

Micro Motion® Flowmeters Eliminate the Environmental and Process Hazards of Measuring Chlorine Gas

RESULTS

- Reduced process variability by eliminating the impact of process pressure and temperature swings
- Enhanced environmental and safety compliance due to multivariable characteristics in the flowmeters
- Operators can monitor process



APPLICATION

A chemical processing company measures chlorine gas. In this process, chlorine is batched to a gas phase reactor. A high-value chemical intermediate is formed in a continuous reactor.

CHALLENGE

The company originally used a fully compensated orifice plate to measure the gas, which failed to meet the accuracy necessary to control the chemistry of the reaction. For example, a reaction once got out of control and caused a backflow of acid through the chlorine gas feed system. Because the orifice plate was unable to indicate the existence of a reverse flow of liquid, the operators were unaware of the emergency situation. Tragically, the situation developed into a fire that resulted in a fatal injury. The company needed a more reliable metering technology that would reduce the risks associated with using chlorine gas.

Selective chlorination is critical to meeting product specification, and variations in pressure and temperature from the vaporizer made this a difficult process to control. In addition, the orifice plate meters created too many potential leak points.

SOLUTION

The company replaced three of its existing orifice plate meters with Micro Motion® Coriolis flowmeters. The Micro Motion solution was able to meet the accuracy requirements of the reaction chemistry

"What I like the best about the Micro Motion meters isn't even the accuracy and reliability, but what it tells me about the process."

Senior I/E Engineer, major USA Chemical Co.

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The Micro Motion meter was installed horizontally to prevent trapping of liquid and/or gas.



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without the need for pressure or temperature compensation. In addition, plant safety improved. The operator was able to determine the phase state of the process fluid, due to the multivariable capability of the Micro Motion transmitter. By monitoring the density signal from the sensor, the operator will always know if the process fluid is in a gas or liquid phase. Since the operator can monitor both the reverse flow output and the process density, a similar situation to the tragic accident could be avoided. The number of leak points was also reduced from 7 (with previous dP meters) to 2 (with Coriolis meters).

This application is particularly notable, because as stated below in the customer's quote, the company valued the Coriolis meter more for what it revealed about the process (especially during startup) than

what it did for them during "normal" operation. This major US chemical firm experienced large gains in operational efficiency, safety, and process knowledge from the use of a multivariable Coriolis meter.

This customer has since purchased two Coriolis meters for utility gas consumption metering (i.e., natural gas to boilers, etc.). Future work will involve chlorine mass balance between rail car (purchase), liquid feed to vaporizer, and gaseous chlorine feed to reactors.

