

Case Studies: Flow

Flowmeter Smooths City's Troubled Waters

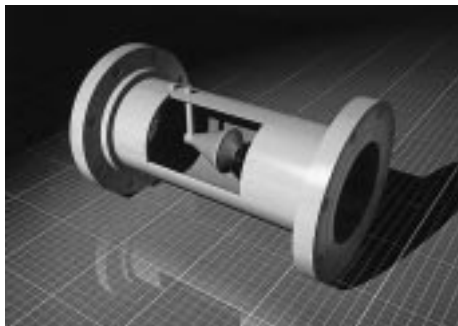
By **GEORGE BOSSER**
and **STEPHEN GOTTULA**

In 1992, Westminster, Colo., needed to obtain more accurate flow readings from the Standley Lake Raw Water Outlet Works, which feeds the City's water treatment facility. The city has water storage rights in Standley Lake, which is owned by the Farmers Irrigation Co., but was charged on the basis of water used.

The Raw Water Outlet Works building was constructed in 1965. When Westminster's Semper Water Treatment Facility went on line seven years later, the Outlet Works building was outfitted with a 42-inch header to feed raw water to the new treatment facility. The large header left very little room for a metering device inside the building. A 42-inch venturi flow tube was selected to meter the raw water flow in this limited-space installation.

Over the years, the limitations of the venturi meter in this application became apparent. The city experiences a seasonal water demand characterized by an 8:1 change between summer and winter periods. The venturi's rangeability was closer to 5:1, with significant errors occurring during low flow periods. It was also discovered that other measurement errors were caused by turbulence created when different feeder line sizes were opened into the header, coupled with the close proximity of the metering device to the intersecting lines. These conditions created flow measurement errors ranging from 5 to 50 percent, depending on which feeder line was in use and the flow rate.

By the summer of 1992, the problem became critical. The Denver metro area had been experiencing tremendous growth, putting a strain on available water resources. The Farmers Irrigation Company decided the city needed to be more accountable for the water it used. It



The McCrometer V-Cone® Flowmeter.

proposed charging the city for water usage based on an average meter reading.

Two options considered

The city saw two ways of resolving the metering problem. One was to install a very expensive metering vault external to the Outlet Works structure. This would increase the space in which a meter could be installed, allowing for straight pipe runs to straighten turbulent flow before measurement.

The other option was to find a flowmeter that could operate within the restrictions imposed by the existing structure - i.e., turbulent flow created by main feed lines just 1/2 to 5 diameters upstream of the meter location, lack of straight pipe runs and a tight installation space.

Because of the expense of building an external vault, the city explored flowmeters that could retrofit into the existing installation. After evaluating a number of metering devices, it selected the McCrometer V-Cone® Flowmeter. Though based on differential pressure (DP) principles like the venturi, the V-Cone acts as its own flow conditioner. As a result, it can measure disturbed flow without the straight pipe run requirements of other measuring devices.

This capability makes the V-Cone suitable for limited-space and difficult-flow applications. The selection of the V-Cone

was also made for the following reasons:

- ♦ Its ability to condition the flow profile prior to measurement reduces the "noise" component of the DP signal. This allows for large turndown and better accuracy.

- ♦ It offers rangeability of 10:1.

- ♦ It offers accuracy of up to ± 0.5 percent of rate or better.

After approximately four years of operation and accumulation of flow data, the city has found the new flowmeter meets their expectations and has satisfied the demands of the owners of Standley Lake Reservoir.

Average errors for minimum and maximum flow rates have dropped to 2 percent from 10 percent, when compared against confirming metering sources.

The City of Westminster estimates it saved approximately \$10,000 by not having to build an external metering vault with electrical wiring, isolation valving, and structure and land development requirements. In addition, the new meter solved limited-space issues and eliminated safety concerns associated with building an external vault.

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