

Refinery Blending

Coriolis flow sensors have been successfully incorporated into a wider range of dynamic blending applications. The release of the latest Micro Motion ELITE High Capacity Coriolis (CMFHC4) meter expands the use of Coriolis technology into a number of high flow capacity refinery applications such as heavy fuel oil and crude oil on-line blending.

■ Heavy Fuel Oil

Accurate flow monitoring and control contributes to improved profitability by:

- Minimizing quality giveaway
- Maximizing production
- Minimizing the use of lighter products
- Increasing accuracy for sales

Blending Heavy Fuel Oil to target specifications is challenging due to the wide range of refined products used as feed stock, fluctuations in feed stock quality / availability and varying fluid properties. Micro Motion Coriolis provides accurate volume / mass flow measurements without being impacted by secondary variables such as fluid changes in density, viscosity and composition.

It is estimated that minimizing distillate giveaway can lead to \$1 to \$5 in savings per tone of HFO. Direct mass measurement within 0.10% of the Heavy Fuel Oil product provides the added assurance of reducing potential product giveaway.

■ Crude Oil

Coriolis flow sensors have played an important role in measuring the volume and mass flow rates and confirming crude oil quality (density) on feedstock to the crude distillation unit. With the growing trend toward heavier crudes and higher sulfur content, blending is becoming more prevalent to optimize crude slate in relation to the refinery process unit efficiencies and market demand. Utilizing Micro Motion Coriolis meters on oil blending to optimize crude slate quality can help:

- Improved distillation unit throughput
- Increase yield of higher value products
- Improved performance of downstream units
- Lower energy costs

Operating the refinery at optimal and constant crude composition can generate savings for major refineries on the order of 2% to 3% of the operating margin of the whole refinery.

Oil & Gas Applications

Refining Blending

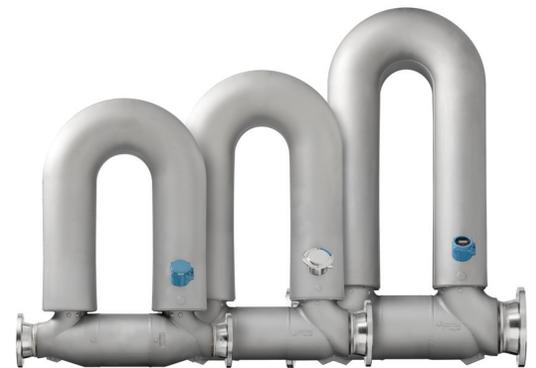
- Heavy Fuel Oil
- Asphalt
- Crude oil
- Gasoline

Custody Transfer

- Crude oil
- Natural Gas Liquids
- Natural gas
- Pipeline leak detection

Drilling fluid flow rates

- Molten sulfur



CMFHC2 CMFHC3 CMFHC4

Micro Motion ELITE High Capacity Coriolis Meters



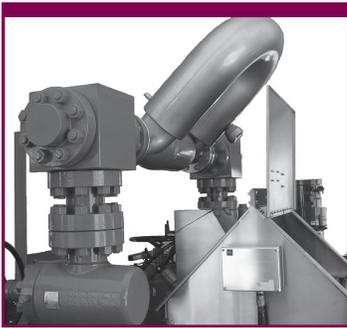
Crude Oil Custody Transfer

Although Coriolis technology has been widely used in the custody transfer of crude oil it was typically restricted to smaller pipeline networks because of sensor flow capacity. The use of parallel Coriolis meters has proven to be a viable option to increase flow capacity while:

- Reducing overall measurement uncertainty
- Lowering prover cost
- Providing measurement system flexibility associated with turndown, varying viscosity oil and meter redundancy

The ELITE CMFHC4 offers a meter with the capacity to accurately measure pipeline flow rates where it normally might of required two to three parallel meters. This dramatically reduces system cost and footprint while delivering the proven Total Cost of Ownership benefits associated with Coriolis technology. Utilizing Micro Motion High Capacity meters in crude oil custody transfer provides:

- Precise fiscal measurement over time
- Reliable measurement systems
- Cost effective measurement systems
- Improved safety, health and safety



Drilling Fluid Flow Rates

Accurate, continuous and reliable monitoring of drilling fluid downhole / returns flow rates and density can play a significant role in controlling well bore pressure during conventional and more challenging drilling operations. Micro Motion Coriolis technology is widely accepted in Managed Pressure Drilling systems and the addition of the ELITE CMFHC4 to the High Capacity product line expands the capability to utilize this technology on conventional drilling operations using gravity feed to the shaker.

ELITE High Capacity Coriolis meters are already field proven to help reduce:

- Non-Productive Time
- Increase drilling efficiency with more accurate data
- Reduce risk through early kick and lost circulation detection
- Reduce formation damage with improved well bore pressure control

Micro Motion Technology Solution

These are just a few of the applications that benefit from the ELITE High Capacity Coriolis technology. Key attributes of this flow meter are:

- $\pm 0.1\%$ of reading flow / mass measurement over a wide turndown
- Flow measurement that is not impacted by changing fluid properties or flow profiles
- Sustained measurement performance with a no “mechanical parts” design
- No need for pipe runs and flow conditioners
- Full stream density measurement for confirmation of API gravity and product quality
- Enhanced performance under entrained gas situations

Learn more at the Oil & Gas Industry Measurement Solutions page on www.MicroMotion.com.
www.micromotion.com/oil-and-gas



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