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Sensors support reliable and safe operation, provide regulatory monitoring and validation, and ensure quality control, process efficiency, and optimization. And they must do so with accuracy, stability, and fast response time. Eastman Chemical Co. turned to the Foxboro DolpHin Series pH sensor line from Invensys, Foxboro, MA, to address these issues at a gas scrubber at the company's Longview, TX, manufacturing complex. The new sensors contributed to significant cost savings in maintenance and equipment by reducing cleaning, calibrating, and replacement requirements, as well as manufacturing supply costs.

Eastman's Texas Operations manufactures more than 60 major chemical and plastic products for sale to customers worldwide. Its gas scrubber uses water and caustic in a 20 percent sodium hydroxide solution to remove hydrochloric acid from a flue gas stream to meet Eastman's environmental quality standards and to comply with Federal Resource and Conservation Recovery Act (RECRA) requirements.

To monitor the pH levels, the scrubber uses a two-probe redundant system to ensure continuous operation in the event of a single sensor failure. The probes are tied to an automatic shutdown system that aborts the scrubbing operation if the pH is outside acceptable limits.

Due to severe conditions in the scrubber (185 F and pH of up to 10.5), sensors had to be replaced frequently—often within 2 weeks of installation and even as frequently as three times per week. Because the sensors could not withstand the environment, readings were not accurate, which caused operators to have to add caustic, resulting in higher pH values. The higher pH values, in turn, would etch the glass on the sensors, resulting in inaccurate

performance and faster rates of failure. The end result of this snowball effect was unacceptably high manufacturing and maintenance costs.

“Frequent sensor failure caused unreliable pH measurements which required additional samples to be analyzed by the control room operators,” said Wyatt Partney, senior control systems technician at Eastman’s Longview facility. “That resulted in increased loads on downstream processes.

“With the Foxboro DolpHin pH sensors, Eastman’s equipment and maintenance costs were eight times lower than with the previous sensors, and the efficiency of our scrubber operation was optimized,” Partney noted. The new sensors’ pH glass formulation provides greater measurement stability and accuracy and longer service life, up to 6 months, a significant improvement from the previous products that were operating properly for 3 to 4 weeks at best. And the new sensors have resulted in a 50 percent decrease in the amount of caustic used as a result of inaccurate pH level measurement that caused operators to continuously add the sodium hydroxide scrubbing solution.

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