

Ultrasonic and Coriolis Flowmeters a Big Hit at Norway's North Sea Flow Workshop



By Dr. Jesse Yoder, President, Flow Research, Inc.

From Oct. 24-28, 2011, Flow Research attended the International North Sea Flow Measurement Workshop. This was the 29th edition of this Workshop, which is held annually. It has been alternating between Norway and Scotland, and next year will be held in Scotland.

The Workshop was held in Tønsberg, Norway, which is about two hours south of Oslo.

While the large majority of attendees were from European countries, other countries represented include India, Oman, Qatar, Nigeria and Singapore. The Workshop featured 330 delegates from 29 countries, including about 25 from the United States.

The main focus of the Workshop was the papers delivered on various topics related to flow, although the Workshop did feature exhibits from flowmeter suppliers and research institutes. Most of the papers related to multiphase, ultrasonic or Coriolis flowmeters. The Workshop clearly had the flavor of a technical conference rather than an exhibition.

Much Research and Development in Ultrasonic Flowmeters

A great deal of attention is currently being focused on ultrasonic

flowmeters. Much of the research and development effort is currently going into these meters, perhaps at the expense of other meters such as vortex and turbine. However, there is good reason for this. The ultrasonic flowmeter market is the fastest growing market, and end-users are replacing their turbine and differential pressure (DP) flowmeters with ultrasonic in many cases. There is, in particular, a great deal of attention being paid to the ultrasonic market for custody transfer, both of liquids and natural gas.

Suppliers have made significant progress in enhancing the accuracy and reliability of ultrasonic flowmeters. This has mainly been done by increasing the number of paths, thereby increasing the number of measurement points, and also by adding greater diagnostic capability. The enhanced diagnostic capability, it is claimed, can reduce the need for upstream piping, and also increases the ability of the ultrasonic meter to determine sources of error. While much progress has been made in ultrasonic meters for custody transfer of natural gas, lately new and more accurate meters have been developed for custody transfer of petroleum liquids as well.

Elster-Instromet

One company that participated actively at the conference was Elster-Instromet. Elster's latest offering in ultrasonic flowmeters is its Q.Sonic Plus. The Q.Sonic Plus has six paths and 16 chords.



Jacob Freeke (right) with staff at the Elster booth

It is designed for custody transfer of natural gas. It has increased diagnostic capability, which reduces the need for upstream piping. The Q.Sonic Plus was first introduced to the North American market in May 2011 at the American Gas Association (AGA) Conference in Nashville, Tenn., which Flow Research also attended.

The advanced diagnostic analysis of the Q.Sonic Plus accounts for flow profile, swirl and turbulence. It adjusts its measurement to take into account build-up of grime on the inside of the meter, using its multiple paths and enhanced number of measuring chords. In addition to custody transfer, the Q.Sonic Plus is designed for fiscal metering for natural gas transmission, distribution, storage and production.

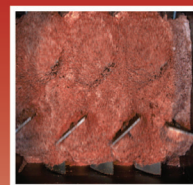
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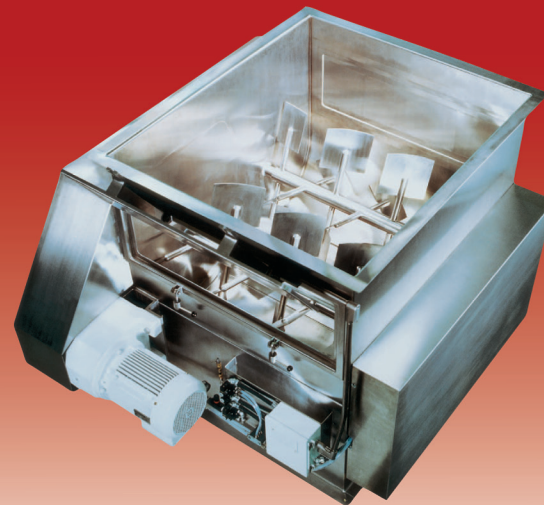


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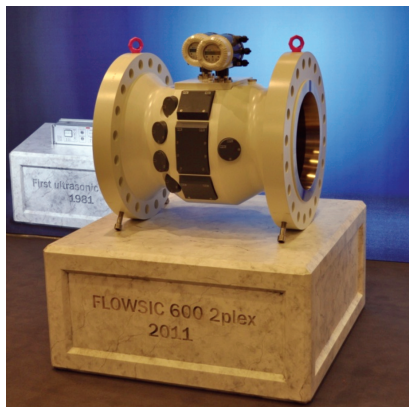


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SICK Maihak

SICK is a relatively recent entrant to the custody transfer market, but the company has made substantial strides in the past five years. SICK displayed its FLOWSIC600, an ultrasonic flowmeter designed for custody transfer of natural gas. The FLOWSIC600 has either two or four measurement paths. Like the Q.Sonic Plus, the SICK meter emphasizes diagnostics. It uses Condition Based Maintenance (CBM), which means that it issues a warning to the user whenever any number of key parameters is exceeded. Key diagnostic parameters include symmetry, turbulence, speed of sound, profile factor and signal-to-noise ratio. SICK has become a major supplier of ultrasonic flowmeters for natural gas applications.



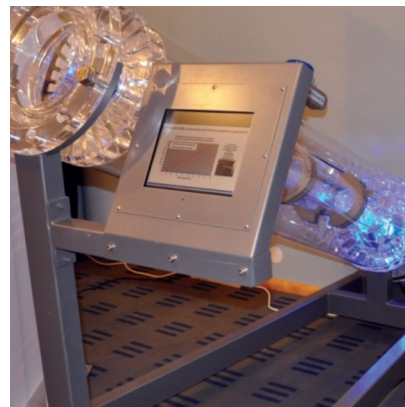
SICK's FLOWSIC600 ultrasonic flowmeter

SICK also manufactures the FLOWSIC100 Flare meter, an insertion ultrasonic flowmeter for flare gas applications. One application is CO₂ emissions monitoring for compliance with government regulations. The FLOWSIC100 has a unique sensor design that is especially suited for high-speed gas flow. The ultrasonic transducer is embedded in a flow-optimized

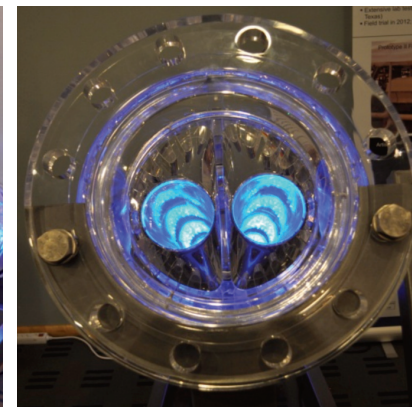
sensor shape, designed to reduce noise and signal drift. Ultrasonic flowmeters for flare gas and stack gas measurement compete with averaging Pitot tubes and thermal flowmeters.

KROHNE


KROHNE has traditionally been stronger in developing ultrasonic flowmeters for liquid applications, especially petroleum liquids, than for gas. The company introduced the Altosonic V, a five-path meter for custody transfer of liquids, in 1997. It later followed up with the Altosonic III, a three-path meter for more general purpose applications, but also designed for liquids. In 2009, KROHNE brought out the ALTOSONIC V-12, an ultrasonic flowmeter designed for custody transfer of natural gas. This meter has a total of 12 chords:



KROHNE's OPTIMASS 2000



Entrance to OPTIMASS 2000 with flow splitter



10 reflecting chords and two chords for diagnostic purposes. While KROHNE is still working to penetrate what is a highly competitive market, it is interesting that the ALTOSONIC V-12 also places a major emphasis on diagnostic capability, like the Q.Sonic Plus and the FLOWSIC600.

Flexim

Like Controlotron (now Siemens) before it, Flexim has made its way in the ultrasonic world largely through clamp-on metering. Flexim is a German company, founded in 1990 by four entrepreneurial graduates of Berlin's Humboldt University and the University of Rostock. From there the company has grown, expanding into the United States, China, Singapore, Argentina, France, Benelux and Austria. Flexim's mainly clamp-on meters for liquid measurement are called Fluxux®, while the meters for gas applications are called Fluxus G.

While clamp-on meters have obvious advantages, such as completely non-intrusive measurement and portability, they do not have the accuracy required for custody transfer applications. The pipe wall can attenuate the signal, and its exact dimensions and composition are not always known. Some suppliers have responded by permanently mounting transducers onto a pipe, in effect creating an inline clamp-on meter. Others have introduced ways to measure the thickness of the pipe wall. These issues are known to clamp-on ultrasonic companies, and they have dealt with them in different ways.

Cameron

In 2006, Cameron purchased Caldon, long known as a supplier of liquid ultrasonic flowmeters to the nuclear industry. Caldon's flowmeters are highly accurate, but are quite expensive, often costing in the range of \$100,000. Since that time, Caldon has turned its attention to the oil and gas industry, and has developed its eight-path ultrasonic flowmeter for petroleum liquids. At the North Sea Flow Workshop, Caldon displayed its new entrant into the gas flowmeter market: the LEFM 380Ci. Like the liquid version, the LEFM 380Ci has eight measurement paths. The term "LEFM" stands for "leading edge flowmeter."

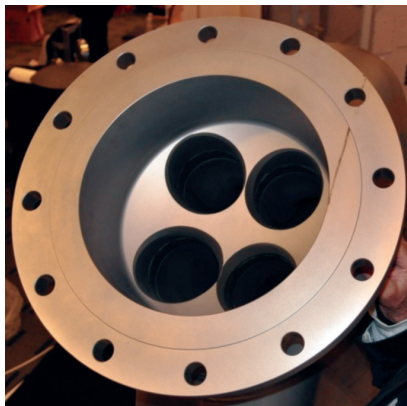
Coriolis Flowmeters Now in Larger Sizes

The biggest news in Coriolis flowmeters is the new, larger size meters. Both Endress+Hauser and KROHNE had their new large-size meters on display. The Endress+Hauser meter is a 14-inch Coriolis meter that accepts 12-, 14- and 16-inch flanges. The new E+H meter is called the Proline Promass 83X/84X Coriolis. The 84X model is suitable for custody transfer applications.

KROHNE's large-size Coriolis meter is called the OPTIMASS 2000, and it is available in a 10-inch model. It is also available in smaller 4- and 6-inch models. KROHNE's meter has a straight-tube design. While it is quite long, it is less bulky than the large-size bent-tube meters, including the E+H model. This may give KROHNE a strategic advantage, especially in places where space is



E+H Promass 83X/84X



Entrance to E+H Promass 83/84X

tight, like on oil platforms. The OPTIMASS 2000 is designed for liquid applications.

A Look Ahead

Considering all the research and development being done on both ultrasonic and Coriolis flowmeters, both of these markets have a bright future. Both meters offer high accuracy, long-term reliability and measurement with no moving parts. The energy markets are providing a boost to these new-technology flowmeters. The market for ultrasonic meters used for custody transfer of natural gas is one of the fastest growing niches within the flowmeter market. And Coriolis meters are increasingly being used for custody transfer of petroleum liquids, especially for downstream distribution applications. Here

they are displacing positive displacement meters.

With leading flowmeter suppliers clearly committed to bringing out more new products and end-users lining up to purchase them, both Coriolis and ultrasonic flowmeters can be expected to continue to gain increasing market share. These are the two fastest growing flowmeter markets, and it doesn't look like this will change anytime soon.

Jesse Yoder, Ph.D., is president of Flow Research, Inc. (www.flowresearch.com), a company he founded in 1998. He has 25 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 130 market research studies in industrial automation and process control and has published numerous journal articles. Flow Research is currently working on new editions of its Coriolis (www.flowcoriolis.com) and ultrasonic (www.flowultrasonic.com) studies. He can be reached at jesse@flowresearch.com.

Read Dr. Yoder's blog and leave comments at ProcessingMagazine.com/blog.