

Gasification Plant Decreases Process Downtime and Increases Efficiency with Rosemount Sapphire Sensor

RESULTS

- Significantly decreased process downtime
- Improved efficiency of process
- Decreased damage to refractory brick lining

APPLICATION

Gasification of solid carbon fuels

CHARACTERISTICS

Operating temperature and pressure at 1538 °C (2800 °F) and 42 bar (615 psi)

Slag and contaminants formation causing premature thermocouple failure

CUSTOMER

Gasification plant in the U.S.

CHALLENGE

This gasification plant needed to frequently service their gasifier as its refractory brick usually cracks due to excessive heat. Their optimization engineer and reliability engineer needed to improve the efficiency of the gasifier and make it more reliable to avoid process shutdowns to repair the unit.

Additionally contaminants in the fuel source caused premature failure of the thermocouples previously in use. Prior to failure, the thermocouple would report temperatures that can be several hundred degrees cooler than the actual temperature due to the effect of contamination of the thermocouple wires causing variations of the mV signal. As a result, the temperature of the gasifier reaches in excess of 1760 °C (3,200 °F) causing the refractory brick, lining to crack.

Having a poor control on the process temperature meant that they needed to run the gasifier hotter than necessary. This frequently resulted in a cracked refractory brick, leading to unscheduled shutdown to replace the failed sensor and to repair the damaged brick. In addition, the plant burned more fuel due to the faulty readings of the thermocouples.



Sapphire high temperature sensor enabled the gasifier to run more efficiently and operate for longer periods between maintenance cycles with fewer major repairs despite challenging application environment.



Figure 1. Rosemount AIS Sapphire High Temperature Sensor

ROSEMOUNT

For more information:
www.rosemount.com


EMERSON
 Process Management

SOLUTION

To solve the problem, the engineers decided to install a Rosemount AIS Sapphire high temperature sensor. The sapphire protection tube incorporated into the Sapphire Sensor protects the thermocouple from contamination, ensuring accurate temperature readings throughout its useful life. Since the thermocouple is no longer subject to contamination, it lasts significantly longer than other high temperature thermocouples. Furthermore, the Sapphire Sensor has a dual sealed head providing added comfort by ensuring that process gases will not leak into the ambient environment.

By improving the temperature measurement, the optimization engineer enabled the gasifier to run more efficiently and use less fuel. It also allowed the reliability engineer to make the gasifier operate for longer periods between maintenance cycles with fewer major repairs to the refractory lining required. And ultimately, it decreases the unnecessary process shutdown, saving valuable operations time.

RESOURCES

Emerson Process Management Oil and Gas Industry

<http://www.emersonprocess.com/solutions/oilgas/index.asp>

Rosemount Temperature

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

Rosemount Application and Industry Solution Sensor

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



Figure 2. Sapphire Sensor Cutaway

The Emerson logo is a trade mark and service mark of Emerson Electric Co. Rosemount and the Rosemount logotype are registered trademarks of Rosemount Inc. All other marks are the property of their respective owners.

Standard Terms and Conditions of Sale can be found at www.rosemount.com/terms_of_sale

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

ROSEMOUNT

For more information:
www.rosemount.com

