

Flowmeter Battle Royale

The Competition in an Expanding Custody Transfer Market

By Dr. Jesse Yoder, President, Flow Research

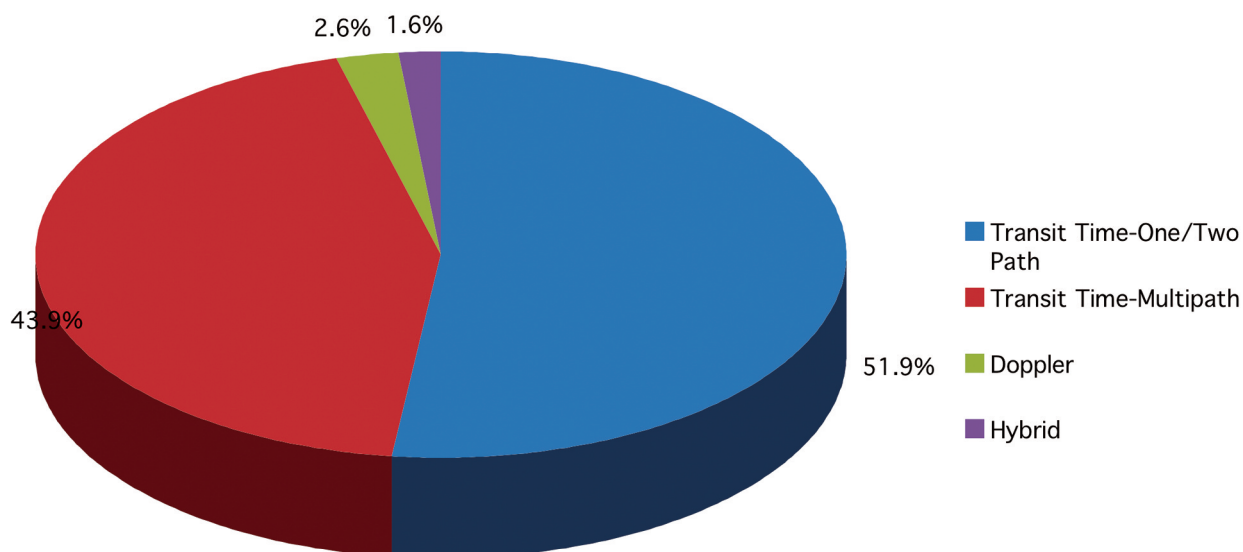
The world's search for energy sources has put the spotlight on flow measurement. Being able to accurately and reliably measure the flow of both oil and gas has become increasingly important as both these fluids are used more widely to satisfy the many power and energy demands in industrial economies. And these demands are growing, today, as many economies recover from a severe recession.

Custody transfer applications are especially important now because they involve a change in ownership of the fluid. For natural gas, a series of custody transfer measurements takes place as the gas comes out of the ground, is sent to a processing plant, and from there travels through pipelines to its ultimate destination at an industrial plant, commercial building or residence. Flow measurement involving custody transfer of natural gas is a highly-specialized measurement, and certain flowmeters have been developed specifically for that purpose.

The main types of flowmeters used for custody transfer of natural gas are differential pressure (DP), ultrasonic and turbine. The use of

DP flowmeters for these applications is governed by Report 3 from the American Gas Association (AGA), which lays out the criteria for using DP flowmeters for custody transfer of natural gas. DP flowmeter suppliers have developed special primary elements for use in custody transfer. Both single- and dual-chamber orifice fittings are used with DP transmitters to make custody transfer measurements. With a dual-chamber orifice fitting, an orifice plate can be inspected or changed without shutting down the line. Suppliers of single- and dual-chamber orifice fittings for custody transfer applications include Emerson Daniel, Cameron, Canalta Controls and The Measurement Company.

Turbine flowmeters are also widely used for custody transfer of natural gas. In 1996, the AGA issued Report 7, which details criteria for using turbine flowmeters for custody transfer applications. Turbine meters excel at measuring clean, medium- to high-speed flows of low-viscosity fluids. When they are calibrated properly, turbine flowmeters can achieve accuracies that equal the accuracies



of multipath ultrasonic flowmeters. However, impurities in the flowstream can be a problem for turbine meters, as the fluid must pass over a rotor that spins in proportion to flowrate. Elster-Instromet is a leading supplier of turbine flowmeters for custody transfer of natural gas.

The use of ultrasonic flowmeters for custody transfer of natural gas is increasing, due to their high accuracy and reliability. A special type of ultrasonic flowmeter called multipath has been developed for custody transfer. Transit-time ultrasonic flowmeters for custody transfer must have three or more paths across the flowstream to obtain required accuracy levels. Most multipath ultrasonic flowmeters for custody transfer have four, five or six paths. In 1998, the AGA published Report 9, which outlines the criteria for using ultrasonic flowmeters for custody transfer applications. This report gave a boost to the ultrasonic flowmeter market, which has been in growth mode ever since. Suppliers into the custody transfer component of this market include Elster-Instromet, Emerson Daniel, Sick Maihak, FMC Technologies and KROHNE.

Extensive interviews with oil and gas companies in the Middle East in 2009 confirm a trend, which is also occurring in other

regions: End-users are moving away from the traditional technologies of DP and turbine flowmeters towards multipath ultrasonic flowmeters for custody transfer applications. The main reasons for this change are that ultrasonic flowmeters are non-intrusive; are highly accurate; and have low-maintenance requirements. While the initial cost of multipath ultrasonic flowmeters is high, the value of the product measured and the low-cost of maintenance combine to make them a cost-effective option for many companies.

One unresolved issue for ultrasonic flowmeter suppliers and end-users alike is that there is currently no generally accepted standard for how often ultrasonic flowmeters need to be recalibrated. Recalibration can be expensive, and typically requires pulling a flowmeter out of service so it can be shipped to a calibration facility. Companies interviewed in the Middle East indicated their plans to have their ultrasonic flowmeters recalibrated every three, five or seven years. Until the issue of frequency of recalibration is addressed, there will be some uncertainty for end-users who wish to maintain their ultrasonic flowmeters in proper operating condition.

The custody transfer market is a good example where cooperation among industry associations, suppliers and end-users has resulted in



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common agreement on measurement standards and practices. The AGA reports on DP, turbine and ultrasonic flowmeters were developed with the cooperation of suppliers and end-users alike. As a result, end-users have a choice of three widely accepted technologies for custody transfer applications. While ultrasonic flowmeters currently have the edge, all three technologies remain viable choices for custody transfer measurement.



Jesse Yoder, PhD, is president of Flow Research, Inc. (www.flowresearch.com), a company he founded in 1998. He has 22 years of experience as an analyst and writer in process control. Dr. Yoder specializes in flowmeters and other field devices, including pressure, level and temperature products. He has written over 100 market research studies in industrial automation and process control, and has published numerous journal articles.

LegendsofFlow.com

The purpose of this website is to provide information and knowledge about those people who have made substantial contributions to the field of flow measurement. There are three levels, or tiers, of people on this site:

- **Pioneers of Instrumentation** - Historical figures who have developed theories or made important contributions to flow measurement.
- **Legends of Flow** - Living or contemporary people who have developed theories, founded companies, or otherwise made important contributions to flow measurement.
- **Movers and Shakers of Flow** - Important people and decision-makers in flow who have not yet achieved legendary status, but who still play an important role today in the field of flow measurement and instrumentation.

This website also features legendary companies and legendary technologies:

- **Legendary Companies** - Important companies in flow and instrumentation that play a fundamental and innovative role in product- and technological-development.
- **Legendary Technologies** - This section contains articles and information about the legendary technologies that have made the flowmeter market what it is today. Includes both new-technology and traditional technology flowmeters.

This website features original interviews with Legends of Flow, biographical sketches, and articles on all the main flow technologies. If you would like to nominate someone to be listed among the Legends of Flow or the Movers and Shakers of Flow, please contact Flow Research.