

Steinbeis decides for TOC monitoring with Hach BioTector B7000i

Problem

A TOC-Online analyser in the inlet of a wastewater treatment plant at a recycling paper manufacturer had to be replaced because the device was old and the measuring range was frequently exceeded. Initially a TOC online analyser with high temperature combustion technology was installed, but it was not able to cope with the difficult wastewater matrix reliably.

Solution

A two channel TOC-Online Analyser Hach BioTector B7000i succeeded in easily measuring the TOC content at the inlet and outlet of the wastewater treatment plant. The implemented oxidation process allows the use of large diameter sample tubes and representative sample volumes. This and the self-cleaning function led to reliable and trouble-free operation of the device despite high chloride and calcium loads.

Benefits

The TOC-Online Analyser HachBioTector B7000i is low maintenance and has a high uptime, despite the difficult matrix due to high chloride and calcium concentrations in the wastewater. The local authorities have agreed to accept the measured TOC-values for reporting as soon as the correlation between TOC and COD has been shown.

Background

Steinbeis Papier GmbH is a German manufacturer of printer and magazine paper made from 100% recycled content. The company has approx. 350 employees with a production capacity of about 300,000 tons of paper per year. Steinbeis Papier obtains its process water from a major river and discharges it back into the river after cleaning it with a two-stage aerobic treatment process in the company owned, purely industrial wastewater treatment plant. The Hach equipment used on-site include instruments for online monitoring of TSS and ammonium in addition to a Buhler 4011 sampler and DR3900 in the laboratory.

A new TOC device was needed

At Steinbeis Papier the control of the clarification process was automated with an online TOC unit from Hach at the inlet of the wastewater treatment plant. The TOC values, which showed a good correlation with BOD5, were passed to the process control system. The process control system managed the dosage of urea and phosphoric acid in real-time based on volume flow, ammonia levels and TOC values to ensure an optimal nutrient ratio. The company was very satisfied with this solution for many years, but the measuring range of the TOC

instrument used (ASTRO-TOC) was often insufficient and the instrument needed to be replaced due to its age to ensure ongoing reliability of the online TOC values which are essential for the precise control of the plant and trouble-free TOC degradation. They decided to install a new TOC online analyser which would measure the TOC content in the inlet and outlet of the wastewater treatment plant.

First, a unit with high-temperature combustion oxidation at 1,200°C (without catalyst) was installed. Due to the demanding wastewater matrix the commissioning of the device was difficult, and it took about 8 weeks until it delivered usable measurements. Then, after only 14 days, blockages occurred caused by deposits in the reactor.

To remove blockages in TOC devices with high-temperature combustion oxidation, the device must be switched off and the oven needs to cool down. Afterwards the reactor must be manually cleaned before the device is restarted. The whole process takes about 8 hours. During this time no measured values are available, and the clarification process cannot be controlled based on measured values. Even failures cannot be detected during this maintenance work and the responsible employee is bound for several hours.

Solution

TOC Monitoring with Hach BioTector B7000i

Instead of the high temperature TOC instrument, an online TOC analyser Hach BioTector B7000i was installed. "The BioTector simply ran after start-up" says the Steinbeis sewage plant manager enthusiastically. Since then, the device has been delivering its measured values reliably without any problems and without manual cleaning.

At Steinbeis, a 2-channel device is used which monitors both the influent and the effluent wastewater of the treatment plant. The local authority has agreed to approve the reporting of organic residues through TOC values once the correlation between TOC and COD values has been demonstrated.

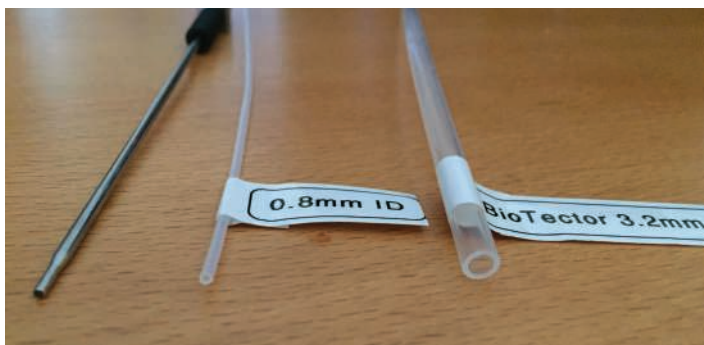
An important advantage of the Hach BioTector B7000i is the automatic cleaning of the reactor and sample tubes after each measurement. It prevents blockages and carry-over, even with difficult sample matrices, such as fiber loaded samples. The oxidation of the organic carbon takes place in the BioTector at room temperature in the liquid phase. Salts generally remain dissolved and are flushed out of the device after the reaction so that there are no restrictions due to deposits. As a result, frequent manual cleaning and re-calibration of the device are not necessary.

As a result, downtimes are effectively prevented, and TOC values are permanently and reliably generated with high measuring accuracy. The instrument only needs to be recalibrated every 6 months as part of scheduled maintenance which is taken care of by a service contract with Hach in Steinbeis' case. During the reagent change, which is necessary every 4 weeks, the instrument doesn't need to be switched off and can continue to run.

Overall, the Hach BioTector B7000i has a certified measurement availability of 99.86% (Mcert). This corresponds to a plannable downtime of 12h/year in total.



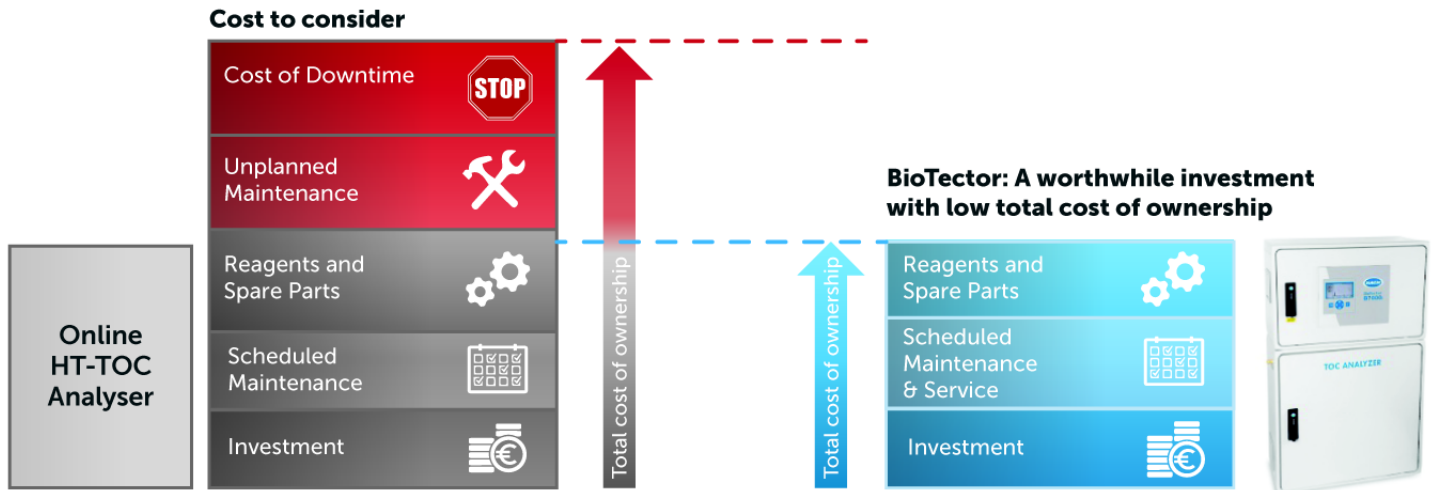
Installation of the TOC Analyser Hach BioTector B7000i at Steinbeis.



Right picture: Hach BioTector sample tube with 3.2mm inner diameter offers safety against blockage.

Left picture and center: Tubes with small inner diameter (0.8mm) used in conventional TOC instruments.

Unlike other TOC technologies, the Hach BioTector B7000i uses large sample tubes with a diameter of 3.2 mm. This provides a good particle passage and a high degree of security against clogging. As a result, sample filtration is not necessary for soft particles up to 2 mm. In addition, a large and therefore representative sample volume of up to 10 ml is used, which ensures a high accuracy of the measurement. Variations due to very small sample volumes can thus be avoided.



Costs to consider when determining the total cost of ownership of TOC analysers

Conclusion

To efficiently control a clarification process based on TOC values, the measured values must be reliable and accurate. Only then can the right amount of nutrients be added to the wastewater to ensure that the bacteria perform optimally. In addition to a high availability of measured values and the initial cost of a TOC-Online analyser, maintenance costs and personnel expenses play a key role. Wastewater from the paper industry is often demanding with high loads of salts and other additives which can lead to malfunctions due to blockages in equipment with high-temperature oxidation, resulting in high maintenance requirements and downtime. The Hach BioTector B7000i TOC analyser has been specially developed for such difficult wastewater matrices. Despite high dirt and salt loads, it delivers reliably accurate readings with low maintenance requirements.

The Online TOC Analyser Hach BioTector B7000i is:

- **Trouble-free** – salt contents up to 30% does not interfere or lead to blockages.
- **Reliable** – certified availability of measurements of 99,86% (Mcert).
- **Low maintenance** – 6-month maintenance interval: Maintenance contract with first-class service available from Hach.
- **Highly accurate** – due to the representative sample volume of 8-10ml.
- **Robust** – large 3.2 mm sample tubes provide security against clogging. Therefore, no filtration is required for soft particles up to 2 mm in size.
- **Free of drift and carryover** – due to automatic cleaning of reactor and sample tubes after each measurement.



About the Customer

Steinbeis is a manufacturer of printer and magazine papers from 100% wastepaper with a production capacity of 300,000 tons per year.

Region: Germany, Europe



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