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From the 1970s to Today

Four Key Advances in Coriolis Flow Measurement

Since the first Coriolis flow sensors were introduced to the marketplace in the 1970s, the technology has evolved considerably. As the installed base for Coriolis grew, the sensors were being called upon to deliver data in environments with increasing levels of complexity. This meant that Coriolis sensors had to adapt and conform to a dizzying array of ever-changing installation requirements, process conditions, communication formats, and configuration parameters. The following article highlights four key advances in Coriolis flow measurement's journey from the 1970s to today.

ADVANCE NO. 1: The modern Coriolis sensor must be easy-to-use and simple to install.

With this in mind, manufacturers have evolved Coriolis sensors from what has traditionally been a relatively unwieldy instrument to now offer lightweight and compact models. After all, what is the value of a high precision measurement tool if you cannot get it to fit in your process?

This size reduction was accomplished by reducing the length of the tubes, using short radius bends to deliver a short lay length and a compact profile. Additionally, the compact tubes are plumed with hemispherical inlet and outlet ports, which aid in reducing inlet turbulence, as well as process noise. These ports also aid in minimizing pressure loss.

With short flow tubes and easy bends working in conjunction with the flow conditioning of hemi-ports, modern Coriolis sensors offer impressively low pressure losses and signal-to-noise ratios. This means there is more pressure and more signal available for the process.

ADVANCE NO. 2: The modern Coriolis sensor must be able to stand up to the rigors of mounting stresses.

Changes in process pipe temperature can produce tensional, torsional and compressive forces on the Coriolis sensor as the piping shrinks or grows with changing temperatures. For this reason, some modern Coriolis flowmeters are designed with a backbone of stainless steel that is approximately 12mm in thickness (in the smallest sensor). Larger sensors have significantly thicker frames in order to accommodate the rigors found in large-pipe installations.

This robust construction resists pipe stresses on the process connection, enabling stable and repeatable measurements over time. The robust construction of the sensor, along with the flow conditioning of hemi-shape manifolds, help reduce vibratory and process flow noise, offering repeatable precision even in the most challenging flow applications.

ADVANCE NO. 3: Most modern Coriolis sensors now measure mass and volume flow density, temperature and concentration measurement as a matter of course.

In fact, the latest Coriolis transmitters feature a wide array of filters and adjustment relays and batching controls, as well as customizable display architecture. All of this technology now needs to be easy to access and manipulate, and we see this in the menu structures of modern Coriolis sensors, which employ non-technical verbiage with easy to understand functions.

If a button is not engaged at each level of configuration, the transmitter will ask if you need help and suggest a next step. Coriolis sensors even feature setup wizards that allow a novice to set up all the primary settings just by answering the questions the meter asks.

Once under way and in use, the transmitter also provides diagnostic and alarm support with straight-forward language that not only reports on the sensor's condition, but also suggest avenues to address what the sensor is reporting.

Easy to install and easy to use seem to be the most common requests from Coriolis users, and manufacturers are responding accordingly. Even with the state of the art technology, the latest generation of Coriolis sensors are among the most user friendly of flow measurement instruments.

ADVANCE NO. 4: Ultimately, the key challenge for Coriolis utilization is the cost of the technology itself.

In recent years, a number of manufacturers have released value-priced Coriolis sensors. Even though these Coriolis sensors are still a bit more pricey than traditional foundation flow sensors, the capabilities they offer make them an attractive choice from a total cost of ownership perspective.

Budget Coriolis sensors offer flow accuracies of 0.2 -0.75 percent of rate, and this specification remains stable over the life of the meter, which can span 10-20 years. Compare that to a foundation meter that starts at 1 percent of rate accuracy and varies significantly over time. In many cases, low-cost Coriolis sensors provide a return on investment less than one year.