Monitoring Flow in a Toxic, Corrosive or Aggressive, Debris-Ridden Current

TELEDYNE ISCO
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Application Note
W-AN17

Non-contact vs. submerged flow measurement

Oftentimes, wastewater or industrial waste is toxic, corrosive or contains debris such as rock which would damage or destroy a submerged/wetted flow measurement sensor. In some instances, interaction with the sensor must be kept to a minimum due to safety concerns.

In these instances, a Teledyne ISCO LaserFlow® non-contact sensor for open channel flow measurement is the ideal solution. Suspended above the flow, a LaserFlow remains the most accurate and cost-effective way to measure flowrate in most open channel circumstances, whether small or large pipes, streams, rivers, sewers, stormwater, wastewater or industrial applications. An example is at a location where ore is mined.

Mine 'tailings'

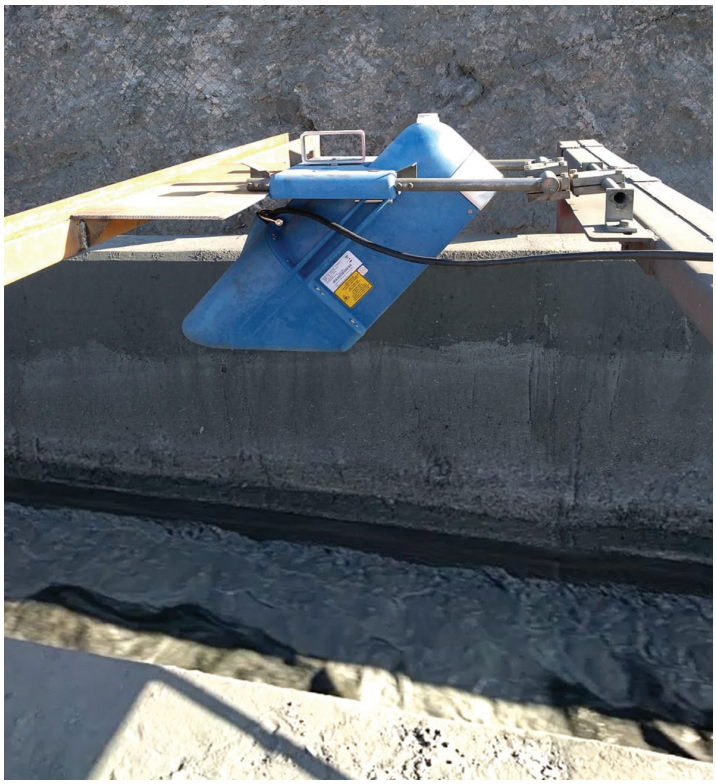
After ore containing an economically recoverable commodity is mined from the earth, that commodity is extracted in a processing plant or mill. After the commodity of value is extracted from the ore material, the resultant sludge is termed "tailings." These tailings are typically a mud-like material containing ground rock and chemicals used in the extraction process.

In this application, the objective was to calculate the total volume of tailing waste going to storage ponds. The data retrieved using a Teledyne ISCO Signature® flowmeter not only helps in plant management, but also in meeting operational and environmental regulatory requirements.

How it works

The tailings travel at a high rate of speed down a channel into a holding pond. By measuring the depth of the tailings in the channel and knowing the dimensions of the channel, the area filled with tailings is calculated. This depth is measured using an ultrasonic sensor on the LaserFlow that bounces a sound wave off the surface to determine the depth of the channel. The sensor also directs a laser beam to the proper depth below the surface, where 5,000 velocity readings are taken below the surface of the flow over a two-second period. The frequency of the returned light will shift from the transmitted signal. This shift, called Doppler shift, is used to automatically compute the velocity. The LaserFlow provides 15 individual velocity points of data for redundancy and accuracy.

Information gathered by the LaserFlow is transmitted to the Signature flowmeter, which supports a variety of measurement technologies, including equipment from other manufacturers. Signature records and transmits



LaserFlow sensor measuring the flow of ore tailings.

data via cellular communication, generates reports, and sends alarm notifications via text messaging or email when certain pre-programmed criteria are met. With a USB flash drive attached, you can quickly download diagnostic, program, history and summary reports, update firmware and connect devices, and download data files for use with Teledyne ISCO's Flowlink® data management software.

Results

The LaserFlow proved to be a safe, durable, long-term solution to measure the flowrate of the tailings without concern for toxicity or rocky debris in the effluent. The non-contact feature also meant the flowrate could be captured without having to shut down production to deal with a damaged underwater sensor. Once readings were taken, the Signature was found to be a reliable flowmeter producing a string of accurate results that could be automatically turned into detailed reports for monitoring and regulatory use.

LaserFlow sensor and Signature flowmeter installation at an ore mine.

LaserFlow®

A non-contact velocity sensor for open channel flow and level measurement

Standard Features

- Single or multiple point measurement below liquid surface
- Repeatable, reliable results
- Rugged enclosure with IP68 ingress protection
- Zero deadband from measurement point in non-contact level and velocity measurements
- Quality readings without manual profiling
- Bidirectional velocity measurement applications

Signature® Flowmeter

Comprehensive support for any flow measurement application

Standard Features

- Multiple simultaneous flow technologies
- SDI-12 and RS-485 Modbus input
- RS-485 Modbus output
- Rain gauge input
- Multiple parameter data logging
- Program and Summary Reports
- Data integrity verification
- Triggering, sampler enabling
- Compatibility with Flowlink® software

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