Monitoring Industrial Effluent Flow When High Turbidity, Solids, and Fibers are Present

Gujarat, India

TELEDYNE ISCO
Everywhereyoulook™

Environmental Case Study
Expertise in Flow

Overview

The LaserFlow™ Non-Contact Area Velocity Flow Sensor from Teledyne Isco provides accurate and reliable data with a maintenance-free sensor that is installed above the water. The LaserFlow is suitable for use in a wide range of levels and velocities. It is used in conjunction with the Signature® Flow Meter, a flexible, configurable flow meter for permanent discharge compliance monitoring.

Figure 1: LaserFlow Area Velocity Flow Sensor

Background

Grasim Industries Limited's Vilayat plant in Gujarat, India is a manufacturer of high-quality staple fiber and caustic soda. The environmentally conscious company treats approximately 13,200 m^3 of waste water per day from three production units. The effluent from each of these production units varies in their attributes. In order to optimize the treatment, accurate flow information from each unit is important. Wastewater from two of the production units is clear and without any solid particles; therefore, it can be easily pumped and measured with a closed pipe flow meter.

To reduce energy costs resulting from pumping, the effluent from the third production unit is sent to the treatment plant via gravity feed. The channel is 1.3 m wide and 1.8 m high. Therefore, the waste stream must be metered using an open channel method.

Challenges

Popular flow metering technologies and methodologies provided various challenges as detailed in the table below:

Technology/Methodology	Potential Issues
Weir with level measurement	Weirs frequently clog with solids content and require periodic cleaning to get accurate readings. This requires costly plant shutdowns.
Flume with level measurement	Building a flume to the dimensions of the channel is very expensive. It also requires a costly plant shutdown.
Area-velocity flow sensor (contact/in situ)	Debris and solid particles may cover the sensor and hinder velocity measurement.
Transit-time	Solid particles reflect the ultrasonic signal from the transmitter, blocking it from the receiver. It also requires a costly plant shutdown.

Solution

Teledyne Isco's LaserFlow Non-Contact Area Velocity Flow Sensor offered an ideal solution to the site's metering challenges. The above-water installation of this laser Doppler flow meter is not threatened by the list of potential issues above. Additionally, because it is installed above the water, the installation of the LaserFlow did not require a plant shutdown.

Figure 2: LaserFlow installed at Grasim Industries Limited

The LaserFlow remotely measures the level and velocity of the flow in the influent channel. By using an ultrasonic level measurement, the sensor calculates a subsurface point at which to focus an optical laser. The

Doppler frequency shift of the returned light is proportionate to the water's velocity. The LaserFlow is able to measure velocities at up to fifteen points below the water's surface. This minimizes the effects of turbulence and eliminates the need for manual profiling. By producing exceptionally accurate mean velocity readings and level measurements, the LaserFlow renders some of the most accurate area velocity measurement results in the industry. Additionally, due to the non-contact nature of the LaserFlow sensor, personnel safety is improved and operating costs are greatly reduced.

System Integration and Reporting

The LaserFlow, in conjunction with the Signature Flow Meter, collects level, velocity, and flow parameters that are outputted via 4-20 mA signals and received by the customer's distributed control system (DCS). These parameters are used in conjunction with others by the DCS to provide comprehensive process control throughout the facility.

The Signature is unique in its ability to verify data integrity as four of its logged data types cannot be altered and are designed to alert the user to any trends or anomalies. This makes the LaserFlow and the Signature excellent choices for creating regulatory compliance reports.

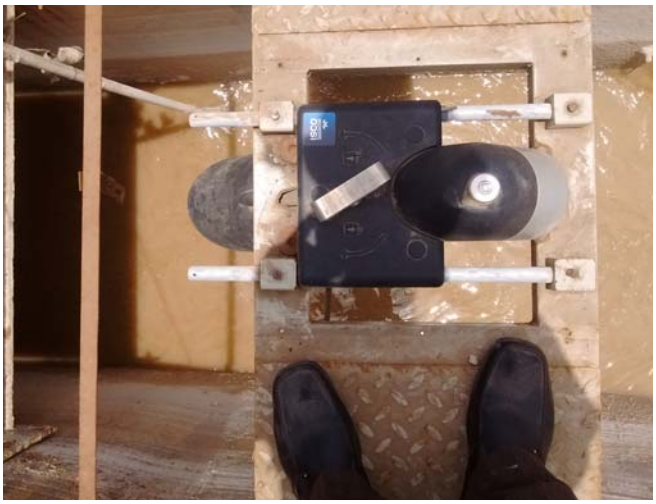

Figure 3: Accessibility of the non-contact LaserFlow

Customer Feedback

"We are satisfied with the performance and the readings from the LaserFlow meter. Since this flow meter is a non-contact instrument, less maintenance is necessary."

For more information on the Teledyne Isco TIENet 360 LaserFlow sensor, please visit our website: www.teledyneisco.com.

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