PROCESS INSTRUMENTATION

Field test turns **clamp-on ultrasonic flow meter skeptics into believers**

usa.siemens.com/clamp

After having been reluctant of using clamp-on ultrasonic flow meters for energy measurement in cogeneration plants in large residential and commercial buildings, a US-based engineering firm was convinced by the clamp-on meter's strengths. A test of a SITRANS FS220 clamp-on flow meter in an actual field application revealed such strong and reliable performance that it was enough to convince the engineering team to start using the clamp-on ultrasonic flow technology.

The engineering firm wanted to design and construct a unique building for a new commercial project in a large US city. The idea was that much of the building's energy would be generated on-site by a clean-burning 4.6-megawatt cogeneration plant, also known as a combined heat and power plant (CHP).

Background

The new skyscraper, which will mainly be used for office space, is built largely of recycled and recyclable building glass, steel, and aluminum. It will include 2.2 million sq. ft. (198,000 m^2.) of floor space; much of it being occupied by large data centers that need to be cooled down for proper operation. For this reason, the supply of chilled and condenser water to the air-conditioning system has to be constant without any interruptions whatsoever. To achieve this, the engineers opted for a completely redundant cogeneration chiller plant with a back-up system that would kick in case of any failure on the main system. A cogeneration plant generates electricity and heat at the same time, making it a much more efficient solution than a regular chiller system.

SITRANS FS220 clamp-on ultrasonic flow meter with stand alone thermal energy calculator are ideal for district energy, building management, and university HVAC applications, including:

- Chilled water sub-metering
- Hot water sub-metering
- Steam / condensate
- Condenser water
- Potable water
- Glycol
- Thermal storage
- River or lake water
- Lake source cooling
- Chemical feed
- Ammonia feed

SITRANS FS220
Flow Meter

SITRANS FS230
Flow Meter

SITRANS FEC920
Energy Calculator

To make the plant even more efficient, the engineering firm also decided to connect a thermal storage system to the cogeneration plant's exhaust heat. Thermal storage is considered a very cost-efficient type of air conditioning because ice is produced and stored at night. In the day time, water is sent through the ice to produce the chilled water that circulates the air conditioning system. Since a kilowatt-hour of electricity consumed at night is produced at a much lower marginal cost compared to the cost during the day, significant savings can be obtained. An added feature of such a system is that it doesn't contribute to peak electrical loads often seen on hot summer days responsible for a very large percentage of the world's CO_2 emission.

The problem

Up until this project, the engineering firm had typically been specifying insertion-type turbine meters for this type of application because, although they knew that the ultrasonic technology could be applied, they were very skeptical about using it. Their preferred technology, turbine metering, had proven to be reliable through many years of service. After discussing their concerns with the local Siemens sales engineers, the engineering firm asked to run some tests using a SITRANS FS220 clamp-on ultrasonic flow meter for the application. In one of these tests, concurrence of 19 l/m (5 g/m) between two meters on the same piping flowing at 9,475 l/min (2,500 g/m) was found. Such accuracy is essential to the efficient and dependable operation of the physical plant and distribution system and also to the engineering firm. They were finally convinced that the SITRANS FS220 was the superior solution for their application needs.

The solution

As a direct consequence of the tests, Siemens provided single channel FS220 clamp-on flow meters with dual channel thermal energy calculators to be installed at different locations in the building. For the most critical measurement points, two dual-path FS230 meters were installed that allow the installation of two sets of sensors anywhere on a specific pipe using only one energy meter. This approach is used to overcome the profile errors that can be induced by short straight runs of pipes, combined with piping disturbances such as elbows and T's. In such situations they provide improved accuracy because data is being obtained from two paths instead of only one. On the less critical portions of the system the SITRANS FS220 single channel flow meter with single or dual channel FEC920 energy calculator were installed.

Because of the success of this installation, the engineering firm has begun specifying the SITRANS FS220/FS230 clamp-on flow meters for additional projects as well. Applications in this market have various factors that make specifying clamp-on meters a good decision; the main reasons being that the applications often require large pipes, which may be pre-existing, and critical services that cannot be interrupted.

The product

SITRANS FS220/230 clamp-on with stand-alone energy calculator flow meters avoid the performance and reliability problems that afflict conventional intrusive thermal energy flow meters. Their high accuracy, wide bi-directional range-ability, and high sensitivity prevent the loss of energy cost billing suffered when flow rates fall below the operating range of intrusive heat meters.

Absolutely no pressure drops mean lowest operating costs. Shutdown is never needed for installation, maintenance, or calibration check, saving additional cost and inconvenience. Non-intrusive, clamp-on "no-wear" flow sensing delivers intrinsic high reliability.

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