



STEAM MEASUREMENT



Building Energy Efficiency / HVAC

“The UMD operations manager was excited to have the more accurate steam flow measurement online with minimal effort.”



*Kirk Running,
Territory Manager,
Advanced Process Solutions,
Plymouth, MN.*



Measuring Task

Steam flow measurement for balancing supply and consumption on a university campus

Steam is a commodity and necessity for many industries in the world. Whether it is used for heating a building or as a heating source for an industrial application such as heating a vessel, the measurement of steam is essential.

The University of Minnesota Duluth (UMD) always had an issue with the measurement of the main steam line exiting the boiler. This line feeds approximately $\frac{1}{3}$ of the campus or rather all the campus dorms. They could never achieve a good balance between the boiler output and submeters in the buildings. The meter was a ΔP transmitter, and it was challenged to pick up the low demand — low flow rates — during the summers. They allocated funds to create a metering location on the condensate return, and then they heard about Flexim’s new steam meter.

Clamp-on flow measurement for liquids using the transit-time principle has been around for over 40 years. Fifteen years ago, non-intrusive gas flow measurement was introduced, but the measurement of gaseous water continued to be an insurmountable challenge for clamp-on ultrasonic technology for a long time; up until Flexim’s R&D engineers came up with

the right solutions. At the end of 2019, Flexim released FLUXUS® ST, the first clamp-on ultrasonic measuring system for non-intrusive measurement of steam. FLUXUS® ST is suitable for measuring the volume and mass flow of saturated and superheated steam at temperatures up to 356 °F. The pressure and temperature range allow this meter to be used in HVAC applications as well as some industrial heating applications. Non-intrusive steam measurement boasts the same advantages as clamp-on ultrasonic flow measurement with FLUXUS – advantages which are well known by Flexim’s customers: No opening of the pipeline means full plant availability. No contact with the medium means no wear and tear and therefore practically no maintenance. Due to the extreme dynamics of the acoustic measuring technology and its high sensitivity to low flow velocities, there is also no need for reducing the pipe cross-section, as is sometimes necessary in wetted measuring methods to achieve a minimum flow.

Solution



A local sales representative, Kirk Running with Advanced Process Solutions, identified Flexim’s recent achievement in measuring technology as the ideal solution.

“UMD was already using Flexim clamp-on meters and decided to give the steam meter a try”, Running said. “The meter was installed by a Flexim field engineer; the entire installation took less than a day to complete. With the installation complete, the university was able to reliably carry out a measurement of the boiler for the first time, and they saved money in the process.”

The Flexim installation was done on a 6-inch schedule 40 carbon steel pipe which measures steam at 350 °F and 111 psig.

A stationary ultrasonic system FLUXUS G721 ST is used as measuring transmitter.

It works according to the well-known transit time or “time of flight” principle which offers excellent accuracy and extremely high measuring dynamics. The new 721 transmitter platform furthermore features enhanced programming software and a faster processor that reduces the effect of noise on the meter. It has a built-in data logger that will store all meter diagnostics that are examined in order to verify a good flow signal as well as operating parameters such as mass flow, flow velocity, flow totals and other important operational data and diagnostics.

The installed meter also uses BACnet communication to connect and communicate to the university’s building automation system. This provides real-time data to the university and allows the facility and power plant personnel to monitor steam usage.

“The UMD operations manager was excited to have the more accurate steam flow measurement online with minimal effort,” Running said.

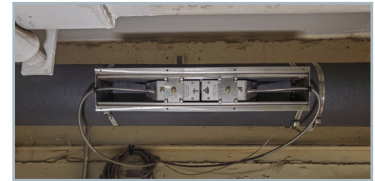
UMD is in the process of linking up all the energy and water flow data to a HMI that will display real-time usage. There is also student involvement with monitors in the student engineering building, revealing real-time water and energy usage. This will allow students to see the results of conservation projects on campus. For example, they can have a contest to see which campus building can reduce water consumption the most.



UMD’s campus overlooking Lake Superior © UMD

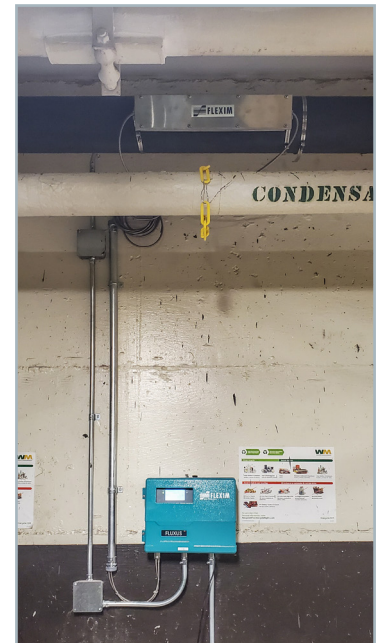


A global innovation:
Non-intrusive steam flow measurement with clamp-on ultrasonic technology.



Clamp-on ultrasonic transducers type GRK1S52 mounted in PermaLok rail during installation (i.e. without mounting cover).

The meter can improve the accuracy and reliability of steam measurement, all without any process interruption.



Measuring point with clamp-on ultrasonic transducers mounted in Perma-Lok rail and the stationary transmitter FLUXUS® G721 ST

Measuring Points and Instrumentation

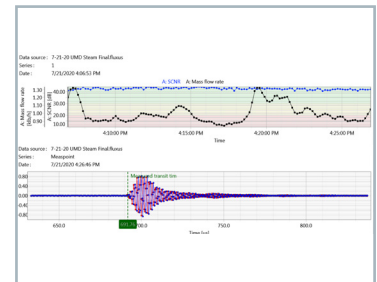
Pipelines	6" carbon steel, schedule 40
Medium	saturated steam
Temperature	~ 350 °F
Pressure	~ 111 psig
Measuring Device	1 stationary clamp-on ultrasonic FLUXUS® G721 ST steam flowmeter 1 pair of clamp-on ultrasonic GRK1S52 transducers, mounted in PermaLoks

Customer

University of Minnesota Duluth

The University of Minnesota Duluth (UMD) consistently ranks among the top Midwestern, regional universities. Providing an alternative to both large research universities and small liberal arts colleges, UMD attracts students looking for a personalized learning experience on a medium-sized campus of a major university. UMD's fall 2020 enrollment was 10,275 students. Over 1,881 people work at UMD.

UMD's campus consists of more than 50 buildings on 244 acres overlooking Lake Superior, all built since 1948.



FluxDiag shows a very well performing steam flow measurement with excellent diagnostics.

Advantages

- Accurate steam flow measurement with no reduction of the pipe cross-section, no pressure loss
- Extremely large measuring range (flow velocities from 0.03 ft/s up to 200 ft/s) allow to capture all steam usage from very low to very high flow rates
- Easy to retrofit, without interruption of supply

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