Case Study

Water CS39

Non-contact Flow Measurement at Wastewater Treatment Plant, Ankara, Turkey

Teledyne ISCO LaserFlow® sensors and Signature® flowmeters were installed at the inlet and overflow channels of the wastewater treatment plant in Ankara, Turkey. The non-contact laser technology was the first solution able to provide accurate and continuous flow measurement for the main WWTP channels.

Ankara Plant Site Challenges

The Ankara Central Wastewater Treatment Plant, designed to process domestic and industrial wastewater, is considered one of the world's largest wastewater treatment facilities, with a capacity of 765,000 m³/d, serving a population of 4 million. By 2025 it is expected to reach 1.380 k m³/d (PE 6 million).

Measuring the flow of the inlet and overflow channels is critical to ensuring the quality of the technological processes and the overall effectiveness of the plant. Several factors made obtaining an accurate and continuous flow measurement challenging:

- Varying flow velocities exceeding 2.5 m/s after an intensive storm event.
- Inlet screening for large debris located a short distance upstream of the inlet measuring point, negatively impacting the flow profile and causing surface turbulence.
- Untreated industrial and municipal wastewater containing significant concentration of solids and various chemical compounds.

The ability to install flow measurement equipment on large main channels working 24/7 was also a challenge and a major consideration when evaluating possible solutions.

LaserFlow Solution

The high concentration of solids in the inlet of the WWTP limited the choice of flow measurement technologies that could be considered. The use of AV contact sensors required time consuming and expensive maintenance work to ensure continuous operation, and was rejected. Another technology, using AV radar for surface velocity measurement, provided unsatisfactory results.

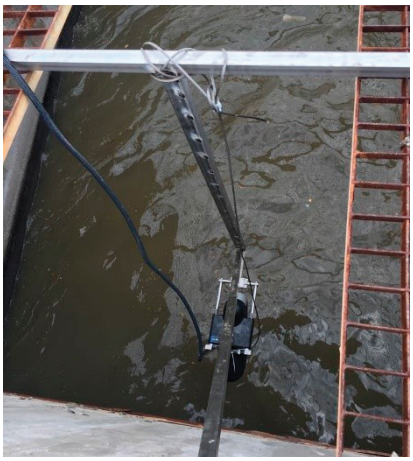


Figure 1: Teledyne ISCO LaserFlow demo installation at WWTP inlet channel

Enotek, Teledyne ISCO's distributor in Turkey, proposed a solution based on non-contact laser technology. The LaserFlow sensor, mounted above the channel, is able to measure velocity at multiple points of the flow profile below the water surface.

Testing occurred at the inlet of the plant for 4 months starting in October 2017. The LaserFlow sensor was located over a rectangular channel, 4.6 m wide, 4.0 m deep. Non-contact technology made the setup up quick and easy, without the need to rebuild the channel. The LaserFlow sensor readings were verified on site based on existing rectangular weirs located downstream. The trial provided enough data for detailed analysis of flow conditions and the performance of the Teledyne ISCO LaserFlow sensor.

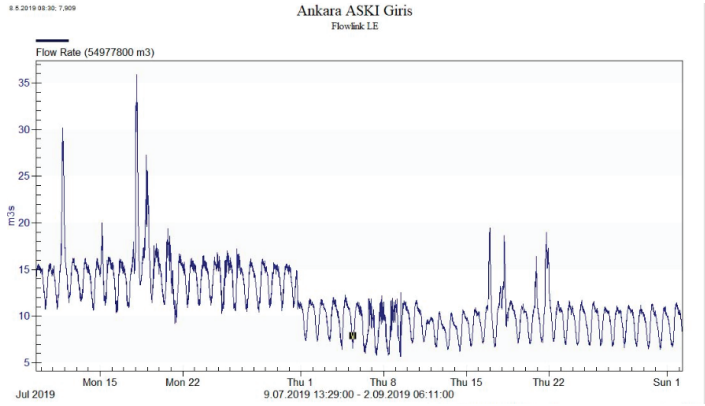
Figure 2: Teledyne ISCO LaserFlow over a 4.6 m wide by-pass channel

As a result of these tests, two Signature flowmeters were also permanently installed at the inlet of the WWTP and also on the 6 m wide rectangular overflow channel.

The customer estimated the non-contact LaserFlow technology provided a savings of €54,500, compared to installing a traditional flume system.

Flow Measurement Results

The graph below highlights the differences in daytime and nighttime flows, and the effects of rain. An important goal was to obtain level and velocity readings every 2 minutes.



Graph 1: Varying flows at WWTP inlet during dry weather and after rain events.

TIENet® 360 LaserFlow Sensor

The TIENet 360 LaserFlow sensor is an area-velocity flow and water-level measurement device that remotely senses flows in open channels using non-contact Laser Doppler Velocity Sensing and non-contact Ultrasonic Level Sensing technologies. The sensor uses advanced technology to measure velocity with a laser beam directed at single or multiple points below the surface of the wastewater stream. Therefore, unlike radar technology, it does not require the creation of ripples on the surface of the stream.

- Zero deadband from measurement point in non-contact level and velocity measurements Continuous measurements in submerged conditions
- Advanced velocity diagnostics for data quality evaluation and analysis
- Bidirectional velocity measurement
- Low level velocity measurement

Signature® Flowmeter

The Signature flowmeter from Teledyne ISCO, designed for open channel flow monitoring, supports flow measurement methods including bubbler, non-contact laser area velocity, ultrasonic, and submerged Doppler ultrasonic area velocity.

With the ability to connect up to 9 sensors, the Signature flowmeter provides a broad range of I/O and communications options:

- pH and temperature
- SDI-12
- RS485
- 4-20 mA output
- Ethernet
- GSM/GPRS modem

The Signature flowmeter is rugged (IP 66) even if the cover of the lid is open. It performs data logging with variable rate data storage and data integrity verification, and has the ability to connect a USB drive for data/report retrieval and programming.

About Teledyne ISCO

Teledyne ISCO is a leading manufacturer of a wide range of innovative products designed to increase productivity while improving the quality of life on our planet. Our standard and customized products are used across multiple sectors including water and wastewater, pharmaceutical, academia, oil exploration, and reactant feed. Teledyne ISCO is continually improving its products and reserves the right to change product specifications, replacement parts, schematics, and instructions without notice.

For further information contact your local Teledyne ISCO representative.

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