Chemical Reactor Shutdown is Avoided with Rosemount 848T and 3420

Products
Rosemount 848T Eight Input Temperature Transmitter with FOUNDATION™ fieldbus

Rosemount 3420 Fieldbus Interface Module

Industry
Chemical

Application
Monitoring reactor temperature during polymerization process

Problem
If the process temperature falls outside the normal reaction temperature limits, polymerization can occur at the wrong stage of the reaction ultimately causing process shutdown

Solution
The cost effective temperature monitoring solution consisting of 848Ts and the 3420 allowed additional temperature monitoring points on the reactor providing visibility to the reaction temperature limits during the polymerization process.

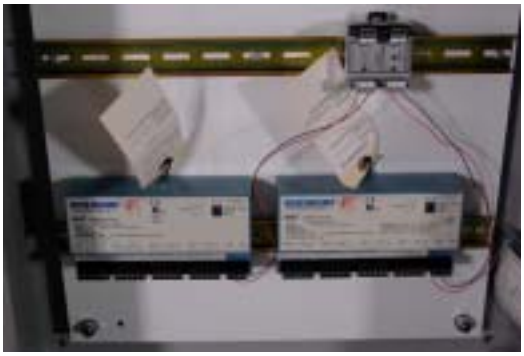
PROBLEM

Typically, the transition during startup of a chemical reactor with a process designed to run at constant steady state conditions is watched very carefully. In this case, a chemical manufacturing company in southwest Louisiana was preparing to start-up one of its production trains for a particular product type. Precise control of the operating conditions is necessary to regulate the polymerization process in order to produce on-spec product.

To observe the progress of the reaction during startup, the customer wanted to monitor the temperature profile of the reactor's dome. Any indication of the temperature moving outside the normal limits could indicate that polymerization was occuring in the wrong stage of the reaction. This could create a solid polymer plug in the reactor which could cause a unit shutdown. If the reactor were to plug it could cost the customer anywhere from 2-3 weeks in downtime depending on how severe the plugging or polymerization was. Lost production for this unit is estimated at approximately $3000 per hour of downtime. This number does not include the labor cost and material cost that would be required to unplug the reactor.

SOLUTION

The project team first evaluated a traditional approach using individual transmitters on 16 temperature sensors. With the long wire run and high installation costs the project was not funded. However, when the team learned of the 848T and its potential wiring cost savings due to the FOUNDATION fieldbus technology, they quickly realized they had a cost-effective alternative. They also utilized the Rosemount 3420 because their 5-year-old Honeywell TDC DCS did not have fieldbus capability but a Modbus Serial interface was available. The cost of the 848T/3420 solution was about 50% of the traditional analog installation.



The instrumentation used in this application consists of two 848Ts and one 3420. Sixteen Type J thermocouple assemblies with magnetic pull downs

were installed at each required temperature monitoring point. The sensor lead wires were run to a nearby 848T with each transmitter accepting 8 sensor inputs. The 848T's are mounted in a junction box and wired to Relcom terminators (shown in the picture). A single pair of wires is run from the 848Ts to the 3420 which is located about 650 feet away in the control room where they are then interfaced to the Honeywell DCS.

RESULTS

This cost effective temperature monitoring solution proved to be beneficial for the customer during startup. The 848T and 3420 enabled the customer to notice an increase in temperature on the dome of the reactor during startup. Upon entering the reactor, plastic buildup on the inside of the dome was identified. If these extra monitoring points had not been made the problem would not have been identified early enough to avoid a shutdown. The customer estimated that this saved them approximately $1.5 million in lost production.

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