Rosemount Advantage

Steam

DP Flow Application Note

Steam Metering with the Mass ProBar® Flowmeter

Aylesford Newsprint, the paper mill in Kent, England, receives site steam and electrical power from the National Power steam raising and electrical generating plant. The transfer of energy from the power plant generator to the paper mill must be metered to justify service charges. Driven to improve efficiency and reduce production costs Aylesford needed to closely monitor and measure steam flows of the delivery lines and condensate return lines.

The Mass ProBar® Flowmeter makes steam metering with a single pipeline connections a viable solution.

The steam pressure conditions at Aylesford are controlled at nominal pressures up to 62 bar, but minute by minute variations in the overall plant steam demand cause potential delivered steam pressure fluctuations of 5%. Continuous computation of the mass/energy flow was desired. The pressure and temperature needs to be closely monitored to calculate the steam density and heat content. Steam density changes significantly affect the accuracy of the measured flow rate.

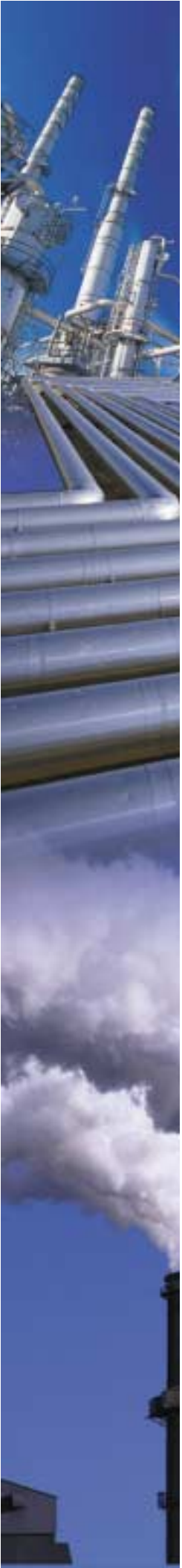
Over the years, vortex flowmeters and orifice plates have been used as steam tariff devices, but both these measurement techniques require separate sensors and computation electronics for total steam energy metering. However, these devices caused significant pressure loss and accuracy fluctuations cause by line pressure changes. Installations were complex and expensive, with several different line penetrations for each sensor type. These devices are also limited by line sizes above 250 mm because of the high permanent pressure loss and difficulty in removal and replacement of the plate for resizing or calibration.

The Mass ProBar® flowmeter gave Aylesford an appealing solution for their steam metering by packaging insertion flowmeter technology with multivariable electronics. The combination of the Annubar® primary flow element and the 3095MV Multivariable transmitter made steam metering with a single pipeline connection a viable solution. Further, the Mass ProBar® flowmeter's microprocessor performs all the functions required to compute the energy flow, within the one sensor mounted unit.

Aylesford Newsprint Facility in Kent, England

Since 1992, Aylesford has been manufacturing premium grade news print for leading European newsprint publishers. The company recycles 500,000 tonnes or used newspapers and magazines a year and makes 400,000 tonnes of newsprint.

The Mass ProBar® flowmeter accurately measures the differential pressure between the upstream facing and downstream facing holes, to deduce the flow velocity. The upstream pressure port is also used to monitor the static or line



pressure on the sensor tube, all within the integral transmitter. For temperature measurement, a RTD probe is inserted in a thermowell inside the Annubar® plenums to prevent contact with live steam. The result is that all process measurements are made through the same process penetration made for the flow sensor, which compensate for fluctuations in pressure and temperature that affect density. The multivariable electronics are capable of taking the three measured process variables and dynamically calculating mass flow rate.

An integrated sensor and electronic system significantly reduce installation cost and time compared to any other system that require multiple sensor connections. The simplicity of the commissioning the 3095MV unit surprised the installation team. Complete set-up only took an hour since all the steam tables are held within the memory of the electronics.

The installed Mass ProBar® flowmeter units have proved their worth and are now used not only for fiscal measurements, but also for control. Space and installation problems were overcome by the Mass ProBar® flowmeter's flexibility to remote mounting the electronics. The Mass ProBar® flowmeter was installed in a pipe run unsuited to any other device, due to the high velocity at full flow, the short length of pipe available, and the system turndown required.

Mass ProBar® Flowmeter Installation
Multivariable electronics measure pressure,temperature and differential pressure,and calculates true mass flow rate. Access to all measurements is available through HART® or through an optional splitter that provides access to all variables via a 4-20mA loop.

The Mass ProBar® flowmeter's method of calculating flow compensation enabled the paper facility to reduce bias error and gain efficiency. The accurate measurement of the multiple variables, flexible and less intrusive measurement and compact packaging made the Mass ProBar® flowmeter the most suitable choice for this mass flow measurement. With the increasing demand for accurate steam flow metering, the versatility and economics of the Mass ProBar® flowmeter has enabled Aylesford Newsprint to standardize their plant with Mass ProBar® flowmeters.

Related Literature

Literature Type	Publication No.
Mass ProBar® Flowmeter Product Data Sheet	00813-0100-4762
Mass ProBar® Flowmeter Installation & Operating Manual	00809-0100-4762
3095MV Multivariable Mass Flow Transmitter Product Data Sheet	00813-0100-4762
Improving Flow Measurement by Real-Time Flow Calculation in Transmitters Having Multiple Process Variables	00816-0100-3219

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