per hour and

Rosemount Vortex Meters have wide turndown capabilities of 30:1 and enable SIS compliance for critical and challenging applications



Rosemount's 8800 Dual Vortex Meters enable redundancy for safety systems in a single meter body

maximum flows of 8,000-15,000 pounds per hour. The minimum flow rate was recommended to keep a positive steam flow when not Spalling to prevent back flow into the steam system. The maximum flow rate was recommended by the licensor to break up the coke that built up on the feed lines.

The licensor design specification and recommendation was to use vortex meters for the Spalling application due to the wide turndown requirements.

CUSTOMER PAIN

There were 12 vortex meters that were installed on each of the 4 feed lines for each of the 3 furnaces. These meters have proven successful in this application for over 15 years and were still in good working condition, but the refinery was implementing a new Safety Instrumented System (SIS) on the coker heaters and needed additional meters for redundancy.

SOLUTION

All 12 existing vortex meters were replaced with Emerson's Rosemount 8800 Dual Sensor Vortex Meters. Rosemount 8800 Dual Sensor Vortex Meters were selected because they were easy to install in the existing piping and they were equipped to handle wide turndown applications.

The Dual Vortex meter is constructed of 2 complete vortex meters with a single shedder bar for both sensors. This compact design enables redundancy while reducing the lay-length of the flow meter body. The meters are calibrated to provide an accurate single flow meter with two independent flow measurements enabling 1oo2 voting needs and are also capable of up to SIL 3 Certification.

Rosemount 8800 Series Vortex Flow Meters are also extremely reliable with a gasket-free, non-clog meter body that eliminates potential leak points, resulting in maximum process availability and fewer unscheduled shutdowns. The unique design of Emerson's Rosemount 8800 Vortex Flow Meters features sensors that are isolated from the process enabling safe on-line replacement without having to shut down or isolate the process.

With the turndown capabilities and compact design of the Rosemount 8800 Vortex Flow Meters, the refinery was able to easily replace the existing vortex and improve safety without modifying piping and saving on installation time and costs.

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www.Emerson.com/Vortex

