

Chemical Plant Increases Process Availability and Product Quality with Multipoint Temperature Measurement

RESULTS

- Improved quality
- Increased process availability
- Reduced maintenance cost



APPLICATION

Acrylic Acid and Acrylic Esters reactor temperature measurement

Application Characteristics

Catalyst filled reactor with different layers

CUSTOMER

Chemical/Petrochemical plant in China

CHALLENGE

The chemical manufacturer was adding two Acrylic Acid / Acrylic Esters reactors to the plant site. Accurate temperature control is critical for quality and throughput from these reactors. If temperatures within the reactor are not accurately monitored and controlled, hot and cold spots can form.

The chemical manufacturer needed to make 40 different temperature measurements at 10 different levels within the reactor to monitor and control reactor temperature. Fast sensor response time and accurate, stable temperature measurement was required to effectively control the reactor temperature. High reliability was also required to minimize the risk of unplanned shutdowns. 40 separate process penetrations in the reactor would also introduce a high risk of leaks.

Hot spots can develop in the reactors leading to side reactions that create off-spec product and a ruined batch. Cold spots can slow the reaction so it will not run to completion, resulting in lower yields. Loss of temperature control can lead to an unscheduled shutdown reducing availability and yield. Single point measurements at each point would increase installation cost. Finally 40 separate process penetrations with single point instruments at each point would increase environmental risk and the ongoing cost of instrument maintenance.



Figure 1: Rosemount Multipoint Sensors

SOLUTION

The challenges faced during the plant layout were solved with Rosemount Multipoint Temperature Sensors. Each sensor has 10 measurement points spaced to measure the temperature at each of the 10 levels of the reactor. This means a single process penetration at the top of the reactor replaced 10 process penetrations spaced over the entire reactor height. The 40 measurement points were accommodated with just four process penetrations. Five 848T temperature transmitters located near the top of the reactor accept the 40 temperature measurements. The long term stability and accuracy of the Compact Multipoint design resulted in reliable and stable performance of the temperature measurement in each of the layers. The fast response time of the Compact Multipoint design allows tight control of the process.

By using four Rosemount Compact Multipoint Temperature Sensors, installation and maintenance costs were reduced. The reduction in process penetrations also reduced the risk of environmental emissions.

The fast response time, accuracy, and stability of the temperature measurements reduced temperature fluctuations leading to higher quality and yield.

The combination of Rosemount Multipoint Temperature Sensors and 848T Temperature Transmitters has proven to be reliable, reducing the risk of unscheduled shutdowns.



Figure 2. Rosemount 848T Temperature Transmitter

RESOURCES

Emerson Process Management Chemical Industry

<http://www.emersonprocess.com/solutions/chemical/>

Rosemount Temperature

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

<http://www.emersonprocess.com/rosemount/products/temperature/m848t.html>

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Emerson Process Management

Rosemount Division
8200 Market Boulevard
Chanhassen, MN 55317 USA
T (U.S.) 1-800-999-9307
T (International) (952) 906-8888
F (952) 949-7001
www.rosemount.com

Emerson Process Management

Blegistrasse 23
P.O. Box 1046
CH 6341 Baar
Switzerland
Tel +41 (0) 41 768 6111
Fax +41 (0) 41 768 6300

Emerson FZE

P.O. Box 17033
Jebel Ali Free Zone
Dubai UAE
Tel +971 4 811 8100
Fax +971 4 886 5465

Emerson Process Management

Emerson Process Management Asia Pacific Private Limited
1 Pandan Crescent
Singapore 128461
T (65) 6777 8211
F (65) 6777 0947
Enquiries@AP.EmersonProcess.com



For more information:
www.rosemount.com

