Lube Oil Refinery Saves Over $180,000 Annually Using Micro Motion® Coriolis Meters

RESULTS

- Maintenance costs reduced by $20,000–30,000 per year
- Improved measurement accuracy caught $150,000 per year in overpayment for hydrogen gas and reduced the need for multiple devices and lab analysis
- Product rework substantially reduced

APPLICATION

A lube oil refinery processes 11,000 barrels of heavy crude per day into over 300 different lube oil products. These products are often used in consumer goods and have a high monetary value. Because production targets are driven by consumer market demands, the product slate shifts frequently, and systems within the refinery need to change rapidly from one feed to the next.

The first step in processing the heavy crude is atmospheric or vacuum distillation. This yields oil products as diverse as diesel, vacuum bottoms resid, and six middle fractionation cuts which are used in consumer products. Historically, measuring the flow of these products was handled by positive displacement meters. Density and viscosity were measured by sending samples off to a laboratory for analysis. A given positive displacement meter might measure any one of the six fractionation cuts, which meant new density and temperature calculations every time the product slate changed.

CHALLENGE

The inaccuracy of the positive displacement meters resulted in tank inventories needing to be monitored with separate level indicators. Extensive post-production tank doctoring and corrective blending were necessary to bring products within specification.

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The inherent incompatibility between the heavy oils being processed and the positive displacement meters drove maintenance costs to an estimated $20,000 to $30,000 per year, not including the cost of lost production due to downtime. It was simply impossible to measure the vacuum bottoms resid, because solids in the stream would erode the invasive moving parts of the positive displacement meters.

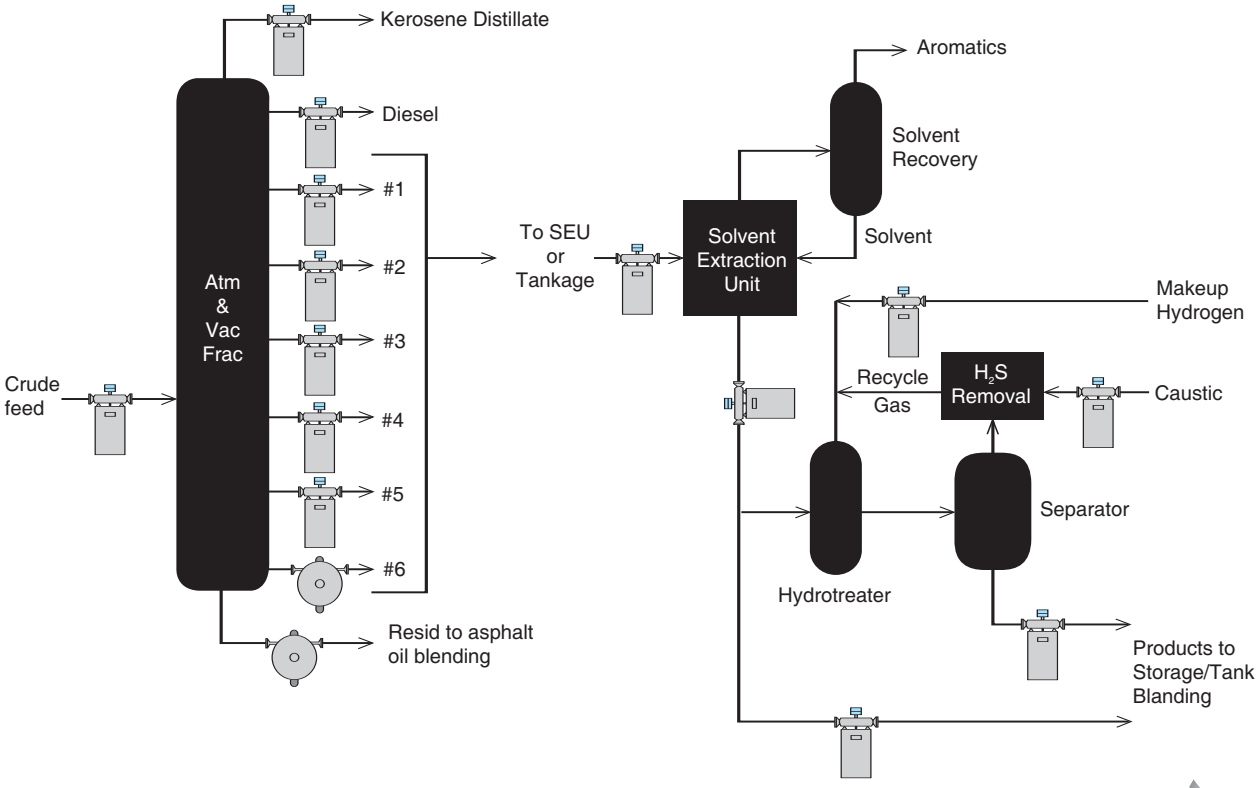
SOLUTION

The refinery installed Micro Motion® Coriolis meters in most metering locations. (The figure below provides a general overview of the metering requirements.) Because Micro Motion Coriolis meters measure mass and density directly, they are not affected by changes in fluid density, temperature, or viscosity. This meant that the refinery could switch from one feed to another with no recalibration or recalculation necessary.

And since the meters could also measure temperature, the density and temperature measurements were used to calculate API gravity at 60 °F (16 °C). The mass flow rate, combined with the temperature and density measurements, was used to figure standard volume at the same temperature. Having all five of these metrics produced by a single in-line instrument substantially reduced the refinery's equipment costs and reliance on expensive laboratory analysis.

The application of Micro Motion Coriolis meters resulted in immediate improvements to the refiner's operations. The high maintenance costs and downtime associated with the positive displacement meters virtually disappeared. Micro Motion Coriolis meters have no invasive moving parts, and therefore are much less susceptible to damage and plugging than intrusive devices.

The improved accuracy of the Micro Motion meters meant better process consistency – less variance, less rework, and therefore higher throughput. The performance of the Micro Motion meters was so accurate that the refinery's hydrogen vendor allowed it to be used for billing purposes. The added accuracy alerted the refiner to the fact that hydrogen gas was being lost in the transfer — the refinery was paying for gas that it had not received. With its much more accurate measurement system in place, the refinery has saved $150,000 annually in this area alone.



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