CASE STUDY • DP LEVEL

3051S ERS AND THERMAL RANGE EXPANDER HELPS REFINERY CUSTOMER TO REDUCE MAINTENANCE COST AND IMPROVE MEASUREMENT RELIABILITY

Customer

A refinery company in Korea.

The customer operates a large oil refinery site, with daily capacities over 1,000,000 barrels, producing a range of petroleum products and millions of tons of benzene, toluene, xylene, etc. High reliability and performance of all facilities are critical to operational safety and efficiency.

Application

DP (differential pressure) and level measurement in VRCHR (Vacuum Residue Hydro Cracker)

Challenge

Vacuum Residue Hydro Cracker uses residues which include extra heavy oils like asphalt from the oil refining process to produce high value light crude oil such as kerosene and diesel.

In VRHCR process, the customer had challenges in two process points, which cause lots of maintenance cost and complex in their daily operation.

Process point 1 is a high column with high process temperature up to 345–369 °C. When remote seal assemblies with 25 m capillary were applied, the measurement was not accurate because of the temperature induced errors from fluctuating seasonal temperatures. In addition, maintenance became quite difficult as the equipment is installed at very high level.

Another process point was impulse piping equipped with another vendor's pressure transmitters for pressure measurement. Impulse piping is subject to frequent maintenance. In addition, the customer needed to disassemble and re-assemble insulation every time the impulse piping was under maintenance, which was time consuming. Besides, the customer was not satisfied with the inaccurate measurement and low reliability.

With the existing solutions of impulse piping and long capillaries, the customer was faced with challenges in measurement reliability and intensive maintenance work every day.

Results

- The customer is relieved from intensive maintenance and frequent shutdowns to improve operational efficiency.
- The customer appreciates measurement reliability and reparabilty enabled by Rosemount 3051S ERS and Thermal Range Expander, solving their problems in tough applications of high temperature (up to 369 °C) and tall vessels (25 m).

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Solution

3051S ERS (Electronic Remote Sensor)

3051S ERS DP Level measurement system uses 2 Rosemount premium transmitters of 3051S, and connects them by electronic cable with full synchronized DP (Differential Pressure) calculation. The transmitters are direct mounted without the use of capillaries. It provides a range of values over traditional systems.

- By eliminating impulse piping and long capillary which are exposed to the fluctuating environmental temperatures, temperature induced errors are significantly reduced.
- A faster response time is another benefit enabling accurate measurements in real-time for improved process control.
- No heat tracing or insulation is required, simplifying installation and maintenance with reduced cost.
- ERS provides variables of Phigh, Plow and DP which gives additional insights to the process, for improved process control and safety.
- An ERS system is as simple as 2 transmitters and 1 non-proprietary cable, saving significant time of installation, maintenance and inventory management.
- Rosemount ERS system uses premium pressure transmitter of 3051S with full options of 1199 remote seal types for various process conditions, include the high temperatures up to 369 °C in this case.

The entire system utilizes a single 2-wire, 4–20 mA HART® loop, streamlining system integration and reducing complexity. The graphical interface of the device dashboard offers a user-friendly experience for configuration, commissioning, and troubleshooting. ERS is an excellent choice for industries seeking advanced technology for their operations.

3051S Thermal Range Expander

3051S TRE uses two diaphragms with two separate fill fluids, which includes a high temperature fill fluid to handle the hot process and a different fill fluid to handle the ambient environment. Otherwise, a single viscous high temperature fill fluid can gel at normal ambient temperatures if no other heat tracing facilities are installed. This, TRE requires no additional heat tracing or impulse piping components to eliminate extra installation costs and maintenance.

> *This is the first time seeing the right DP measurement at the column...*
>
> *Maintenance Engineer*

Image 2. *Rosemount™ 3051S Electronic Remote Sensor (ERS)™ System*

Image 3. *Rosemount™ 3051S Thermal Range Expander System*

For more information, visit
Emerson.com/Rosemount1199DiaphragmSealSystem

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