

Micro Motion® Improves Ethanol Consistency and Streamlines Process

BENEFITS

- Improved process control
- Increased product consistency
- Increased throughput
- Reduced sampling labor and laboratory costs
- Reduced instrumentation with single inline measurement

PROCESS

An ethanol producer in the midwestern U.S. uses molecular sieves to remove moisture from the process fluid. During the dehydration process, highly accurate measurement of % ethanol is required. The producer has tried two different methods:

- Day tank with manual sampling. By taking frequent samples and adjusting the molecular sieve or the distillation column, the producer can average out the swings in the dehydration process. When the product meets specifications, it is sent on to the final storage tank.
- Slipstream density meters. This provides continuous measurement of % ethanol, so that the dehydration process can be adjusted based on near-real-time data.

To avoid rework, the producer runs the system “drier” than specification, resulting in decreased throughput and higher operating costs.

Both methods require a full stream flow measurement to determine production levels and to meet reporting requirements. A vortex flowmeter was used for this purpose.

CHALLENGE

Manual sampling is expensive, and the producer found that it was almost impossible to take enough samples to keep up with changes in the process.

Slipstream density meters are highly accurate. However, density meters that can measure % ethanol are expensive. Additionally, the



Single inline device eliminates need for manual sampling or slipstream

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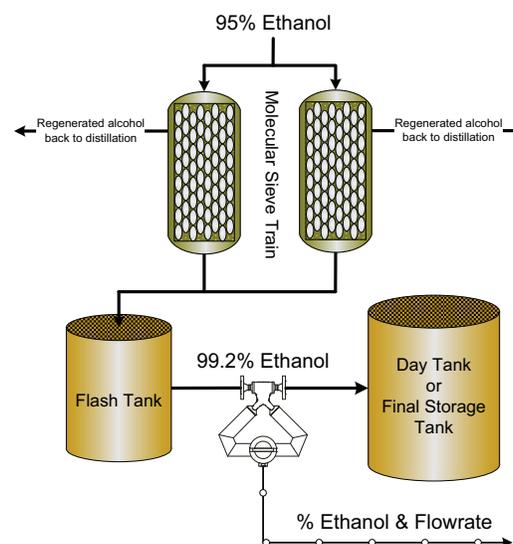


Figure 1 Micro Motion delivers flow and density data for calculation of % ethanol



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added piping and other slipstream complications made this solution expensive to install and to operate.

Finally, vortex technology has accuracy and rangeability limitations. The producer looked to Micro Motion® for accurate and repeatable inline measurement of flow and % ethanol.

SOLUTION

The producer installed a Micro Motion ELITE® meter with next-generation MVD™ technology for simultaneous inline measurement of flow and density, with flow accuracy of $\pm 0.1\%$ of flowrate and density accuracy of $\pm 0.0002 \text{ g/cm}^3$. In combination, these two measurements can deliver the % ethanol in the day tank with an accuracy of $\pm 0.1\%$. Because the measurement is continuous, the producer can react to product variations quickly, minimize product variation, and operate closer to target specifications.

As a result, the producer has been able to streamline the procedure, reduce sampling time and costs, reduce instrumentation costs, increase throughput, improve product quality and consistency, and increase return on materials.

An added bonus came in the form of identifying an equipment problem. As shown in Figure 1, two molecular sieves were used in the dehydration process. Because the Micro Motion device enables continuous measurement, the producer was able to see that Sieve A was running “wetter” than Sieve B, as shown in Figure 2. By bringing the performance of the two sieves closer together, one major cause of product variation could be eliminated at the source, for even greater improvements in product consistency and throughput.

Finally, an additional increase in throughput could be attained by using the Micro Motion solution to monitor the % ethanol or % water in the regenerated stream from the molecular sieve back to distillation.

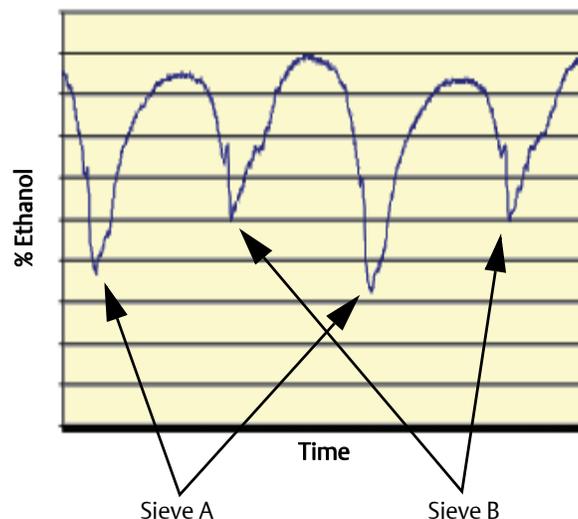


Figure 2 Density differences at switchpoints indicate differences in sieve performance