



Emerson Delivers Unique Custody Transfer Flow Metering Solution

Technical Challenge

Local economies depend on vast amounts of petroleum transported through pipelines. Pipelines provide a safe and economical mode of petroleum transportation. Pipelines transport crude oil to refineries for processing into the products people use daily. Once crude has been refined, pipelines transport liquid products through an enormous pipeline infrastructure providing fuel for cars, trucks, planes, and ships.

When fluid is to be traded between two parties, accurate measurement of the fluid passing through pipelines is required to make a fair transaction. This measurement is termed custody transfer or fiscal flow measurement. No measurement is 100% accurate, so pipeline companies strive to reduce inaccuracies to a minimum agreed upon amount. A meter station operating with an inaccuracy of +/- 0.1% and measuring product worth \$1 million a day stands to lose \$1,000 a day, or \$365,000 a year. With such a large financial stake at risk, pipeline companies do all they can to ensure measurement is as accurate as possible.

The Emerson Process Management Solution

In early 2006, Emerson worked closely with a leading global oil & gas customer. The customer performed custody transfer measurement on a pipeline that transports diesel and gasoline through the state of Texas. The metering station consisted of a 12" pipeline that reduced down to an 8" line where a turbine meter is positioned. The challenge for Emerson was to install a backup measurement device in series with the turbine meter in the 8" line. Emerson, the global leader in custody transfer solutions, evaluated the existing measurement technologies and recommended the new Daniel Model 3804 Liquid Ultrasonic Meter.

A key challenge with the application was the short length of undisturbed, straight pipe on either side of the existing turbine meter. The American Petroleum Institute (API) recommends a minimum of 10 diameters of upstream pipe using a flow conditioning element and 5 diameters of downstream pipe on either side of a turbine or ultrasonic meter. This arrangement was not possible due to the limited amount of pipe available, existing drains in the system, and the need to install the turbine meter and the ultrasonic meter in the same short section. Without an ideal piping arrangement Emerson proceeded with a recommendation for the installation of a tube bundle approximately 6D ahead of the ultrasonic meter next to a 2" drain line. Emerson also



between gasoline and diesel fluid (See table 1).

The customer was impressed with the long term stability of the ultrasonic meter. The customer commented, "It impressed me knowing that the meter stayed very much the same throughout the whole time period with only periodic provings. That will allow us to prove on an occasional basis, reducing wear and tear and maintenance costs on our prover."

recommended the turbine meter to be installed 5 diameters downstream of the ultrasonic meter, also a non-ideal meter arrangement.

Results

The customer tracked flow rate data from the turbine and ultrasonic meter for over a year. Over that period the two meters showed a difference of just 50 barrels over the 15+ million barrels that flowed through them. This is a difference of only 0.0003%. This is especially noteworthy since the turbine meter was proved every batch, and the liquid ultrasonic meter was proved only periodically with the customer's onsite 20" ball prover. Proving results show the ultrasonic's meter factor stayed very steady, even as flow alternated

With no moving parts to wear or seize, maintenance of the ultrasonic meter is minimal. The ultrasonic meter does not obstruct flow, and therefore, introduces little pressure loss to the system. The customer has found the ultrasonic meter to be easy to use and was impressed with the amount of information available with the Daniel CUI (Customer Ultrasonic Interface) software. The pipeline company was so impressed with the meter that they plan to remove the existing turbine meter to use it elsewhere. Furthermore, the company is looking for other locations where they can install other Daniel Model 3804 Liquid Ultrasonic meters. ■

8" Ultrasonic Meter
2006 / 2007 Refined Product

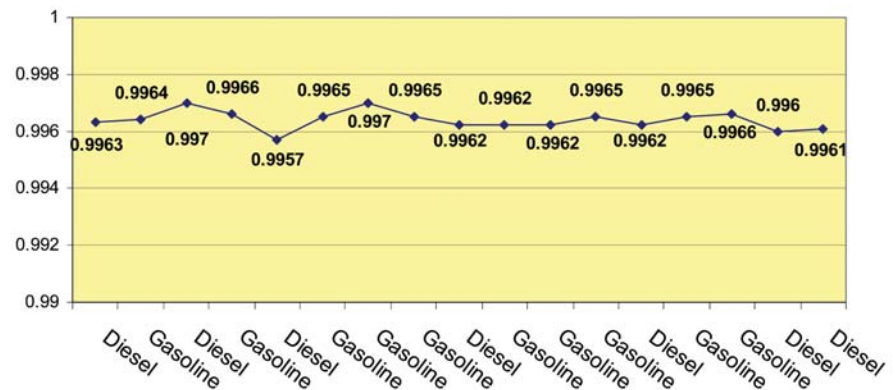


Table 1: Meter factor data of 8" Daniel Model 3804 Liquid Ultrasonic Meter