Production, measurement accuracy and proving costs improved with high-turndown Coriolis

RESULTS

- Ethylene supply contract re-written, assuring process availability during low-flow conditions
- Meter calibration intervals extended to match 2 year plant turnaround schedule
- Proving costs reduced by $5000 per year; -0.06% agreement to third-party lab
- 4 month payback on investment

APPLICATION

Ethylene is supplied to a petrochemical process, but with low-flow interruptions as allowed by contract and excessive proving costs and process interruptions.

CHALLENGE

A large petrochemical company in the US Gulf coast purchases 9-12 million lbs/yr (4.1 to 5.4 metric tons/yr) of critical phase ethylene feedstock. The incumbent supplier used a 1" differential pressure meter (orifice plate) that had limited turndown. When ethylene usage was below a minimum value or the measurement fell below a threshold dP, the supply would be shut off, per the contract. While this was not adversely affecting normal production, during start-up flow rates varied significantly and were occasionally low enough to trigger an interruption in supply. Typical conditions were 1200 psig (83 barg) and 1000 to 1400 lb/hr (450 to 635 kg/hr) with a desired measurement range of 375 to 7500 lb/hr (170 to 3400 kg/hr).

The existing meter could not be easily proven or calibrated as a flow-meter in-line, and at best had an accuracy of around 1%. Proving would represent another source of process interruption.

Risk of lost production drove the petrochemical company to seek out a new supplier and better measurement technology.

Metering skid with Micro Motion ELITE meter installed for critical phase ethylene custody transfer

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Criteria included:

1. Custody transfer accuracy - recognized technology for gas fiscal transfer
2. Wide rangeability - no loss of measurement during start-up or production
3. Diagnostic capabilities - immediate notification of meter health
4. Verification of performance - verify measurement accuracy in-line on a monthly basis and pull the meter out of line during scheduled turnarounds to prevent loss of measurement or downtime due to proving

SOLUTION

After evaluating multiple measurement technologies, the company partnered with a new ethylene supplier and both parties agreed to install a ½" Micro Motion ELITE® CMF050 sensor, equipped with Smart Meter Verification (SMV), recognized as best-in-class for gas custody transfer. This meter offered more than a twofold improvement in flow accuracy and much wider turndown, virtually eliminating the low flow shutoff risk.

The meter started up quickly and immediately began measuring ethylene. The petrochemical company asked the supplier not to remove the sensor from the line except during plant turnarounds for calibration checks to eliminate production interruptions. SMV was run monthly for two years to confirm the meter accuracy had not changed. The next time there was a plant turnaround the meter was removed. During this time, the meter was removed and sent to a third party lab for proving: resulting in a minor offset of -0.06%, well within the meter specification and prover uncertainty.

Based on consistently good results from meter verification and the lack of meter accuracy shift when compared to a lab prover, the customer extended their meter verification interval to quarterly instead of monthly. The meter will be proven only during plant turnarounds unless meter verification indicates a problem.

The petrochemical company has seen an improvement in measurement performance. Payback of less than four months was realized, based on ethylene spot price and usage, and improved system accuracy. If elimination of periodic proving were included, the payback would have been even sooner.

Ethylene custody transfer meter with Smart Meter Verification significantly reduces risk of lost production.

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