

Application note

Ultrasonic Sentinel LCT4 flow meters for liquid custody transfer

Meters for oil custody transfer

Benefits:

- The customer can now operate their dispatching center with reliable and accurate measurements without having to frequently adjust the meter factors. It has proven to be easier and quicker to prove the meters.
- The customer saved operational expenditure (OPEX), increased their system's reliability and availability and can invoice their client with a high level of confidence on the billing.



Application is for a national oil company from Latin America. It has a major gathering and dispatching center from where it extracts, processes, and transports crude oil after the separation process is fully completed. Daily oil production is around 1 MMBPD.

Challenge

The dispatching center transports about 1 MMBPD of oil, which consequently has a lot of attention from the company. Since the oil comes from different fields it handles three different grades with different viscosities ranging from 98 cst down to 2 cst, so from heavy to super light.

Oil needs to be measured accurately and with a high level of repeatability in compliance with the international standards like OIML R117-1 and API MPMS 5.8 and 4.8, regardless of the type of oil flowing. For this reason, the meters are proved frequently—for every oil batch, hence once a week or more frequently—using an in-situ 44" barrels bi-directional (ball) prover.

Because of the high flow rates (up to 559,000 BPD or 2,690 m³/h), the metering stations have different streams with 8" meter runs to handle the entire flow range. All streams have pressure and temperature transmitters, as well as a densitometer installed on the main header. Flow, temperature, pressure and density are connected to OMNI flow computers, which are computing the volume corrections based on API MPMS 11.1 equations to calculate the oil transfer at base conditions.

The metering stations were initially using turbine flow meters with the relevant straight runs, filters and ISO tube bundles as flow conditioners. Because of turbine sensitivity to drift over time, their challenges to remain accurate in changing viscosities and their maintenance costs, the customer decided to move to ultrasonic meters. Unlike turbine meters, ultrasonic meters don't have moving parts that are subject to wear and tear over time, generating drift and maintenance costs. The customer installed different liquid custody transfer flow meters from two competitors. Neither delivered the expected performance required by the customer, mainly in terms of repeatability.

Solution

The Panametrics MS team presented Sentinel LCT4 meters to the integrator and the operator. Sentinel LCT4 is a viscosity-independent meter when calibrated on the Reynolds number, has a very nice design and is perfectly suited for such liquid custody transfer applications.

Customer decided to purchase 16 Sentinel LCT4 SS316 in 8" 300RF.

The meters were installed in mid-2014 in place of the other ultrasonic meters. The piping set up for the metering stations remained unchanged. Meters were commissioned in October 2014 and continue working fine and meeting the customer's satisfaction. Accuracy and repeatability are well within specifications.



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