

Micro Motion® Enhanced ELITE Meters Eliminate System Faults Caused by Entrained Air

BENEFITS

- Reduced operation and maintenance costs by \$100,000 in 10 months
- Improved safety and efficiency of the control system operation
- Allowed operators more time to focus on other demanding tasks



PROCESS

In 2004, a large-scale chemical manufacturer in China installed and commissioned 107 Micro Motion ELITE and R-Series Coriolis mass flow meters in their production process for two of their main products, 160KT Acrylic Acid (AA) and 70KT Acrylic Ester (AE). A majority of the flow meters were used in the process control applications, while the remaining meters were installed in the custody transfer applications.

CHALLENGE

In August 2006, the chemical manufacturer discovered that a number of the meters used in process control were producing abnormal results. The process variable outputs were showing sudden disruptions — either up or down — causing an alarm in the DCS system. The process control valve responded to this alarm with an automatic shut down of the system. After some troubleshooting to recover the system, the operators realized they had to switch from automatic operation to manual operation of the production process to determine what was causing the alarm. After monitoring the operation for a period of days, the operators found that the disruptions were caused by the presence of entrained air or bubbles in the process fluid. In most cases, the problem installations were associated with R-Series Coriolis flow meters being mounted close to a control valve.

SOLUTION

The chemical manufacturer contacted Micro Motion Field Service support to address the issue. After working with the customer’s operation team at the site, the Field Service technicians verified the

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Table 1: Faults Readings for Meter Sample with EG Mode

Meter	Before EG Mode		After EG Mode	
	Faults in 20 days	Avg Faults/day	Faults in 26 days	Avg Faults/day
1	0	4	0	1.308
2	6		2	
3	8		0	
4	3		11	
5	23		18	
6	5		0	
7	19		1	
8	9		2	
9	0		0	
10	7		0	
Total	80		34	



For more information:
www.EmersonProcess.com/solutions/chemical
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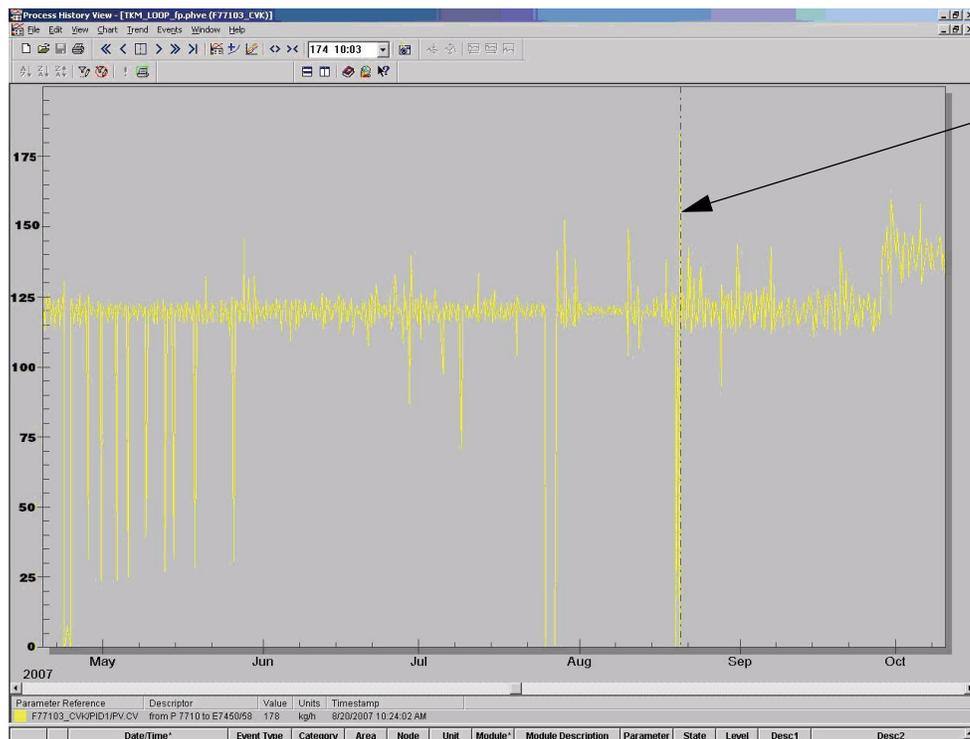
meter error reading in the R-Series meters was caused by air entrainment. They found that during normal operation the actuation of the control valve caused air bubbles and slugs to be introduced into the process fluid. These upset conditions caused the disruptions in the meter readings from the Micro Motion meters.

To address this issue, Micro Motion upgraded the problem meters with the latest configuration of electronics for the meters. This configuration change required that the new software feature, Entrained Gas mode (EG mode), be enabled. Once the customer implemented the configuration change, the amount of fault conditions decreased by 67% (see Table 1 on page 1). The remaining faults were caused by extended periods of slug flow or air bubbles that overwhelmed the compensation capabilities of the EG mode. For the meters still experiencing faults, Micro Motion suggested an upgrade to a new Enhanced ELITE sensor and electronics that incorporates a second-generation digital signal processor with built-in entrained gas capabilities.

In August 2007, the chemical manufacturer upgraded two of its problem flow meters with the new Enhanced ELITE sensor and

electronics technology. After several weeks of operation, the customer realized a complete elimination of errors at these two meters. With these results (see graph below), the customer chose to upgrade the remaining problem installations to the second-generation Micro Motion Coriolis meters.

Since the replacement, the manufacturer's system is operating more safely and efficiently. Also, the system operators have had more time to work on other demanding tasks as the lines are essentially never down. With the cost of Acrylic Acid being more than \$1500 per ton and the average system down time of 12 hours per month, the chemical manufacturer estimates a savings of at least \$100,000 in 10 months of reduced operation and maintenance costs.



Date at which the new Enhanced ELITE meters were installed in the process line

Results of meter handling of entrained gas in the process line. After the installation of the ELITE meters, the meter readings showed a complete elimination of the sudden disruptions in the flow.

