Online SAC_{254} Measurement Provides Rapid Detection of Load Changes in Dairy Processing Discharge

Background

The waste water outlets from milk processing facilities are subject to requlatory requirements. A dairy discharging into the municipal sewer must meet its discharge permit limits. Similarly, a pre-treatment facility or the receiving public works facility must continually monitor the loading profile for efficient and effective operation. Continuous monitoring at any facility allows early detection of load peaks beyond rated limits and the proper reaction that eliminates operational upsets in subsequent treatment. Loading variations are detected easily by monitoring the stream SAC, or Spectral Absorption Coefficient.

Practical experience

During the processing of milk and dairy products, heavily loaded process wastewater can be discharged from the processing facility, feeding the influent to the wastewater treatment plant. Loading peaks can occur rapidly and, undetected, create performance problems for the receiving treatment plant.

For practical purposes, only random samples or mixed samples can be collected and measured in the laboratory to determine Chemical Oxygen Demand (COD). Continuous measurement of stream SAC, however, detects all peak loads without gaps or delay (Figure 1) and allows immediate and targeted process adjustment.

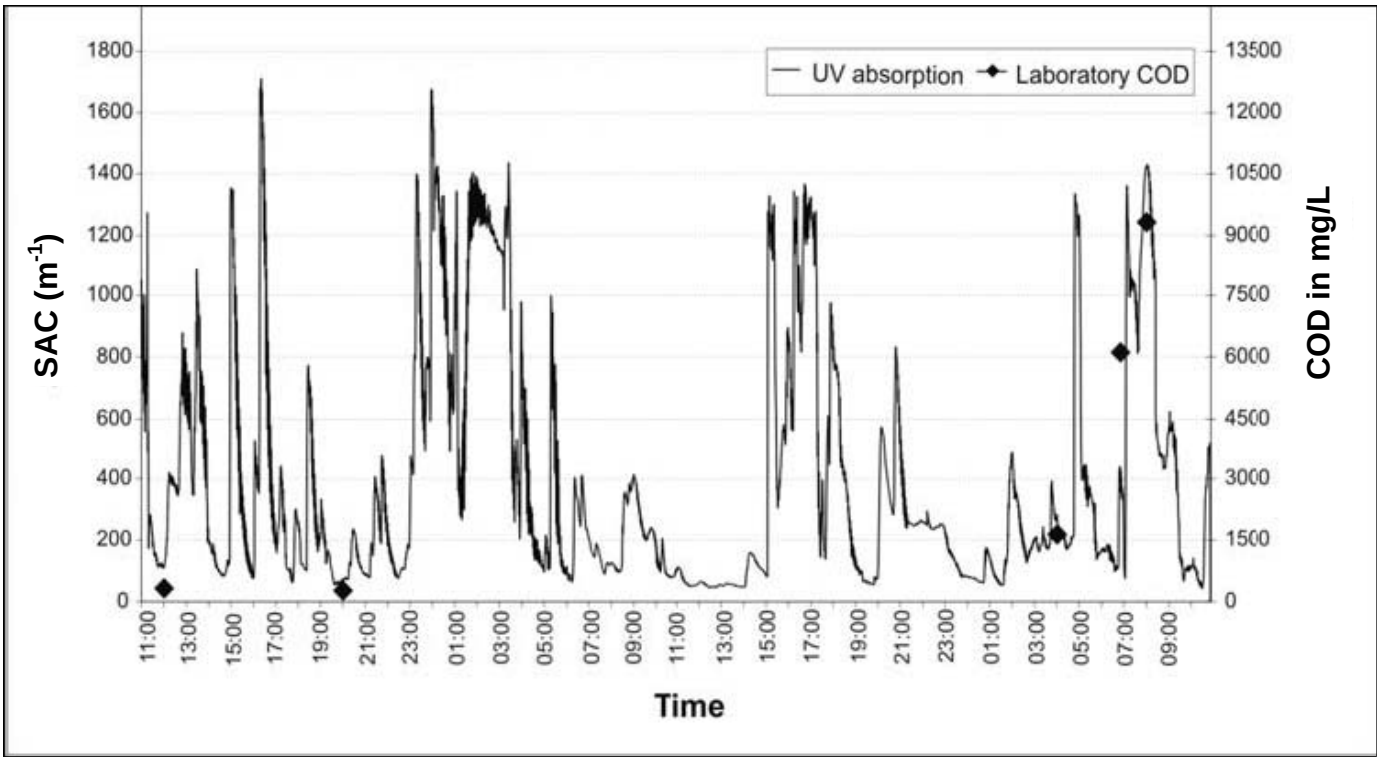

Figure 1 – Discrete laboratory Chemical Oxygen Demand (COD) readings correlate with continuous SAC measurement of feed load – yet do not detect possible excursions that occur between manual measurements.

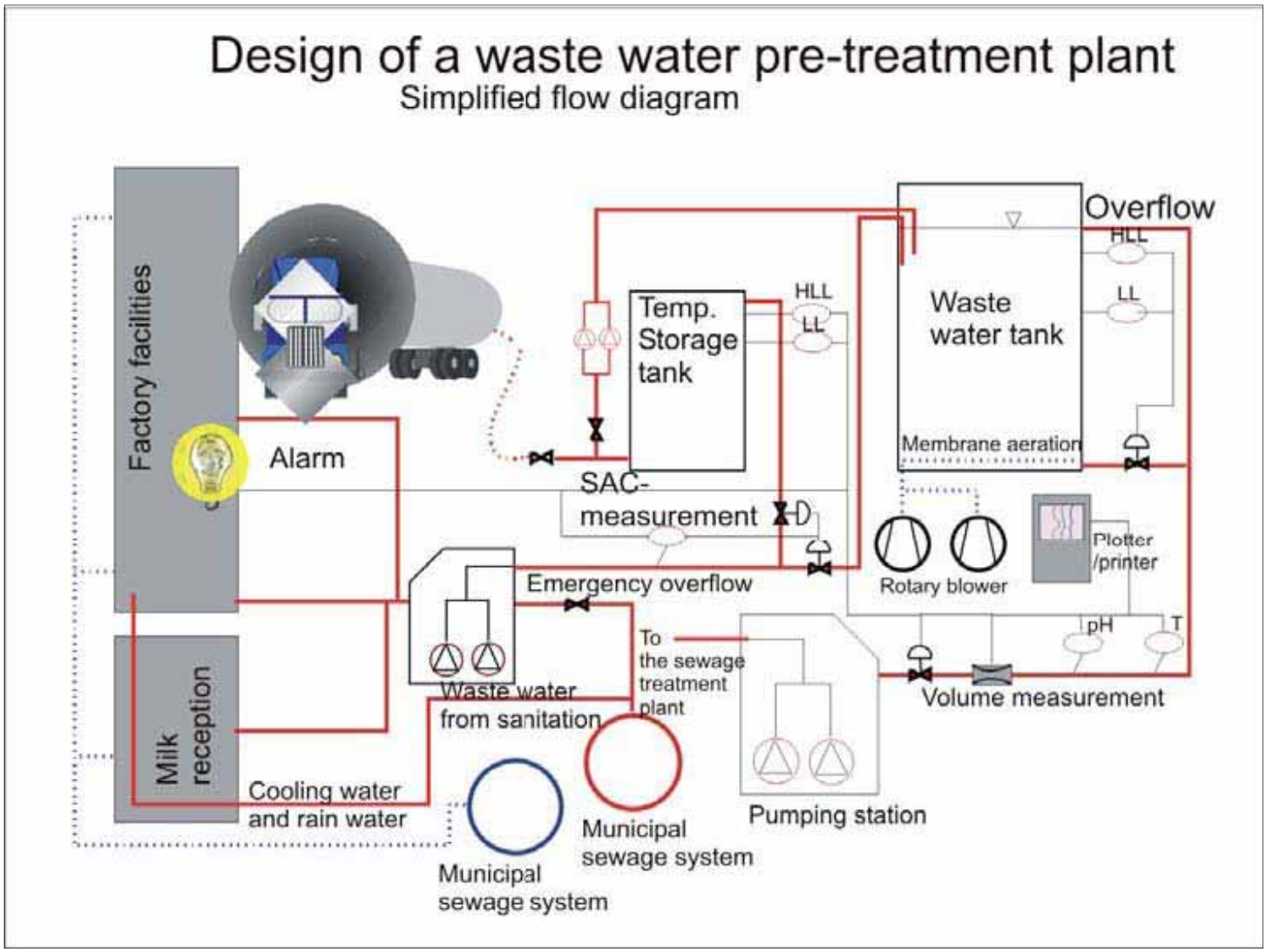

Figure 2 – Scheme for a wastewater treatment plant in the dairy industry

For example, signal output from a continuous-reading SAC monitor can automatically control a diversion gate that separates waste water with a high load; see Figure 2. This tactic allows the high-load water to be held temporarily in a storage tank where it can be fed to the wastewater tank in small amounts when the load is lower. The subsequent wastewater treatment plant, municipal or private, sees a more consistent feed load.

Functional description and measuring principle

The Hach UVAS sc Sensor is immersed directly in the stream or bypass to continuously measure SAC_{254}, a parameter that reflects total dissolved organic substances, or organic load, in the wastewater; see Figure 3. Measurement is based on UV absorption, so no chemical reagents are needed. The probe's integral wiper blade automatically cleans the sensor. Measuring interval can be adjusted to suit specific requirements.

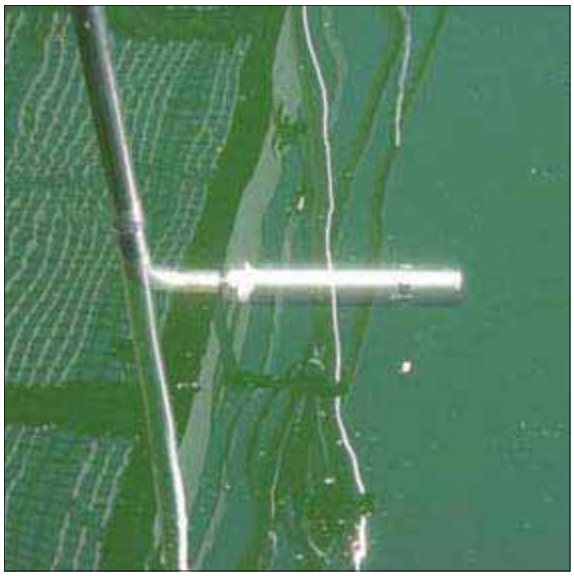

Figure 3 – The Hach UVAS sc Sensor measures SAC without sample collection or reagents

Product Application

sc100 Controller

- Universal controller for wall, pipe or switch panel installation
- Accommodates two digital sensors using splash-proof connectors
- Two analog current outputs, three floating changeover contacts (5 A 115/230 V AC, 5 A 30 V DC), digital interface for ModBus® integration

sc1000 Controller

- Universal controller consisting of a portable display module and probe module receiving up to eight digital sc Sensors using splash-proof connectors
- Several probe modules can be networked
- Modular configuration suits specific requirements and can be expanded with further measuring points, sensors, inputs and outputs, and bus interfaces.

UVAS sc Sensor

- Precise, self-cleaning online probe for delay-free measurement of dissolved organic substances (SAC) in water, without reagents or sample collection
- Provides high accuracy and resolution
- Measuring cycle can be set between 30 sec and 1 hour

This application solution note is one of several Hach documents describing wastewater process control based on continuous SAC measurement. For more detail, refer to:

"Continuous SAC_{254} Determination of Organic Pollutants Supports Management of Municipal Collection Systems," Hach Application Solution AS-SAC1

"Continuous SAC_{254} Determination of Organic Pollutants Is Key in Real-time Wastewater Treatment Control," Hach Application Solution AS-SAC2

"Continuous SAC_{254} and TOC Measurement of Airport Runoff Streamlines Separation of Polluted and Unpolluted Water," Hach Application Solution AS-SAC3

"Online SAC_{254} Measurement Yields Operational Savings in the Paper Production Ozone System," Hach Application Solution AS-SAC4

"SAC_{254} Sensor Provides Reagent-free, Sampling-free Monitoring of Organic Materials in Drinking Water Treatment," Hach Application Solution AS-SAC5

"SAC_{254} as an Oxygen Demand Predictor: the Relationship and Correlation of Oxygen Demand Parameters and SAC," Hach Application Solution AS-SAC6

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