IN MAGMETERS WE TRUST

Technology Improvements Drive Magnetic Flowmeter Uptake

by Jesse Yoder

With no primary element to replace and no moving parts to introduce wear, magnetic flowmeters represent a very stable and reliable long-term method of measurement with minimal maintenance costs.

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photo courtesy of Siemens

The magnetic flowmeter market has shown significant growth in recent years, and this trend figures to continue in the years ahead. In North America, magnetic flowmeter revenues exceeded $150 million in 2004, and the market is projected to rise at a compound annual growth rate of 4.9 percent through 2009 (Figure 1). This upswing is primarily due to technological improvements, which have made magmeters more accurate and reliable, thus enabling them to support a wider range of applications.

History

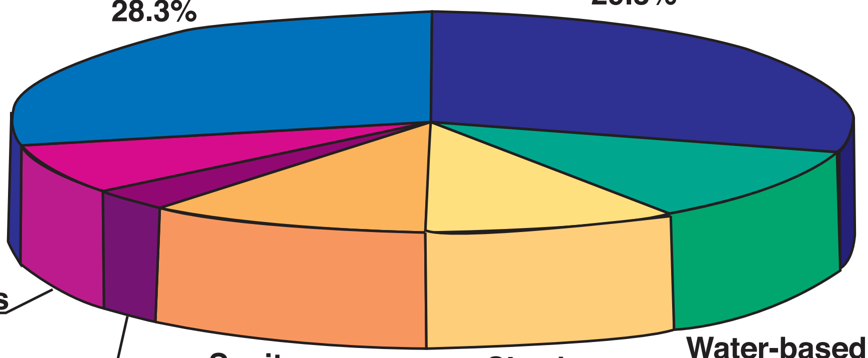
Magnetic flowmeters use Faraday's Law of Electromagnetic Induction to measure the rate of a liquid moving through a pipe. By generating a magnetic field and passing it through a conductive liquid, magmeters can measure flow. When a conductive liquid moves through the magnetic field, a voltage signal is generated. Electrodes detect the magnitude of this voltage signal and use this value to compute flowrate. The faster the liquid moves, the more voltage generated.

When magnetic flowmeters were first introduced, alternating current (AC) was used to generate the conductive field. However, AC flowmeters typically require a zero adjustment to compensate for noise. In 1974, pulsed DC (direct current) magnetic flowmeters were introduced as a solution for noisy applications. As a result, pulsed DC meters have become increasingly popular and today represent the large majority of magnetic flowmeters sold.

More recently, suppliers have introduced high-strength DC magnetic flowmeters, which are capable of producing powerful signals that are more resistant to noise than previous generations of magmeters. Today, there are at least 12 suppliers offering high-strength DC magnetic flowmeters.

Other important technological changes have occurred as well, such as the introduction of two-wire magnetic flowmeter technologies, which are capable of operating on the power provided from a two-wire power source without complex rewiring. Also, new liner types are giving magnetic flowmeters the ability to support a wider variety of liquids. Linings including PTFE (polytetrafluoroethylene), ETFE (ethylenetetrafluoroethylene), PFA (perfluoroalkoxy), and hard rubber are highly durable and designed to handle slurries as well as water containing chemicals. Special liners exist for sanitary applications. No other flowmeter that measures liquids offers such versatility in wetted surface materials.

Figure 1.
Magnetic flowmeters shipped in North America in 2004 by application



Application Advantages

Thanks in part to the reasons outlined above, users are increasingly looking to magnetic flowmeters as a replacement technology for such meter types as differential pressure (DP), positive displacement, and turbine in some applications.

DP meters rely on a primary element to generate a flow measurement. Primary elements are prone to wear over time, resulting in the degradation of flow measurement accuracy. Magmeters are not susceptible to this sort of wear, as they do not use a primary element for flow measurement. Likewise, since DP meters are beholden to primary elements, they can produce pressure loss, a factor that, again, is not a concern for magnetic flowmeter users.

Regarding positive displacement and turbine flowmeters, the main advantage magmeters hold is that of no moving parts. Moving parts are subject to wear and unreliability, which is why more and more users are considering magnetic technologies for applications where conductive liquids are being measured. Also, the flowtube of a magnetic flowmeter is highly durable and subject to little change.

So, with no primary element to replace and no moving parts to introduce wear, magnetic flowmeters represent a very stable and reliable long-term method of measurement with minimal maintenance costs. For these reasons and others, magnetic flowmeters are displacing traditional technology flowmeters for some applications.

Magnetic flowmeters are especially popular in Europe where they are widely used to measure the flow of water. Magmeters are also prominently used for food processing and pulp & paper applications in Europe.

Overall, Europeans appear to have a preference for spool-piece meters as compared to clamp-on systems, and most magnetic flowmeters are of the inline type, whether wafer or flanged. There are no clamp-on magnetic meters, but there are clamp-on ultrasonic meters, which are a popular alternative to magmeters for some applications in the United States, but not as much in Europe.

Limitations

With all of their advantages, the primary limitation of magnetic flowmeters is their inability to measure the flow of nonconductive fluids. Progress has been made in this area, as suppliers have developed magmeters that can measure the flow of liquids with very low conductivity values. However, magnetic flowmeters cannot measure gas or steam flow, and other technology types, such as Coriolis and ultrasonic, are also growing in popularity among users looking to replace old flowmeters with newer technologies. FC

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This article is based on Flow Research's latest study, *The Global Market for Magnetic Flowmeters*, Third Edition. For more information, visit *www.flowresearch.com*.