

MOL Danube Refinery Increases Throughput and Quality of Sulfur Recovery by Improving Process Efficiency

RESULTS

- Improved sulfur recovery and tail gas quality
- Reduced operating cost by improving process efficiency
- Reduced maintenance cost

APPLICATION

Claus Process Thermal Reactor

APPLICATION CHARACTERISTICS

- Extremely corrosive acid gas environment that may contain very high sulfur oxides, hydrogen, sulfides, chlorides, acid gases, ammonia, etc.
- 1,380 °C (2516 °F) at max with significant temperature changes during the process 200-300 °C (392-572 °F).

CUSTOMER

MOL Danube Refinery in Százhalombatta, Hungary

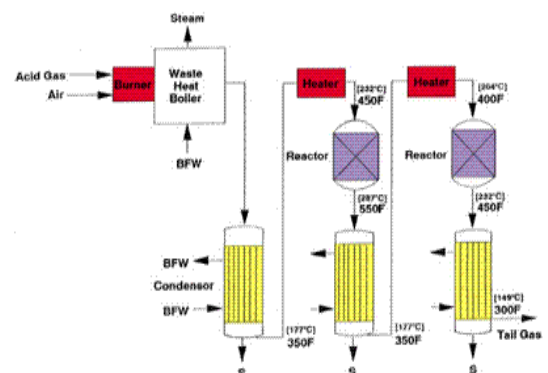
CHALLENGE

MOL Danube Refinery is the largest oil refinery in Hungary. They are utilizing a Claus Process to recover sulfur from feed acid gas to ensure compliance to environmental regulations. The plant's maintenance engineer wanted to increase the process efficiency by improving throughput, quality, maintenance, and operating cost.

Accurate temperature measurement is critical in the desulfurization process as it will affect the recovery output and tail gas quality. There are a total of four temperature measurement points in the burner chamber. Two points monitored by conventional ceramic high-temperature sensors and the other two points by pyrometers. The conventional sensors with DIN Form A aluminum connection head and inside/outside ceramic protective tube cracked easily due to very fast temperature changes occurring in just minutes. This exposes the sensor to high concentration of sulfur oxides, hydrogen, sulfides, chlorides, and other acid gases causing thermocouple wire contamination leading to sensor failure. Replacement cannot be done immediately after a sensor fails as the desulfurization process can only be shutdown once per year.



MOL Danube Refinery is planning to implement the solution to its other recovery units with the same expected improvement and savings.



Claus Sulfur Recovery Plant

With only the pyrometers left to monitor the process temperature after the conventional ceramic sensor fails, the accuracy of the measurement was affected. This led to increase energy usage as the burner is running higher than the optimum process temperature. Recovery throughput and tail gas quality was impacted as well since accurate temperature measurement is critical in the process.

SOLUTION

The maintenance engineer replaced the failed conventional sensor of one Claus Recovery unit with a Rosemount Application and Industry Solution (AIS) Sapphire Temperature Sensor. The initial test showed that the sapphire sensor with its patented sapphire protective tubing lasted longer compared to just four to six weeks of the conventional sensor. This showed it was more successful in this harsh process condition, withstanding abrupt temperature changes, high gas corrosion, and contamination.

Since the sapphire sensor lasted longer, it resulted in more accurate temperature monitoring, enabling MOL Danube Refinery to meet their target sulfur recovery content and further increase tail gas quality. The burner is now running longer on its optimum temperature resulting to better energy use, leading to improve process efficiency. And with the sapphire sensor still working for over 12 months, maintenance does not need to do replacement of failed sensors during process shutdown, which was common in the past. This allowed them to save on maintenance cost. Having this positive test outcome, MOL Danube Refinery is planning to implement the solution to its other recovery units with the same expected improvement and savings.



Claus Recovery unit with a Rosemount Application and Industry Solution (AIS) Sapphire Temperature Sensor

RESOURCES

Emerson Process Management Refining Industry

<http://www2.emersonprocess.com/en-US/industries/refining/Pages/index.aspx>

Rosemount Application and Industry Solution Sensors

<http://www2.emersonprocess.com/en-US/brands/rosemount/Temperature/AIS-Sensors/Pages/index.aspx>

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