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Monitoring IWW Effluents with FP 360 sc Oil-In-Water Sensor - Application Note

By Dr. Vadim Malkov and Dr. Dietmar Sievert

Test Description

In a glass production plant, wastewater from different sources within the plant area is collected to one single stream and sent out to a municipal wastewater treatment plant. The wastewater stems from different sources in bottle glass production, including glass recycling. In the production process more than 10 different types of oil are used, e.g. as lubricants for pumps. Process and wash waters can easily come in contact with these oils. In addition, rainwater hitting the truck loading and fuel oil tank areas is added to the normal wastewater stream from the plant.

High oil concentrations in the wastewater have to be avoided in order to protect the sewer system and the biological stages of the municipal wastewater treatment plant. Therefore the final wastewater stream is passed through an oil/water separator. Water authorities set a threshold value of 20 ppm (mg/L) total oil in water after the separator. This was checked by grab sample analysis once a week. Typical lab results found oil in the low ppm range (<5 ppm).

In order to reduce the number of lab analyses and to allow for continuous monitoring of mineral oil contamination of the wastewater stream, a Hach Lange FP 360 sc probe was installed in an inspection chamber close to the final wastewater discharge outlet. Due to its high sensitivity to low ppb levels of OIW and specificity to Polycyclic Aromatic Hydrocarbons (PAHs) - a typical mineral oil component - the sensor is capable of providing an early warning with low interference from particles and/or other components in the wastewater. The probe was installed by using a stainless steel chain mounting set. (Figure 1)

Figure 1. FP 360 sc oil-in-water probe installation in inspection chamber after oil/water separator

During the first four weeks, multiple grab samples were taken and compared to the sensor readings. A factor could be derived from these readings and the lab results, allowing to calibrate the sensor and display its readings as “ppm OIL” directly (e.g. with a factor of 34, a reading of 100ppb PAH is displayed as 3.4ppm OIL). Because the exact composition of the oils coming from different sources in the plant is not predictable and variations of the factor may be significant, a warning level was set to 15 ppm OIL. Typical readings were below 4 ppm OIL as shown in the diagram (Figure 2).

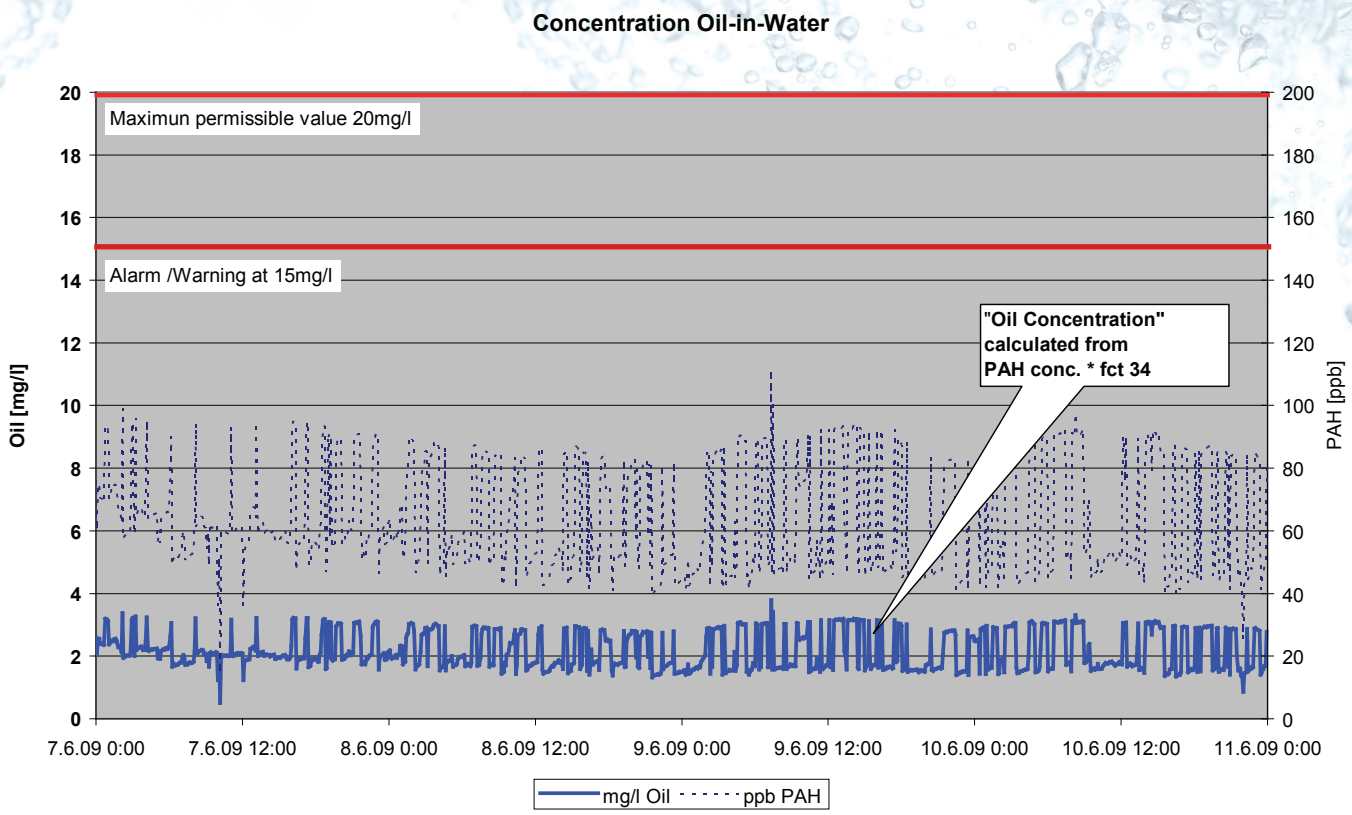

Figure 2. FP 360 sc readings displayed as ppb PAH and mg/L OIL

In the first two weeks of the test, the measuring window had to be cleaned manually every 3-5 days. To overcome quick fouling the air blast cleaning system was added (Figure 3). Oil-free compressed air for the cleaning system was supplied by a High Output Air Blast (HOAB) unit managed by the same Hach Lange sc1000™ controller that was used for the sensor. Cleaning was performed automatically for one minute every hour. During next 10 weeks of operation no additional manual cleaning was necessary.

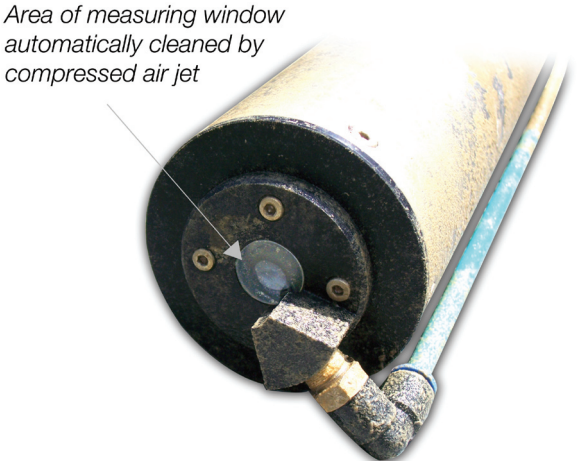

Figure 3. Head of FP 360 sc oil-in-water probe with air blast cleaning system…

Test Conclusions

The test demonstrated significant improvements in Oil-in-Water monitoring of industrial wastewater in comparison to the weekly grab sample analysis method. Continuous readings could be achieved with the FP 360 sc probe allowing for consistent real-time monitoring of the wastewater. Even with multiple oils present in the water a good correlation to lab results could be achieved. Maintenance effort could be minimized by using the automatic air blast cleaning system.

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Vadim Malkov *(Ph.D. Organic Chemistry, Kazán State University, Russia) joined the Research and Development division of Hach Company (Loveland, CO) in 2002. His work includes experimental studies in the area of process analysis of water quality in the industrial and municipal applications and he has more than 20 years of experience in various fields of chemistry. He has led and participated in development of several new process analyzers and applications in the area of water disinfection and corrosion control. He has published more than fifteen papers in scientific and professional journals as well as one US patent. Dr. Malkov has presented the results of his work at numerous conferences in the United States and abroad. He is currently working as a Product Applications Manager for the Process Instrumentation Business Unit (Hach Company). Phone: 970-663-1377 x 2689, vmalkov@hach.com*

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