OPINION

The Advantages of Multivariable Vortex Flowmeters

Faced with less time and personnel to devote to an increasing range of control and measurement problems, engineers must often weigh the cost of inaccuracy against the initial and maintenance costs of flowmeters. This demand for higher accuracy and lower cost over the lifetime of the device is driving the development of enhanced functionality.

Most of the recent innovations in flowmeter technology are related to mass measurement. The developing trend is a result of a growing awareness of the need to measure mass flow, and a critical understanding of the variables that can affect an instrument's specified accuracy.

The trend to replace orifice meters and other differential pressure producing devices is an example of how both of these influences are at work. The orifice plate and differential pressure transmitter still dominate the flow measurement market and are perceived to be the lowest-cost solution. However, recent studies show that this technology is rapidly losing market share.

The single biggest weakness of the differential pressure meter is turndown. All flowmeter accuracy statements are based on a specified operating range. A flowmeter's operating or turndown range can vary depending on the technology. Given the opportunity, most engineering professionals will specify a device with wider turndown to improve the measurement's accuracy.

Another process parameter that can degrade flowmeter accuracy is fluid density variation. A device that measures flow in one location, pressure in another and temperature in a third is more vulnerable than a device that measures all of these variables in a single location.

Vortex flowmeters are rapidly gaining market acceptance because they offer both durability and wide turndown. However, in order to measure mass flow, the vortex meter requires auxiliary pressure and temperature measurements in order to calculate density. The location of these sensors can have a significant effect on system accuracy.

Multivariable vortex mass flowmeters measure steam, gas and most liquids from a single entry point in the process line.

Systems that use external process measurements to calculate mass flow often fail to consider that process conditions can change radically. Because the multivariable vortex mass flowmeter measures these variables in a single location, the operator can depend on several process measurements.

Another disadvantage of "traditional" compensated vortex metering systems is the high cost of installation. The complex electrical and mechanical system requires power and signal wiring between the flowmeter, the pressure transmitter, the temperature transmitter and the flow computer. Three process penetrations and mounting adapters for mechanical connection to the pipe are also necessary. Several different components must be integrated and tuned in order to make the system work properly.

The multivariable vortex mass flowmeter can be installed with a single process penetration and only one set of power and signal wires. This instrument also simplifies commissioning and field-adjustments.

Integrating mass flow measurement with multivariable output capability in a single device yields the following benefits:

1. Measuring mass flow rate, volumetric flow rate, pressure, temperature, and fluid density with one smart transmitter reduces initial equipment costs.
2. Installation of a single device reduces engineering effort and installation cost, providing low cost-of-ownership.
3. Monitoring all process variables in a single location improves measurement accuracy. □

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