An integrated approach to energy metering

Ultrasonic flowmeters are replacing their mechanical predecessors for better functionality and increased flexibility

Energy metering is a very broad category that incorporates measurement of all four types of fluids. Natural gas is used as a power source in power and other industrial plants. Steam is used as a heating source in refineries, food processing plants, chemical plants, refineries, and other industrial plants. Hot water is used almost everywhere as a heat source, in manufacturing operations, and in water and wastewater applications. Cold or chilled water is used for cooling purposes, drinking water, cleaning, and in all kinds of manufacturing processes. Oil is still the main power source for most industrialised countries, and refined fuels are used in automobiles, ships, trains, and in countless manufacturing operations.

Energy metering and management is a major area for flow measurement that requires measuring all fluid types, and also requires using different types of flowmeters. District heating and cooling, compressed air measurement, and heating, ventilation, and air conditioning (HVAC) make up a major portion of energy metering. These applications are used worldwide in every region, because energy metering is a requirement for residential, commercial, and industrial buildings.

In many examples of district heating and cooling, the utility's customer is the owner of a hotel, housing compound, business park, shopping mall, or other structure with multiple tenants. The owner can keep track of the energy usage of tenants by using submetering. With submetering, individual flowmeters are installed at the inlet to the tenant's property. By tracking the energy usage by each tenant, the property owner can bill the tenant accordingly.

One example of this type of metering is at Marina Bay Sands, a luxury hotel in Singapore. Kamstrup has installed more than 1,500 units of electricity, water, and cooling meters in this hotel.

A multivariable insertion vortex flowmeter for stream applications

The consumption data for each unit is monitored, and all the data sent to a central location for billing purposes. The communication protocol used for this is M-Bus, which is a European standard for remote reading of gas or electricity meters. If the hotel also measures the energy as it is delivered from the utility, it can also monitor the correctness of the utility company's bill.

Smart meters replacing mechanical meters

Mechanical meter reading is still in place for many of these types of units. The types of mechanical meters are generally positive displacement or turbine, which still have a large installed base. Al Bustan Village in Riyadh, Saudi Arabia, is an example of a housing compound that was doing submetering with mechanical meters. Al Bustan contains 850 residential units and 370 apartments. Because the meters were mechanical, they could not be read remotely. Kamstrup was able to replace the mechanical meters with smart ultrasonic meters that can be read remotely. The ability to provide integrated reading of water, cooling, and electricity meters was one of the key factors in enabling Kamstrup to win the bid for this contract.

Single supplier advantages

The ability to deal with a single supplier is one of the key advantages for end-users who are looking to replace their mechanical meters, or to institute a new system for submetering. It also applies to companies looking to measure compressed air, steam, or water flow as part of their manufacturing operations. Dealing with a single supplier facilitates the ordering process, provides a single contact point for technical support, and also makes any service calls easier to manage.

Sierra Instruments has become a

A thermal mass flowmeter measuring compressed air

A closer look at the thermal mass flowmeter

single supplier for many energy metering applications by offering three types of flowmeters that measure steam, air, gas, and water. Sierra's thermal flowmeters measure both gas flow and compressed air. The company offers vortex flowmeters that measure steam, gas, and water flow. Sierra's clamp-on ultrasonic flowmeters provide a flexible method for measuring liquid flows. And Sierra offers software apps that can be used with all three meter types. Examples include ValidCal Diagnostics for field validation, Datalogging, and MeterTuning.

Air Conditioning Supply (ACS) uses Sierra's thermal flowmeters for measuring compressed air. ACS estimates that 76% of its factory operating costs come from electricity usage. And the cost of compressed air makes up the largest portion of its electricity bill. By using Sierra's thermal flowmeters, ACS has been able to increase the accuracy of its energy audits because these meters are immune to changes in operating temperatures. The flowmeters ACS used previously showed a 5-10% reduction in accuracy with variations in operating temperatures. As a result, ACS estimates that it saves as much as $40,000 annually in electricity costs.

Sierra ties its three solutions together through its proprietary Raptor operating system. This system consists of firmware along with software apps that run on its thermal, vortex, and ultrasonic flowmeters, which it calls the Big-3. The Big-3, together with the Raptor operating systems, offers a complete energy solution for flows like compressed air, natural gas, steam, and hot and chilled water. Because so many manufacturing companies have to measure all these fluid types in the course of their energy management, Sierra's solution should be attractive to companies that want to manage their energy costs.

An integrated approach

Another company that offers an integrated approach to its products is Great Plains Industries (GPI). GPI offers a QSI Interface Board that offers a single operating system and communication protocols that are compatible with all of its FLOMEC flowmeters. These include positive displacement, insertion magnetic, turbine, and clamp-on ultrasonic flowmeters. In addition, the QSI Interface Board is compatible with many non-FLOMEC products. Two of the three versions offered for scalable flow or energy come with a BTU calculator.

Sierra Instrument's clamp-on ultrasonic liquid/ thermal BTU flowmeter

Of course, many companies offer multiple types of flowmeters, some of which can be used for energy management. However, Sierra and GPI are both taking novel approaches by introducing firmware and software designed to provide an integrated approach, especially for companies that want to use more than one of the company's flowmeter types. This is a trend that is likely to be emulated by other companies in the future.

Ultrasonic energy meters take the lead

Ultrasonic flowmeters are taking the lead in displacing mechanical meters in the energy metering market. The ultrasonic metering market has typically been dominated by three suppliers: Siemens, Danfoss, and Kampstrup. These meters tend to be lower in cost than most other ultrasonic meters, and sold in larger quantities. It is perhaps no coincidence that all these companies are based in Europe. Energy metering and submetering have typically been more popular in Europe than in the United States. However, because of their inherent advantages and obvious cost savings, they are becoming more popular in the United States as well.

Energy metering also goes by the name 'district heating and cooling'. This involves a similar concept, but is more specific to metering hot and cold water. District heating and cooling is also on the rise in the United States. Kamstrup just opened up its first water meter manufacturing facility in the United States on 8 February 2018. The stakes are high for both energy metering and district heating and cooling, due to the potential cost savings involved. It is no surprise, then, that these applications are attracting expanded offerings from high-quality companies like Kamstrup, Sierra Instruments, Siemens, and Danfoss. Those companies that offer an integrated approach with a single source solution will have a competitive edge in this dynamic and growing field.

More information

This article was written by Jesse Yoder, Flow Research.

Visit www.flowresearch.com

All images courtesy of Sierra Instruments