

GE Sensing's Field Service Team Helps University of Vermont Gather Critical Data for Expansion

GE's Field Service Team Helped UVM Evaluate Steam Usage for an Upcoming Expansion Without Disrupting Service to Area Buildings

UVM was planning on expanding its 450-acre campus to include new dormitories and other buildings. Planners questioned whether the existing underground network of steam pipelines used to supply heating and cooling throughout the campus could handle the additional capacity of the expansion. If they could not, adding new pipelines, boilers and control systems would significantly impact the expansion budget. Additionally, the university needed to take measurements without shutting down service to campus buildings.

UVM contacted GE Sensing to inquire about our ability to make flow measurement without penetrating the pipeline. The GE Field Service Team performed a two-week flow survey using our gas clamp-on flowmeter. Upon completion of the survey, the GE Team downloaded data logs from each flowmeter and presented them to UVM engineers. UVM engineers were able to obtain the critical data they needed to account for any additional development costs without disrupting service. Subsequently, UVM purchased the flow survey equipment to use for future needs.



Photo taken by Bruce Hewitt, courtesy of the University of Vermont

Application Background

Under the leadership of new president Daniel Fogel, the University of Vermont in Burlington, Vermont, launched a progressive campaign in late 2003 to improve the university infrastructure. The plan called for renovations of several existing buildings and dormitories, new parking structures and a new 800-bed dormitory.

The campus has its own central plant that supports heating in the cold Vermont winters, as well as air conditioning in summer months for all campus buildings. Planners questioned whether the existing underground network of steam pipelines around the 450-acre campus had enough capacity to support the locations where new buildings were proposed. If not, adding new steam pipelines, boilers and control systems would significantly factor into the development cost of the campus expansion plan.

Survey Steam Lines to Determine Capability without Disrupting Service

The UVM Energy Management Office of the Physical Plant Department decided to take a look at its

steam plan for three, five and 10 years for both the North and South campuses. Part of the analysis involved making steam flow measurements at points in the distribution system where no flowmeters were previously installed. UVM contacted GE Sensing about its ability to make these flow measurements without penetrating the pipeline. UVM engineers needed a non-intrusive flow measurement because the university could not shut down the steam system for installation of wetted flow technology on a system still in use for heating buildings.

GE Field Services Surveys Lines with Ultrasonic Gas Clamp-On Flowmeters

GE offered to perform a steam flow survey using clamp-on gas flowmeters for a period of approximately two weeks at four different measurement locations/buildings: Christie, Givens, HSRF and Living & Learning. See Figure 1 and Table 1, on the next page for more application details.

Gas Clamp-On Flowmeter/Flow Survey



Figure 1: Clamp-on steam installation on a 4-inch line at Christie

Application details and installation locations were verified between UVM engineers and GE Sensing Field Services as being suitable for clamp-on steam ultrasonic flow measurement. UVM technicians prepared the installation sites by erecting staging where necessary to reach overhead steam pipes and by stripping back pipe insulation materials. GE's field service engineers installed the clamp-on transducers, pipe dampening jackets and flowmeter electronics.

After two weeks of operation, GE engineers returned to the university, downloaded data logs from each flowmeter and removed the systems. The data was subsequently presented to engineers at the Energy Management Office for analysis. See Figure 3.

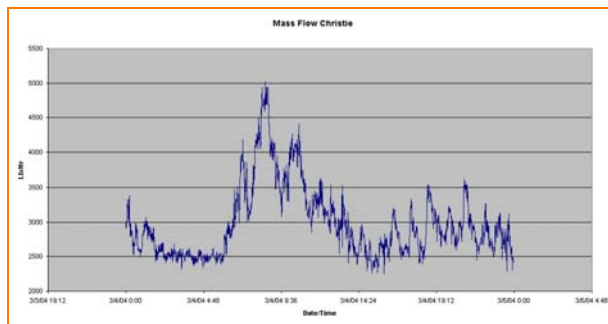


Figure 3: Steam mass flow data from Christie measurement point. Usage is low in early morning and spikes throughout the morning due to heating for student showers and building heat.

Table 1: Specifications

	Building Name/Measurement Point Location			
	Christie	Givens	Living and Learning	HSRF
Pipe size OD (inches)	4.500	5.536	4.500	10.750
Pipe wall thickness (inches)	0.237	0.285	0.237	0.365
Nominal temperature (°F)	353	377	360	382
Nominal flow range measured over test period (lb/hr)	1840 – 5185	3160 – 11310	1770 – 4945	146 – 4735

At the end of the flow survey, GE field service engineers removed the flowmeter electronics, but left the clamping fixtures, dampening jackets and clamp-on transducers in place, with a plan to return during the following winter with electronics to perform another short-term survey.

In January 2005, GE field service engineers returned to perform a 10-day flow survey. Re-installation of the flowmeter electronics and validation of the system showed that the dampening material held up to long-term installation on hot steam pipes. Indeed, the dampening material's ability to dampen pipe noise actually improves after initial installation as the material cures to an almost cork-like consistency. In some cases the ultrasonic couplant had to be re-applied to maximize flowmeter performance—a typical recommendation for most clamp-on ultrasonic flowmeter installations for almost any application.

Accurate and Easy to Use Non-Intrusive Technology

When plant engineers look for a non-intrusive flow measurement solution, clamp-on ultrasonic flowmeters are typically the first technology considered. However, clamp-on technology has not been available until recently. Thanks to new technology developed at GE Sensing, clamp-on steam flow measurement is now a reality for many of these common types of steam applications.

Using this new technology, GE Sensing is able to provide customers, like UVM, with easy to use and accurate flow measurement without disrupting their processes. UVM was able to obtain the critical information they needed to account for any additional development costs for the campus expansion plan without disrupting service. Subsequently, GE field service never removed the survey equipment because UVM purchased the four flowmeter systems in order to conduct their own flow surveys in the future.

