The **Moneymaker**

Why are electromagnetic flowmeters so popular?

By Jesse Yoder, Ph.D.

Magnetic flowmeters generate more revenues worldwide than any other type of flowmeter, according to the latest research compiled by Flow Research, Inc. This places magnetic flowmeters ahead of some powerhouse flow measurement technologies, such as Coriolis, positive displacement, turbine, and differential pressure (DP). And while the story is somewhat different in terms of units, with differential-pressure and variable-area flowmeters having a larger installed base than magnetic flowmeters, the higher average selling price of magnetic devices has enabled the technology to entrench itself as the biggest moneymaker in the flow measurement category.

Why Magnetic Flowmeters?

Most flowmeters do their best work in clean liquids or gases. This is true, for example, of turbine, Coriolis, transit-time ultrasonic, and vortex meters. Magnetic flowmeters, however, thrive in dirty liquid applications. As such, magnetic flowmeters are widely employed to measure the flow of conductive liquids and slurries, including pulp and paper slurries and black liquor. Their main limitation is that they cannot measure hydrocarbons (which are nonconductive).

Magmeters, as they are often called, are highly accurate and do not create pressure drop. Their initial purchase cost is medium to high, depending on size. While their price is generally higher than DP flowmeters, most are priced lower than equivalent Coriolis flowmeters, making magmeters a nice choice for end-users who are aiming to strike a balance on price vs. performance.

AC vs. DC Magnetic Flowmeters

When magnetic flowmeters were first introduced, many had coils powered by continuous alternating current (AC). These devices were subject to noise that interfered with the meter reading. As a result, AC magmeters needed to be calibrated regularly against an onsite hydraulic zero to maintain their accuracy.

Direct current (DC) magmeters were developed to solve the problems associated with the noise associated with AC meters. The DC meters were based on pulsed direct current. When the current is turned on, a voltage is generated in the magnetic flowmeter, showing the velocity of a flowing liquid. When the current is turned off, any remaining voltage is assumed to be the product of noise. The DC meter computes flow velocity by subtracting this extra remaining voltage.

While DC pulsed technology was first introduced in 1974, it became popular in the 1980s, and its popularity has grown since then. In 2013, more than 95 percent of magnetic flowmeter revenues were from meters using some type of DC technology. Pulsed DC technology does have the drawback, however, of lower signal strength compared to AC meters. This gives AC meters an advantage for measurement of some dirty liquids and slurries.

To compensate for low signal strength, some DC magnetic flowmeter suppliers developed "high-strength" DC meters, which use the pulsed on-off technology of DC with a higher coil current. This makes them better able to handle high noise applications, such as slurries and dirty liquids than standard DC meters. These high-strength meters are growing rapidly in popularity. In 2008, they accounted for 5 percent of magnetic flowmeter revenues. By 2013, this percentage had more than doubled.

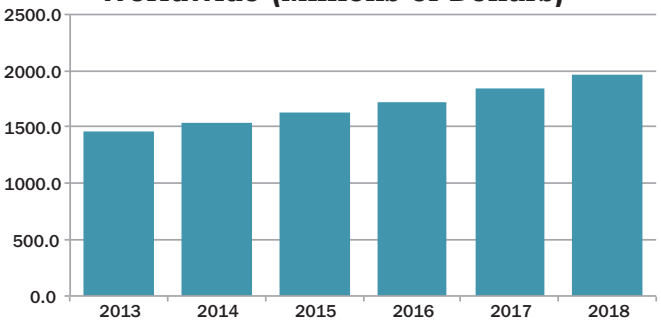
New Product Developments Keep this Market Fresh

While the magnetic flowmeter market is a mature and stable one, there are some new product developments in the magmeter market, and these new developments figure to help generate continued growth. One recent development is the advent of two-wire magnetic flowmeters instead of four-wire meters, which have a dedicated power supply. Two-wire meters use the power available from the loop power supply. This reduces wiring costs and can result in lower installation costs, which is making two-wire meters a popular choice of end-users. While two-wire meters still represent only a small percentage of the total magnetic flowmeters sold, their use grew significantly from 2008 to 2013.

Another important development is the growth in battery-operated and wireless magnetic flowmeters. Battery-operated meters make it possible to install magmeters in hard-to-reach places, and wireless meters can transmit a receivable signal where the use of wires is impractical. Both of these segments represent fast-growing areas of the magnetic flowmeter market.

Another area where magnetic flowmeters distinguish themselves is in their liners. Liners enable the meters to measure both very dirty and very clean liquids. The two most popular ones are PFA (perfluoroalkoxy) and PTFE (polytetrafluoroethylene). Hard rubber is widely used for water and wastewater applications.

Total Shipments of Magnetic Flowmeters Worldwide (Millions of Dollars)



Source: Flow Research, Inc.

The China Wild Card

The magnetic flowmeter market has grown substantially in China and in the Asia-Pacific region in the past five years. China is engaged in some very large water projects that are designed to bring water to low-rainfall areas. One example is the South-North Water Transfer Project, which is being built at a cost of $62 billion. Its purpose is to bring water from the Yangtze River in southern China to the Yellow River Basin in arid northern China. Another massive water project in China is the Three Gorges Dam.

There are a significant number of magnetic flowmeter suppliers in China. Some of them are associated with Western companies, such as ABB, KROHNE, and Endress+Hauser, others appear to be operating independently. Unfortunately, precise reporting from the new manufacturers in China remains an obstacle to a complete understanding of their contributions to production volumes in this region. It is safe to say that the Chinese market is a significant portion of the world market, and that this is the fastest growing region for magnetic flowmeters. FC

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