High accuracy density measurement in crude oil custody transfer with Micro Motion 7835 meter

RESULTS

- Reduced uncertainty minimizes mis-measurement
- Calibration traceable to International Standards (ISO 17025)
- Proven technology with installation, operation and field calibration defined in API Chapter 14.6

APPLICATION

Iraq's South Oil Company uses crude oil metering systems to measure the oil as custody is transferred from producers to shippers at the new Al-Basra Oil Terminal. The metering systems serve, in effect, as a 'cash register' that provides an accurate accounting of the oil that changes hands through the oil terminal.

While there are other flow measurement technologies available, the most traditional method for this application is with the combination of a turbine meter, density meter, platinum resistance thermometer, pressure transmitter and flow computer. The turbine meter measures the uncorrected volume of crude exported; the density meter measures the operating density of the crude exported; the flow computer accepts and interprets signals from each of these, and calculates and records quantities.

CHALLENGE

The new terminal, which includes both onshore and offshore facilities, will boost Iraq's oil export capacity by 2.7 million barrels per day. The added capacity will give Iraq increased access to global markets as it expands production from its southern oil fields.

With such large volumes of oil being sold every day, measurement accuracy is paramount, particularly when oil prices are high. Even the slightest disparity can result in significant loss of revenue. Pipeline operators and their customers need to be assured that custody transfer systems are properly and regularly calibrated to very tight tolerances, and comply with all applicable government regulations and custody transfer measurement standards.

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Iraq's South Oil Company

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For example, at typically $100 per barrel of oil, should the system uncertainty be as little as 0.1%, it still equates to uncertainty of measurement of $270,000 per day.

The density measurement is a key component in a custody transfer system (uncorrected volume rate multiplied by operating density equals mass rate). Therefore, the density meter has to offer the highest accuracy, with calibration traceable to National Standards.

SOLUTION

The customer chose Emerson's Daniel® metering systems to measure the amount of oil as custody is transferred from producers to shippers through the Al-Basra Oil Terminal. The systems combine innovative ultrasonic measurement technology with diagnostic software that can detect potential problems before they affect accuracy.

The Daniel metering systems will be part of an integrated solution that also includes Emerson's Rosemount®, Micro Motion® 7835 Liquid Density Meter, Roxar, and Daniel measurement instruments; EIM valve actuators; Daniel meter-verification technology; and DanPac™ measurement and control systems with Daniel flow computers and DeltaV™ controllers and software.

"We were impressed by Emerson's ability to provide the accurate, reliable measurement that users of the Al-Basra Oil Terminal will expect," said Oday Nadir Abdul Kareem Al-Quoraishi, South Oil Company's project manager. "The Emerson team's industry experience, their measurement expertise, and their proven capability to meet the needs of customers in the Middle East made Emerson the logical choice for this complex project."

As liquid volumes are affected by changes in both temperatures and pressure, gross volume cannot be used for sales or fiscal purposes. Two derived quantities can be used for these purposes: (a) Mass or (b) Nett Standard Volume i.e. the measured volume referred to standard temperature and pressure expressed as a dry oil quantity.

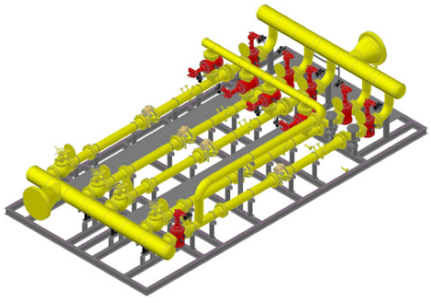
Both of these quantities can be computed on-line, from the measured gross volume, provided that continuous measurement of fluid density at the operating temperature is made.

The performance and installation of a density meter in a fiscal metering system is described in International Standards such as those available from the American Petroleum Institute (API). The requirements include:

The density measuring uncertainty should be better than 0.1% of the true density at the point of volume measurement.

At a typical density of 800 kg/m3, the Micro Motion 7835 Liquid Density Meter has an uncertainty of 0.06% at operating conditions, well within the recommendations. This uncertainty is also traceable as the calibration of the 7835 Liquid Density Meter is fully traceable to International Standards (UKAS/ISO 17025).

A key benefit to the South Oil Company in using the Micro Motion 7835 Liquid Density Meter is that as the calibration of the meter is traceable to International Standards and it offers the highest accuracy, their customers will have confidence in the value of the measurement of the oil sold/purchased. This is particularly important today with the high value of crude oil.



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