

Coke drum - Temperature monitoring

Industry: Hydro carbon - Refinery
Products: YTA510 (Temperature Transmitter)
YTMX580 (Multi-input Temperature Transmitter)
YFGW510 (Field Wireless Access Point)
YFGW410 (Field Wireless Management Station)



Introduction

Delayed Coker is a type of coker whose process consists of heating a residual oil feed to its thermal cracking temperature in a furnace.

The most important variable in industrial furnace control is temperature. Temperature is measured throughout the furnace in different zones and temperature effects the materials being manufactured and therefore must be precisely monitored to prevent deviations in quality of the final product.



Benefits

- Minimized plant startup time and downtime
- Improved product quality, continuous temperature monitoring leads to improvement of the product quality
- Reduced maintenance effort (NO wires, NO routing problems, NO cable maintenance issue)
- Optimized fuel consumption and reduced operation cost (OPEX)
- Reduced total power consumption, low power consumption devices enable cost savings
- Enabled easy integration with existing host system, industry proven Modbus platform enables easy and seamless integration with a wide range of host systems

Requirements

- Coker tube furnace is the heart of the delayed coking process. The heater provides all the heat in the process. The outlet temperature of the furnace is typically around 500 degree C.



- Temperature monitoring is required due to the following reasons:

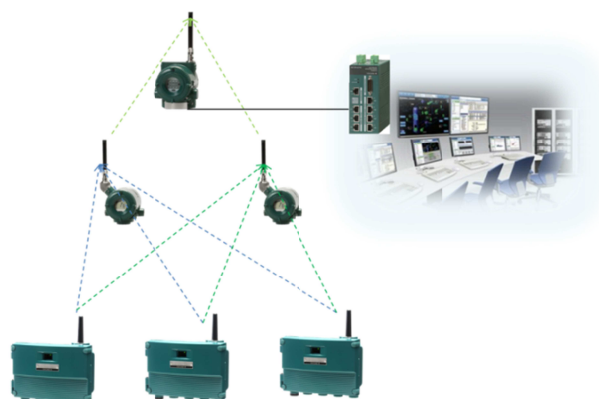
- ✓ Coker furnaces are designed to have a constantly rising temperature gradient to reach the thermal cracking temperature quickly and thus optimize the fuel consumption.
- ✓ The burners are controlled by the measurement of tube temperatures.
- ✓ The furnace needs to be decoked or cleaned. Continuous operation of the coke drum forms a layer of insulation on the inner lining of the tubes resulting in the variation of temperature on the coke drum skin.



- Delayed coking is one of the processes used in many refineries. Depending on the capacity, number of coke drums in operation varies from 4 to 8. Each coke drum will require upto 24 temperature points to be monitored.

Solution

Three YTMX580 multi input temperature transmitters were installed. Each of these accepts 8 temperature inputs and it reduces the quantity of transmitters required to only 3 on each coke drum. Field wireless access point was installed on the control room located 600m from the measurement area with dense obstructions. Two repeaters were used to establish redundant communication paths between the measurement devices and the field wireless access point. The field wireless management station was integrated with 3rd party host system using RS485 serial Modbus communication.



The ISA100 wireless system provides an easy customizable GUI with deterministic topology monitoring for the operator. It identifies the wireless condition such as error rate of both primary and secondary communication paths to visualize communication quality.

Conclusion

- Wireless solutions enabled reduction of huge bundles of cable running from the field to the control room.
- High capacity Lithium Thionyl battery powered devices enabled savings in OPEX with proven battery life of better than 1.6 years with an update time of 10 sec for the temperature measurements (eight inputs).
- Industry proven Modbus platform enabled easy integration with existing 3rd party host systems.
- Wider application coverage of ISA100 wireless minimized infrastructure which reduces installation time and expense, this is reflected as direct savings to the users.
- Best in class signal availability of ISA100 wireless architecture with stable wireless connections proved to be a trustworthy wireless solution, perfectly meeting the user requirements.
- Maintainable topology reduced the cost of ownership and enabled more points to be added as necessary in the future.

Yokogawa has a proven track record of delivering reliable, scalable and open technologies for a century. ISA100 wireless solutions address the specific challenges of the industrial automation industry while lowering cost of ownership for our end users and maximizing their return on investment.


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